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20th International Congress of Nutrition

Granada, Spain, September 15–20, 2013

Abstracts

Guest Editors
A. Gil, Granada
J.A. Martínez, Pamplona

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*Contains the Abstracts of the
Nutrimenthe International Conference
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Guest Editors

C. Campoy, Granada
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Editorial

Dear Participants,

The 20th International Congress of Nutrition (ICN) is organized under the auspices of the International Union of Nutritional Sciences (IUNS) by the Spanish Society of Nutrition (SEÑ). To organize the IUNS 20th lCN at these times of economic and financial crisis has been a big challenge. Notwithstanding, at the same time it offered us the unique opportunity to bridge the multidisciplinary areas of nutritional sciences, particularly basic and applied research activities all around the world. Furthermore, this Congress provided a broad platform to discuss experiences gathered at multinational and global levels in the fields of nutrition research, human nutritional requirements, role of nutrition in the promotion and prevention of chronic non-communicable diseases and nutrition education, as well as in the composition of foods and the role of bioactive food components on health and well-being at different food cultures. Likewise, food safety and consumer protection and food production and environment sustainability are major aspects related to food science and nutrition worldwide that are approached. Therefore, we planned a comprehensive congress under the theme" Joining Cultures through Nutrition" to convey nutrition and healthy lifestyles for everyone in a sustainable environment'.

Being conscious of the broad range of professionals working in the different fields of nutritional sciences, the 20th ICN features a 'Track' design of audience segmentation by grouping the related sub-themes and ensuring the inclusion of sessions from scientific knowledge to applications. The main tracks are:
1: Advances in Nutrition Research
2: Nutrition Through Life Course
3: Public Health Nutrition and Environment
4: Nutrition and Management of Diseases
5: Nutrients and Nutritional Assessment
6: Functional Foods and Bioactive Compounds
7: Food culture practices and Nutritional Education
8: Agriculture, Food Science and Safety

The scientific program comprises 6 plenary lectures, 32 special lectures, 4 debates, 90 parallel symposia, 38 sponsored symposia and 16 Satellite Symposia.

The response to the proposed scientific program was very encouraging. In addition to the invited lectures, we received about 3570 submissions, 96% of which have been accepted. 347 correspond to invited speeches for Paralleled Symposia (30% did not deliver any abstracts), 193 have been selected to be presented as Oral communications and 3223 as e-posters. All submitted abstracts were peer-reviewed by at least two independent reviewers blinded to authors and institutions from the International and Local Scientific Committees. The number of entries in the list of abstract is higher than 17000. An effort has made to assure the involvement of speakers and participant from all continents and countries, including nutrition and food specialists in research, academia and industry as well as policy makers with a gender balance and applicability for all societies

In the present Supplement of Annals of Nutrition and Metabolism only the abstracts for Parallel Symposia, Oral Communications and Posters are published. In addition, the abstracts corresponding to the International NUTRIMENTHE Conference, which has been held as a Satellite event of the 20th ICN, are also published. The Plenary Lectures and Special Lectures will be published later on in full in a Supplement of Advances in Nutrition available on-line to all 20th ICN participants.

The 20th ICN wish to recognize and thank the importance of the participation of young investigators and nutrition professionals from developing countries. Travel grants, registration fee and accommodation for selected young investigators and other awardees were made possible by contribution from international agencies and foundations and private sectors. A special fee rate for students and participants from low- and middle income countries was offered to encourage their participation.

We would like to express our sincere appreciation to all participants and particularly to invited speakers and national and international experts and delegates whose contributions, participation and interest make this congress a successful forum for sharing and exchanging knowledge in nutritional sciences for the benefit of the whole world.

Prof. Angel Gil
Congress President and Chairman of the Organizing Committee

Prof. J. Alfredo Martinez
President of the Scientific Committee

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T1 ADVANCES IN NUTRITION RESEARCH

NPS1-1 Early life nutrition intervention: Effects on long term health and function

EARLY NUTRITION PROGRAMMING OF ADULT HEALTH: OPPORTUNITIES FOR THE PREVENTION OF OBESITY AND ASSOCIATED DISORDERS

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Child growth reflects health and nutrition. In addition to growth faltering, effects of excessive growth on child health get increased attention. Rapid weight gain in the first two years pre-dicts later obesity risk. Breastfeeding protects against rapid weight gain and may reduce obesity risk at school age by about 20%, relative to early formula feeding. We followed the "Early Protein Hypothesis", i.e. the lesser protein supply of breast milk is causative. In a mul-ticentre RCT, term infants were fed isoenergetic formulae with higher or lower protein during infancy. Length was not affected but weight-for-length and BMI were lower at 24 months of age in the lower protein group and similar to a breastfed reference group. There was a per-sistent effect on lowering later BMI and a marked risk reduction for obesity up to early school age. Based on current evidence, the timing of starting complementary feeding at four or six months does not affect obesity risk, but there are indications for adverse effects of high in-takes of energy, protein and sugar with complementary feeds. We conclude that breastfeed-ing has a modest protective effect against obesity. Infants not breastfed should get formulae with reduced protein contents. The use of cows' milk (rich in protein) as a drink should be avoided during infancy.

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Key words: Child growth, nutrition programming, obesity, breastfeeding, complementary feeding

THE SOUTHAMPTON WOMEN'S SURVEY: FROM EPIDEMIOLOGY TO INTERVENTIONS AND POLICY

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Introduction: Observational mother-offspring cohort studies inform our understanding of early life influences on offspring health. Findings can inform the design of new intervention studies. Observational studies can also lead directly to policy changes, but such changes need formal evaluation.

Methods: The Southampton Women's Survey (SWS) is a longitudinal birth cohort with data collected on the mothers before conception. 12,583 women aged 20-34 years were assessed when not pregnant; 3,159 were then followed through pregnancy and the children are followed-up.

Results: Maternal vitamin D insufficiency in pregnancy was associated with markers of impaired bone development and with greater adiposity in the children. Women's educational attainment was strongly related to the quality of their diets before conception, which in turn predicted the quality of the diets of their infants and children. Variations in infant diet were related to body composition at the age of four years. Our findings have led to intervention studies. Firstly, we are conducting a randomised controlled trial of vitamin D supplementation in pregnancy (MAVIDOS). Secondly, in relation to our diet quality findings, we are conducting a complex intervention, in collaboration with local policy makers, in which staff working in centres for women and children in disadvantaged areas are trained to engage in 'healthy conversations' with young women visiting the centres, to enable them to improve their diets and lifestyles (Southampton Initiative for Health). A school intervention to increase science and health literacy (LifeLab) has been developed and will be evaluated in a cluster randomised trial.

Conclusion: The SWS, a large mother-offspring observational cohort study, has led to the development of interventions to improve health of women and their children. These are being evaluated to inform public health policy, locally, nationally, and internationally.

Key words: Maternal nutrition, infant nutrition, vitamin D

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LONG-TERM EFFECTS OF EARLY LIFE MICRONUTRIENT INTERVENTIONS IN UNDERNOURISHED SETTINGS

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Fetal and postnatal nutritional environments are important predictors of later cardiometabolic and other functional outcomes. Micronutrient deficiencies in early life may have important long term effects; plausible mechanisms and pathways of action have been derived from the existing animal and in vitro models. These relationships have been examined in settings where the burden of mcronutrient deficiencies is high and opportunities for follow-ups of birth cohorts and interventions exist. Studies that have examined the effects of prenatal micronutrient intervention effects on outcomes of blood pressure, insulin resistance and obesity have found mixed results. For example, prenatal multiple micronutrient supplementation in randomized trials have found no effect (Mexico), decrease (Nepal) or increase (Bangladesh) for the outcome of blood pressure. In one trial in Nepal, prenatal folic acid supplementation resulted in reduced risk of microalbuminuria and metabolic syndrome, whereas prenatal zinc with iron-folic acid supplementation increased height, and reduced adiposity compared with the placebo. Studies have also observed long term survival benefits for micronutrient interventions in some of these studies. Recently preconceptional multiple micronutrients produced alterations in methylation patterns in genes involved in infection related immune response in a study from the Gambia, which may provide a potential link to the beneficial impact of micronutrients on long term survival. Additionally, preconcpetional vitamin A resulted in improved lung volume and prenatal iron-folic acid benefitted neurocognitive function in school age children in rural Nepal. This overview provides an update on the recent literature related to the critical role of micronutrients in long term survival, cardiometabolic health and other functions in low-middle income countries.

Key words: Micronutrients, pregnancy, metabolic syndrome, preconceptional

ANTENATAL DIETARY EXPOSURES AND NUTRITIONAL STATUS ON OFFSPRING HEALTH IN UNDERNOURISHED SETTINGS

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Inverse associations between size at birth and later risk of cardiovascular disease and/or risk factors are well established and interpreted as showing the long-term effect of environmental exposures operating in early life. Fetal growth restriction in this context is thought to reflect nutritional insufficiency during in utero development. Most published evidence in support of a link between antenatal nutritional exposures and long-term health comes from industrialised countries. However, one might predict the worst case scenario in populations with widespread undernutrition, yet undergoing a nutrition transition away from the traditional diet and lifestyle. Understanding associations between maternal dietary status on offspring health is thus critical, for appropriate targeted nutrition. In this presentation, I will review the evidence linking dietary exposures and nutritional status during pregnancy on offspring health outcomes in undernourished settings.

Key words: antenatal diet, fetal growth, developmental origins, cardiovascular disease

PS1-1 Developments in personalized nutrition: What's next? (Food4me Project) Challenges and opportunities for personalised nutrition business models

EXPLORING FUTURE OPPORTUNITIES AND BARRIERS FOR BUSINESS MODEL CONCEPTS IN PERSONALIZED NUTRITION

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Our societies have to find ways to release the pressure on healthcare budgets from the consequences of unhealthy lifestyles and dietary behavior. As the science on the genetic basis and metabolic dynamics that control the relation between food and health progresses, the difficulties of achieving the lasting dietary behavior change where needed still presents a daunting problem and is mainly due to the inherent individual

dimension of food choice and the concept of health. Personalized nutrition is a new approach that may help to overcome this problem by matching dietary advice with health requirements at a more individual level. Food4me has explored theemerging personalized nutrition offerings in the market and the barriers and opportunities as currently perceived from a consumer, industrial as well as societal perspective. This resulted in the development of a personalized nutrition system that describes the characteristics of a personalized nutrition concept and how it is influenced by its environment (societal, technical, commercial, political, legal, ethical, psychological). In order to use this to explore possible novel business model concepts, future scenarios were created to explore how value patterns around nutrition and health could shape future European societies by 2030. With two variables 'logic of healthcaresystems' and 'concept of health' defining the scenario space, for scenarios have been created: 'Super Sister', 'My health My Home', 'Me Inc' and 'Nudging World'. They will serve in the next steps of the project as a rich background to design novel business model concepts and to evaluate barriers and opportunities.

Key words: Personalised nutrition, business models, future scenarios.

PERSONALISED NUTRITION INTERVENTION, HOW EFFECTIVE IS PERSONALISED NUTRITION ADVICE?

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There is ample evidence from observational studies that dietary patterns are associated with many aspects of health but there is limited evidence about which interventions are most effective in achieving sustained changes in eating behaviour. The current "one size fits all" approach to nutrition interventions may be less effective than interventions which are stratified or personalised. In the Food4Me Proof of Principle (PoP) Study we are testing the hypothesis that personalisation of nutrition advice enables participants to make more appropriate, and sustainable, dietary behaviour changes. We are personalising dietary advice based on 3 types of information i.e. current (habitual) diet, phenotype and genotype. Participants in the PoP Study are randomised to one of 4 treatment limbs i.e. Level 0: Conventional (non-personalised) dietary advice; Level 1: Advice based on current dietary pattern; Level 2: Advice based on diet and phenotype (anthropometric characteristics and nutrients and metabolites in blood); Level 3: Advice based on diet, phenotype and a panel of genotypic variants. In addition, participants in Levels 1 – 3 are randomised to more or less intensive intervention. The Food4Me PoP is being undertaken in 7 European countries and we aim to recruit 1280 participants. A novel aspect of this study is that we are using web-based protocols for participant recruitment, for data collection and for personalised feedback to participants. The latter is based on a set of algorithms which we have developed specifically for the PoP study. The primary outcome from the study is change in dietary intake (eating behaviour) which will be measured at 6 months. We are also recording changes in physical activity, in anthropometry and in blood-based biomarkers of nutrient status and health. We will use the experience of the PoP Study to evaluate and to refine the algorithms which we have developed for providing "automated" feedback.

Key words: Dietary intake, eating behaviour, personalised nutrition, phenotype.

IS IT RIGHT? THE ETHICAL AND LEGAL IMPLICATIONS OF PERSONALISED NUTRITION

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Do we know enough for offering personalized nutritional advice?

On the one hand the scientific evidence for personalized nutritional advice is limited, and motivation is not yet well understood. On the other hand, standard population based dietary advice is usually not proven by clinical trials. How can we responsibly go forward in such a situation characterized by limited knowledge and disagreement? How can personal, cultural and scientific perspectives on food and health be integrated? Food is not only nutrition, but it is connected to social contexts, cultural values and identities. Likewise, health may be seen as instrumental in relation to individual life plans. The ethical challenge is how to integrate individual, cultural and scientific perspectives of food as well as health.

How does personalized nutrition affect individual autonomy?

The individualization of health promotion brings to the fore the dilemma of individualization, caused by a conflict between the right to individual freedom and societal interests. Also, a certain amount of trust is necessary, as the consumer has no possibility to entirely verify the scientific basis for personalized nutrition offerings. Trust requires trustworthiness, which cannot be enforced, but must be deserved.

Which urgent ethical and legal matters stand out when personalized nutrition is commercialized?

Consumers often have a positive attitude to the option of receiving personalized nutrition advice based upon genetic testing. However, current direct-to-consumer offerings over the Internet suffer from a questionable level of truthfulness. From an ethical point of view, consumer protection is crucial, and caution must be taken when putting nutrigenomic-based tests and advice services on the market. Current Internet offerings appear to reveal a need to further guarantee legal certainty by ensuring privacy, consumer protection and safety.

Key words: Personalized nutrition, ethics, values, dilemmas, legal issues.

PS2-9 Biomarkers of nutrition for development: An overview BOND

ADDRESSING CROSS-CUTTING ISSUES

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During the course of the BOND process several issues were identified that cut-across the range of nutrients being considered, one of them being the impact of inflammation on selection, use and interpretation of nutritional biomarkers. To address this real need, the Inflammation & Nutrition Science for Program/Policy: Interpretation of Research Evidence (INSPIRE) Project was initiated. The project was a response to the increased needs expressed by the global nutrition community to address the bidirectional relationship between nutrition and inflammation and to identify gaps in knowledge. The core objectives of INSPIRE include – 1) review what is known about the interaction and impact of inflammation (infection or other causes) on selection, use and interpretation of biomarkers; and, 2) develop a set of principles, to be published and posted on Tier 1 of the BOND website, that contains information and guidance to users. More specifically, the information will feed into the deliberations of the BOND Expert Panels on how to account for the impact of inflammation on selection, use and interpretation of biomarkers; and, 3) develop a research agenda. To accomplish these goals, four thematic areas were identified by the Scientific Steering Committee (SSC) and Working Groups (WG) were created to review the literature and develop a prioritized research agenda. The themes were: 1) Overview of the role of nutrition in immune function and the inflammatory response; 2) Evaluation of the impact of nutrition and specific nutrients on immune function/inflammation and vice versa; 3) Translating evidence to practice: approaches to addressing the nutrition and inflammation relationships, and, 4) Methodologies and new technologies. In this presentation, the speaker will discuss a set of principles developed through the INPSIRE process to guide the community on addressing the issues of inflammation as it pertains to the nutritional biomarkers.

Key words: Biomarkers, INSPIRE, nutrition, inflammation.

ROADMAP FOR BOND: A PANEL DISCUSSION OF PHASE 1 AND OPPORTUNITIES FOR PHASE II

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With the BOND program having completed the first wave of nutrients (iodine, vitamin A, iron, zinc, folate and vitamin B12) and with the launching of the web-based resource, a conversation is needed with the broadly-defined nutrition 'community' to get feedback about the utility and future of the BOND. Based on the feedback received so far, and with additional partner support, the scope of the BOND activities for phase II will be developed using a "cluster approach". This will integrate a more systems biology approach to address issues of public health importance. BOND Phase II will include: 1) Biomarkers in Growth (BIG), intended to focus on biomarkers of linear growth and will address the relevant clusters (including vitamin D, calcium, magnesium and phosphorous) as well as

other functional markers; and, 2) Biomarkers in Neurological Development (BIND), designed to address the role of micronutrients in neurological development and cognitive/behavioral outcomes. The relevant nutrient clusters will include vitamins involved in single-carbon transfer and amino acid metabolism (pyridoxine, riboflavin, thiamine, and with additional work on iron). In this presentation, the speaker will discuss the next steps for BOND, including opportunities for phase II and will deliver a roadmap for its suggested implementation. This will be followed by a panel discussion with the audience, expert panel chairs and the BOND Program staff. It is expected that the work of the expert panels and the input from the community during this discussion will help inform the research agenda, which will also help funding agencies make decisions about new directions in biomarker research and development.

Key words: Biomarkers, BOND, BOND phase I, BOND phase II, growth, micronutrients.

ENDOCRINE ASPECTS OF LINEAR GROWTH AND POTENTIAL BIOMARKERS

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The identification of useful biomarkers influencing growth and development as a result of nutrient factors would be of great interest. Such markers would not only provide potential targets for therapeutic interventions in those affected but would expand our understanding of the multiplicity of factors influencing normal growth and development and the identification of underlying unique hormonal, substrate, genetic and/or epigenetic factors influencing the unaffected general population. Currently, the only effective biomarker for linear growth is accurate measurements of a child's length or height. It is upon these measurements and perhaps similar ones of the parents that will identify children at risk who could be targeted for intervention and follow-up. Linear growth is achieved largely in the spine and the epiphyses in the distal femur and proximal tibia and final adult height is largely genetically determined. Auxologic measures are epidemiologically inexpensive to obtain but the precision and accuracy of such measures overtime is not trivial but only from such linear tracking can we obtain critical measures of growth velocities. Linear growth measures paired with measurements of bone age and a limited number of hormone measures have been the traditional mainstay of pediatric endocrinologists. The observed increase in second generation heights upon children migrating to western societies is well documented but poorly understood. These are most likely multifactor and a variety of biomarkers might be considered including markers of inflammation, hormone secretion, environmental stress and pollutants, macro and micronutrient deficiencies. Timing of the "nutritional" insult(s) and relief from such factors are most likely critical. Thus, evidence of the offending factor(s) at a later time may be difficult to identify. The timing of such events may influence the degree of recovery and ultimately the individual's final adult height.

Key words: Linear growth, auxologic measures, hormones, genetics, epigenetics.

BOND OVERVIEW AND SUMMARY OF EXPERT PANEL REPORTS

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The Biomarkers of Nutrition for Development (BOND) program, initiated in 2009 by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) of the National Institutes of Health (NIH)/U.S. Department of Health and Human Services, with support from the Bill and Melinda Gates Foundation, PepsiCo, and the NIH Office of Dietary Supplements and the NIH Division of Nutrition Research Coordination, has three main goals: 1) address the need for discovery, development, and implementation of reliable and valid biomarkers to assess nutrient exposure, status, function, and effect; 2) develop a process to harmonize the decision making about what biomarkers are best for use in the full range of activities represented by the global food and nutrition enterprise; and, 3) use information developed through 1 and 2 to provide evidence-based advice to those involved in food and nutrition-related activities. To achieve these goals and establish a proof of concept for the BOND approach, the phase I of BOND was focused on six "case study" nutrients: iodine, vitamin A, iron, zinc, folate and vitamin B12, chosen by the BOND steering committee for their public health importance and because they represent the range of challenges confronting the user communities. For each nutrient an Expert Panel was constituted and charged with the development of critical reviews. In this opening talk, the speaker will provide an overview of BOND and present the work done to date under the BOND program including the summary of reviews drafted by the expert panel. In addition, the speaker will discuss the key research gaps identified by each panel.

Key words: BOND, biomarkers, micronutrients.

DEMO OF BOND WEBSITE AND QUERY BASED SYSTEM

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The implementation of the Biomarkers of Nutrition for Development (BOND) program occurs primarily through a set of translation activities whereby the work of nutrient specific expert panels will be presented on the BOND website (http://www.nichd.nih.gov/global_nutrition/programs/bond/Pages/index.aspx). The schema for BOND website is like an inverted triangle with the content arranged into three tiers, from generic to specific. The top tier, tier 1, provides an overview of the BOND, links to all participating agencies and organizations and addresses general principles and cross-cutting issues related to nutritional assessment and biomarker use and interpretation. Tier 2, provides an overview of the nutrient biology for the six case study nutrients of phase I (iodine, vitamin A, iron, zinc, folate and vitamin B12) and a summary of biomarkers with relative strengths and weaknesses and caveats for their use. Tier 3 houses the Query Based System (QBS) which is designed specifically to respond to individual user needs. The QBS is an interactive online tool that provides users with customized advice derived from the work of the nutrient Expert Panels about appropriate biomarker(s) to meet their needs. The capacity of the BOND website encourages input from the user communities. That input will be used to determine new directions for BOND and related activities. In this presentation, the speaker will provide an overview of the BOND website, its tiered structure and the QBS, and will take the audience through a virtual tour of the website, including QBS.

Key words: BOND, BOND website, Query Based System, QBS and micronutrients.

PS2-17 Immunonutrition in health and disease

ADMINISTRATION OF POLYPHENOL-ENRICHED NUTRACEUTICALS TO ELDERLY PEOPLE AND EFFECTS ON THE IMMUNE RESPONSIVENESS

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Human ageing is characterized by several abnormalities of both innate and adaptive immune responses, thus leading to an increased frequency of infectious, inflammatory, allergic and autoimmune diseases. In elderly patients, among allergic diseases, asthma is a very common pathological event which complicates the dysfunction of many systems. Among a variety of natural products used to modulate the altered immune response, polyphenols have been shown to exert anti-inflammatory activities in both young and aged persons. Here, special emphasis will be given to the the immune-modulating effects of Leucoselect® Phytosome® (a dietary supplement enriched in the flavonoid epigallocatechin) administered to frail elderly patients. Leucoselect® Phytosome® was able to upregulate the T helper (Th)1 response [increase in serum concentrations of interleukin (IL)-2 and interferon-γ. On the other hand, IL-4 serum levels, as an index of Th2 function, fluctuated within normal ranges. Quite interestingly, in this cohort of frail aged patients from south Italy the balance between inflammation (IL-17) and anti-inflammation (IL-10) was preserved, thus suggesting that the Mediterranean diet might have been involved in the observed effects. In conclusion, these data support the ability of Leucoselect® Phytosome® to induce up-regulation of Th1 responses in frail elderly patients which may be beneficial in those patients affected by chronic allergic disorders.

Key words: Ageing, allergy, inflammation, Leucoselect® Phytosome®, Polyphenols.

PROBIOTICS AS PROTECTIVE AGENTS AGAINST ENTEROBACTERIA

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Salmonella is one of the major causative agents of foodborne diseases, morbidity and mortality worldwide. Salmonella enterica serovar typhimurium(S. typhimurium) produces in mice an infection with similar pathogenesis and clinical manifestations than S. typhiin humans. Probiotics influence the innate and adaptive immunity and the activity of the intestinal microbiota. This knowledge allowed us to propose the use of probiotic bacteria against Salmonella infection. On this topic, the mechanisms mediating this protection are not yet established. We determine the effect of the oral administration of probiotic bacterium L. casei CRL-431 on the biological and immune mechanisms involved in the prevention and treatment of the S. Typhimurium infection, using BALB/c mice. Oral administration of probiotic to healthy mice, induced activation of gut immune cells in a regulated state. The continuous L. casei

CRL-431 administration (previous and post-infection) protected mice challenged with S. Typhimurium. The mechanisms involved were: a) The modulation of innate immune response by increased TLR expression on epithelial and immune cells. b) Epithelial cell activation, evidenced by increases in secretion of IL-6 and MCP-1. c) Increased number of macrophages, dendritic cells and IgA (+) cells in lamina propria of the small intestine, and increased secretion of total S-IgA. d)Reduction of inflammation, with reduced TNF-alpha levels and myeloperoxidase activity, less PMN infiltration in lamina propria and regulation by IL-10. e)Increased phagocytic activity in macrophage isolated from Peyer's patches, spleen and peritoneum, correlated with an increase of IFNgamma. The results showed that L. casei CRL-431 induces biological and immune mechanisms, which confer resistance to S. typhimuriuminfection, showing lesser severity of the infection. The safety of continuous administration of this probiotc strain, allows us to suggest its use as an adjuvant of the mucosal immune system in the prevention, and during Salmonella infection.

Key words: Salmonella infection, probiotics, mucosal immune system.

GEOGRAPHY AND THE IMMUNOINFLAMMATORY PROCESSES IN OVERWEIGHT AND OBESITY

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Cytokines and adipokines regulate various biological processes, including acute phase protein synthesis, and are being used as emerging indicators of the immune or inflammatory response. Their concentrations are altered when homeostasis is interrupted (sepsis, shock, obesity, etc.). There is evidence that hypoxia is a stress factor that affects homeostasis by a reduction of arterial oxygen saturation, however organisms may get used to or compensate these changes with lifelong exposure. Despite the higher prevalence of diabetes and hypertension in populations residing at moderate altitudes (Ö500m), mortality from cardiovascular disease in these populations is lower than in populations residing at sea level. Leon et.al, in Canary Islands, Spain, showed that individuals residing at moderate altitudes have a lower heart rate and lower serum concentrations of total leptin, free leptin, and CD40L. Mazzeo et.al., in Denver, Colorado, exposed healthy women for 12 days to very high altitudes (4300m), showing a significant increase in IL-6. Klausen in Mont Blanc, France evaluated the effect of a very high altitude exposure in ten healthy men; although no effects were observed in IL-1β, TNF-α and C-reactive protein, a highly significant (p=0.002) change was found in IL-6 concentrations compared to sea level values after four days of exposure. We have recently shown that resistin, insulin, adiponectin, IL-2 and IL-8 values are significantly different between overweight and obese adolescents living in moderate altitude or high altitude (2300m) cities in Mexico. Hypoxia caused by different lengths of exposure may be inducing modifications in pro-inflammatory cytokines and obesity associated adipokines, affecting the metabolic effects of chronic disease, thus justifying the difference in morbidity and mortality at different geographical sites.

Key words: Obesity, inflammation, altitude, geography

IMMUNOMODULATOR ROLE OF MOTHER'S MILK

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Breast milk contains the nutrients necessary to support the development of the infant's immune system as well as other components that defend against infection. This includes various antimicrobial substances, factors that promote immune development, constituents that promote tolerance of the infant immune system, anti-inflammatory components, as well as compounds that promote healthy intestinal microbiota. It is well documented that breast milk provides antimicrobial defence to the infant; however, research on neonatal immune development, tolerance and prevention of the inflammatory response is still needed. Although there have been many modifications in the nutrient composition of infant formula aimed at improving immune function (such as fortifying with probiotics, sIgA, LCPUFA, nucleotides...) they have only begun to provide the immune benefits conferred by human milk.

Key words: Human milk, immune system, inflmmation, microbiota.

PS3-25 New biomarkers for health claims made on food

BIOMARKERS OF BENEFIT FOR HEALTH CLAIMS MADE ON FOOD: THIS IS THE CHALLENGE

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The identification of robust biomarkers is crucial for assessing the potential effectiveness of health-promoting food-com-

pounds. This is the basis for new/competitive developments in the food-health sector as covered by the harmonized legislation on health claims (HC) made on food in Europe (Regulation EC 1924/2006), probably the most controversial, certainly the most complicated piece of food legislation, including new concepts, science-regulatory unexperienced interactions allowing a number of opportunities but also uncertainties. Obstacles and related-delays, include nutrient profiles, biomarkers, data and/or intellectual property protection, far from being solved by a number of EC/EFSA guidelines or the more recent Regulation No.432/2012 establishing "a list" (the List?) of 222 permitted HC or the particularities of a few claims on reduction of disease risk based or claims based on new science. 'Biomarkers of Robustness of Metabolic Homeostasis for Nutrigenomics-derived Health Claims Made on Food' (BIOCLAIMS, Grant agreement no. 244995) is a Collaborative - Large-scale integrating research project funded by the EC. It faces the problem that only a few recognized (EFSA) risk factors are available for HC; that for a number of physiological functions there are no useful biomarkers; and that for other functions there is a need for earlier biomarkers. This lack is the main bottleneck for the consolidation/expansion of the health claims-based added values in the food sector.

Moreover, instead of relying only on disease-oriented biomarkers used in the biomedical world and making derivative biomarkers out of these ("surrogate end points"), a new focus on biomarkers towards maintenance of physiological function and homeostasis integrity is proposed. A nutrigenomic-based biomarker is a set of information consisting mainly of quantitative levels of gene-expression and/or proteins and/or metabolites that can be measured in a reproducible affordable way, expressing a health-benefit, either a reduction of disease-risk or a physiological/nutritional benefit.

Key words: Biomarkers, gene expression, health claims, homeostasis.

COMPARISON OF THREE NON-INVASIVE METHODS, INCLUDING CHALLENGE TESTS, TO MEASURE METABOLIC HEALTH IN MICE USING INDIRECT CALORIMETRY

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Indirect calorimetry (InCa) is a non-invasive method that can potentially be used to assess metabolic health. To test this, we compared three InCa-based methods using aged and adult C57BL/6J male mice (72 and 10 weeks old) and assessed the stability of the responses over time. The aged and adult mice differed in adiposity and white adipose tissue mitochondrial density, indicative of a compromised metabolic health of the aged mice. In method 1, diurnal patterns of respiratory exchange ratio (RER) were followed for 24hrs under standard conditions. In method 2, fasted mice received glucose to test effective switching in substrate oxidation. In method 3, mice were exposed to oxygen restriction (OxR, 14.5 % O2) to test how effectively animals switch from normal to low oxygen availability. Each method was repeated with at least a 10 week interval to assess response stability. Method 1 was not stable in time. Method 2 did not reveal differences in metabolic health between adult and aged mice. Method 3 appeared most sensitive to detect differences between both groups and in each period. Adult mice maintained reduced oxygen consumption under OxR, while aged mice did not. Thus, the response to OxR is a sensitive and reproducible method to non-invasively measure metabolic health in mice. Molecular analyses showed that OxR affected glucose and lactate metabolic pathways in liver and adipose tissue, supporting the observed differences in oxygen consumption.

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Key words: Hypoxia, indirect calorimetry, challenge test, oxygen restriction, metabolic flexibility.

STRESS CHALLENGES AS TOOLS FOR BIOMARKER IDENTIFICATION

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The aim of BIOCLAIMS is the development of new "health biomarkers" through assessment of the robustness of the homeostatic mechanisms involved in maintaining optimal health. This is based on the assumption that the ability to maintain homeostasis in a challenged environment is key for healthy ageing. To this end we employ mouse models of different stress challenges using (i) nutritional challenges, and (ii) bioenergetic challenges. (i) Using a high fat diet challenges we could show that short term effects of high fat diet feeding on adipose tissue gene expression are highly predictive of long term effects linked to increased adiposity. We identified Mest (mesoderm specific transcript) as an early marker of fat cell expansion (Voigt et al. Mol Nutr Food Res. 2013, in press), and are now focusing on the identification of markers for adipose tissue health. (ii) We have established a mouse model of healthy aging by ectopic expression of the uncoupling protein UCP1 in skeletal muscle (Keipert et al. Aging Cell. 10: 122, 2011). In this model, a mild mitochondrial uncoupling acts as a constant

bioenergetic stress in skeletal muscle resulting in an increased oxidative stress (Keipert et al. Am J Physiol Endocrinol Metab. 304: E495, 2013) and an upregulation of the integrated stress response, albeit without evident muscle pathologies or functional impairments. Using a combined transcriptome and metabolome approach we identified a novel metabolic rescue cycle involving a reprogramming of skeletal muscle glucose metabolism and secretion of an endocrine acting myokine channeling energy from peripheral tissues (liver and white fat) to muscle. We are now aiming to exploit this model for identification of biomarkers for healthy aging to be used in humans.

Acknowledgement: Supported by the European Union's Seventh Framework Program FP7 2007-2013 under grant agreement nº 244995 (BIOCLAIMS Project).

Key words: Nutrition, biomarkers, healthy aging, stress challenge.

PERIPHERAL BLOOD CELLS AS SOURCE OF BIOMARKERS

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Peripheral blood mononuclear cells (PBMC) constitute an interesting biological material as they can be collected easily and repeatedly with minimum invasion in comparison to sampling of other tissues and reflect expression pattern characteristics of certain pathologies. Thus, the use of PBMC for the development of diagnostic tools is growing and they have also been shown to be useful for nutritional research. Our studies indicate that the expression of key energy metabolism genes in PBMC (studied with omic techniques) changes in response to acute changes in feeding conditions (fasting/refeeding) reflecting changes that occur in other internal organs as liver or adipose tissue. This nutritional regulation in PBMC is altered in diet-induced obese animals, reflecting an insensitivity to feeding conditions, even in the earlier stages with a low degree of overweight. PBMC gene expression is also affected by the intake of different diets and by diet-induced obesity. Hyperlipidic diets produce an alteration in the expression of genes related to energy metabolism, adiposity, inflammation and other pathways related to body weight gain. Interestingly, PBMC altered gene expression can be recovered with weight loss. Macronutrient diet composition also has an impact on PBMC gene expression. We have observed that the intake of isocaloric unbalanced diets (rich in fat or proteins) alter the expression of genes related to several metabolic pathways, including energy metabolism and immune response. Thus, PBMC could be used as a source of biomarkers of adiposity, early homeostatic imbalance related to obesity development, metabolic recovery with weight loss, and intake of unbalanced diets. For these reasons, this set of cells appears as an interesting and useful tool to be used in nutritional studies that could help to predict and/or prevent the occurrence of obesity.

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Key words: PBMC, biomarkers, obesity, nutrition .

READING THE PATTERNS OF ENDOGENOUS DAMAGE TO THE PROTEINS

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Proteins in human tissues and body fluids continually undergo spontaneous glycation, oxidation and nitration reactions forming low levels of glycation, oxidation and nitration adduct residues. Examples of glycation adducts are: Nac-fructosyl-lysine – an early-stage glycation adduct, methylglyoxal derived hydroimidazolone MG-H1 – an advanced glycation endproduct (AGE), oxidation methionine sulfoxide and nitration adduct 3-nitrotyrosine. Proteolysis of proteins damaged in this way releases glycation, oxidation and nitration amino acids, also called free adducts, which are excreted in urine. Urinary excretion of free adducts is an estimate of total body glycation, oxidation and nitration damage – also influenced by adduct repair in some cases leading to underestimates and adducts absorbed from digested damaged proteins in ingested foods leading to overestimates. Stable isotopic dilution analysis liquid chromatography-tandem mass spectrometry (LC-MS/MS) is the best methodology for measurement of protein glycation, oxidation and nitration adducts to which other higher throughput methods such as immunoassay and indirect methods are corroborated. For protein adduct residues prior exhaustive enzymatic hydrolysis is required which can be conveniently automated and performed under aseptic conditions. Free adducts are analysed in 3 kDa ultrafiltrate of samples. Steady-state levels of protein damage are influenced by both changes in rates of glycation, oxidation and nitration and rate of protein turnover. If the rate of modification is constant, the extent of modification of proteins is proportional to protein half-life and therefore protein damage levels are surrogate markers of plasma proteomics dynamics. Quantitative measurement of glycation, oxidation and nitration adducts provides information on the level of exposure to potentially damaging protein modifications, protein inactivation in ageing and disease, metabolic control, protein turnover, renal function and other aspects of body function. Multiple protein damage markers combined by machine learning techniques in diagnostic algorithms provide a powerful approach for biomarker development in diet and health relationships.

Key words: Advanced glycation endprodcut, glycation, nitration, oxidation, proteins.

THE CARNITINE FAMILY AS BIOMARKERS OF METABOLIC HEALTH IN THE INTERVENTION STUDIES USING OMEGA 3 AND THIAZOLIDINEDIONES

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Background and objectives: Combined interventions are required for a better handling of metabolic diseases associated with obesity. Thus, dietary, lifestyle, and pharmacological interventions should be considered in the therapy of type 2 diabetes. Naturally occurring n-3 long-chain polyunsaturated fatty acids (omega-3) are now regarded as healthy constituents of diets for diabetic patients. These lipids act as hypolipidemics, reduce inflammation, and reduce incidence of cardiac events. In our studies in dietary obese mice, we have found that omega-3 augment the effects of anti-diabetic drugs, namely thiazolidinediones (TZDs). Thus, the combined intervention could exert synergistic effects in prevention as well as reversal of insulin resistance in mice. Since insulin-resistance is often linked to impaired oxidation of lipids in metabolically relevant tissues, and since plasma levels of acylcarnitines with long saturated and monounsaturated even side-chain (C12-C18; AC) correlate with the activity of beta-oxidation in the tissues, we aimed to learn whether the plasma AC levels could serve as a marker of beneficial metabolic effects of omega-3 and TZDs.

Methods: Adult B6 mice were fed for 2 months high-fat diet supplemented or not with omega-3, or TZDs, or omega-3 + TZD. Glucose tolerance, plasma levels of AC, and lipid and glucose metabolism markers (in both fasted and re-fed mice), whole-body energy metabolism and metabolic flexibility (indirect calorimetry), and tissue (liver, muscle) lipid content were characterized.

Results: Changes in plasma levels of AC in response to tasted/refed transition discriminated between the interventions. The additive improvement of glucose homeostasis as well as metabolic flexibility in response to the combined intervention was reflected by changes in the plasma AC levels.

Conclusions: Changes in plasma AC profile, which reflect tissue fatty acid oxidation, could serve as a reliable marker of metabolic health.

Acknowledgement: Supported by EU FP7 project Bioclaims and Czech Science Foundation (13-00871S).

Key words: Biomarkers, carnitine, glucose homeostasis, type 2 diabetes, obesity, lipid catabolism.

THE CHALLENGE OF VALIDATING BIOMARKERS IN HUMANS: THE BIOCLAIMS APPROACH

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A biomarker is a biological indicator of normal biological or pathogenic processes or responses to different kinds of intervention. Almost any measurement reflecting changes in biochemical processes, structures or functions may serve as biomarker, including biomarkers of nutritional/environmental exposure and functional biomarkers (e.g. biomarkers of inflammation, oxidative stress, liver function). The general objective of the FP7-project BIOCLAIMS ("BIOmarkers of robustness of metabolic homeostasis for nutrigenomics-derived health CLAIMS made on food") is to identify, in animal and human studies, candidate biomarkers indicating biochemical changes in response to metabolic challenges. The specific questions include "What are early predictive biomarkers of phenotypic changes occurring later in life?", "Do acute stressors (e.g. high-fat diet, oxygen limitation) reveal underlying mechanisms?", "What are the predictive values in different models under different conditions?", "Are these biomarkers predictive across gender, genotype, and life span?", and "Are these biomarkers sensitive to bioactive food compounds?" Special focus is directed on biomarkers of homeostatic robustness, indicating how well an organism preserves its capacity to regulate and maintain a functionally relevant balance of metabolic processes in response to acute (oral glucose or lipid tolerance tests, fasting, oxygen limitations) or chronic/repeated perturbations (impaired renal function, aging, menstrual cycle, season). To achieve these goals, a wide array of models and methodologies has been selected. They are applied to hundreds of samples in cross-sectional studies for studying associations of new biomarkers with established ones, and as outcome variables for comparing results before and after nutritional interventions. Additional studies provide data for all variables on variability from day to day, between seasons and within menstrual cycle, as well as reference ranges. Validation includes good-laboratory-practice validation of new analytical methods, including estimation of precision, within-run, between-run and between-day coefficients of variation, etc. These results will allow for reliable interpretation of biomarkers in on-going and future human studies.

Key words: Biomarkers, metabolic homeostasis.

BIOMARKERS OF INFLAMMATION: RELATIONSHIP WITH NUTRITION AND WITH HEALTH OUTCOMES

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Inflammation is a characteristic feature of many conditions and diseases. Irrespective of the trigger and the locus of activity, inflammation typically involves a common panel of cells and a common set of chemical mediators. It is now recognised that metabolic dysfunctions, like obesity, also include an inflammatory component. Adipose tissue releases a number of inflammatory mediators and circulating concentrations of such mediators increase with body mass index and are higher in obese than normal weight individuals. Furthermore weight loss, either through surgery or through lifestyle change is associated with decreased concentrations of inflammatory mediators in the bloodstream. Within adipose tissue both adipocytes and infiltrating inflammatory cells (mainly macrophages) seem to play roles in synthesis and secretion of inflammatory mediators. Some of these mediators, like TNF, can induce insulin resistance both locally and distally. Food components can influence inflammation in a variety of ways with some acting to promote inflammatory processes and others to dampen inflammatory processes. In general, healthy eating patterns and higher intakes of key components of such patterns are associated with lower inflammation. There is an increase in blood inflammatory markers following consumption of a meal especially one high in fat. This post-prandial inflammatory response is exaggerated with obesity and diabetes and can be modified according to the composition of the meal.

Key words: Adipocytes, iInflammation, immune system, metablic dysfunction.

PS3-33 OMICS technologies with nutritional perspectives

NUTRIEPIGENOMICS AND OBESITY

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The 'epigenetic code' represents 'the sum of the alterations to the chromatin template that collectively modulate gene expression patterns. In other words, epigenetics involves the heritable changes in gene expression that occur independently of the underlying DNA nucleotide sequence. These processes include DNA methylation, covalent histone modifications, chromatic folding and regulatory miRNA or polycomb group complexes. Two outstanding features of epigenetic processes are the ability for transgenerational heritability and temporal differentiation from totipotent cells.

Different examples of dynamical changes in DNA methylation patterns and histone architecture due to the restriction or supplementation with different foods and nutrients have been reported. Thus, maternal caloric restriction has been related to methylation status of some genes, while the intake of minerals, methyl donors such as vitamins of the B complex, polyphenols or amino acids, led to DNA methylation changes. Furthermore, alcohol consumption, hypoxia and inflammation have been associated with an epigenetic regulation. Additionally, metabolically important genes (Epigenes) are being identified (POMC, FASN, CLOCK, FNF-α, LEP, AQP9. CD44, etc.) as part of the epigenetic machinery regulation of body weight homeostasis, which may serve for diagnosis and prognosis purposes. In summary, interindividual differences concerning the outcomes of nutritionally-related chronic diseases depend not only on the dietary intake and the subject's DNA sequence, but also on the inherited epigenome and on different nutritional influences that modify the epigenetic marks and are able to affect gene expression and function. This research is part of the CIBERobn program, Madrid.'

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Key words: DNA methylation, epigenetics, nutriepigenomics , obesity, personalized nutrition.

METABOLOMICS AND NUTRITIONAL APPLICATIONS

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Metabolomics is the study of metabolites present in biological samples such as biofluids, tissue/cellular extracts and culture media. Combining metabolomic data with multivariate data analysis tools allows us to study alterations in metabolic pathways following different perturbations. Examples of perturbations can be disease state, drug or nutritional interventions with successful applications in the fields of drug toxicology, biomarker development and nutrition research. In recent years, metabolomics has been used to define the metabolic phenotype (metabotype) of individuals. There is an expectation that assigning individuals to a particular metabotype will provide a prediction for response to interventions such as drug and nutritional treatments thus providing a personalisation to treatment. Examples which have been successful include response to supplementation with vitamin D and treatment with acetaminophen and Fenofibrate therapy.

However, further work is necessary to establish the true potential of metabolomics in personalised health. Metabolomics can also be applied to the discovery of biomarkers of food intake and current approaches and developments in this field will be discussed.

Key words: Metabolomics, metabolic pathways, metabotype, personalised health.

NETWORK BIOLOGY AND SYSTEMS BIOLOGY APPLICATIONS IN NUTRITION

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Nutrition, in combination with genetics background, represents the major determinant of the individual's health status throughout life. Inadequate dietary patterns, either in a form of undernourishment, scarcity of essential nutrients or excess caloric intake, contribute to failure of systems resilience and consequently development of disease. Understanding of relations between diet, genetics, physiological processes and organ(ism) health is essential for devising nutritional strategies to achieve optimal health benefit.

Current definition of health implements a view of optimally functioning human physiology as the ability to adapt to one's environment. To achieve such optimal function, flexibility should be established and maintained at all levels of systems complexity: at the level of molecular regulation, in various physiological processes, in different organs, etc. To comprehend the organization of systems elements that are required for flexible response to perturbations – and therefore maintenance of health - we are using network biology as a mean for multi-level mapping of systems components and interactions between them. This enables understanding of the processes required for adaptive response in various organs and discovery of (combinations of) "hotspot" nodes that need to be fine-tuned in order to achieve optimal flexibility of the system.

A growing compendium of nutrigenomics and challenge test studies now allows for integrative analysis and reconstruction of "reference networks" as a mean to capture dynamic relations between molecular entities, physiologically relevant marker processes and health benefit endpoints. Our mission is to develop and use such reference networks to address systems flexibility using network properties, as a readout parameter for the health effects of nutrients, for discovery and prioritization of mechanisms, biomarkers and intervention targets and as a guidance for improved, evidence-based dietary interventions.

Key words: Network biology, systems biology, systems flexibility, metabolic health, biomarkers.

PS4-41 Public health genomics in individualized nutrition

PUBLIC HEALTH GENOMICS IN NUTRITIONAL SCIENCES

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Rapid scientific advances in genomics such as in the light of epigenomics, microbiomics and systems biology supported by new ICT solutions not only contribute to the understanding of disease mechanisms, but also provide the option of new promising applications in human health management during the whole life-course of a person. What was little time ago a vision for a new era of public health, in which advances from the -omic sciences would be integrated into strategies aiming at benefiting population health, is now responding to the very pressing need for the development of effective personalized healthcare going even beyond personalized medicine. Nutrigenomics is the field showing not only that nutrients play a central role in the stabilization of the DNA but also that there is a need to understand the complexity of the interaction between nutrition, genomics and other environmental factors as well as their role in the development of diseases. So far, all stakeholders including policy-makers and the private sector are struggling to translate the emerging knowledge into public health. Public Health Genomics (PHG) is the area of public health ensuring that scientific advances in genomics ("from cell...") triggered by innovative technologies are timely, effectively and responsibly translated into health policies and practice for the benefit of population health ("...to society"). The implementation of PHG requires increased concerted activities. The Institute for Public Health Genomics (IPHG) at Maastricht University aims to fulfil this task in all European Member States by hosting the European Centre for Public Health Genomics (ECPHG) and coordinating the Public Health Genomics European Network (PHGEN). Furthermore, it is actively involved in the FP7 CSA on Personalised Medicine (PerMed) funding bodies, as well as in the European Flagship Pilot ITFoM on the future of medicine that aims to achieve the visionary goal of the "virtual human".

Key words: Personalized nutrition, Public Health Genomics.

EPIGENETIC MECHANISMS OF BIOACTIVE FOOD COMPONENTS IN CANCER PREVENTION

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Aberrations in gene expression and protein function observed in a variety of human disorders with cancer at the forefront are caused by both genetic and epigenetic factors. Epigenetics refers to changes in gene expression programming that alter the phenotype without disrupting the underlying DNA sequence. Epigenetic modifications, which include DNA methylation, covalent histone modifications, and regulation by non-coding RNAs, are dynamic and serve as an adaptation mechanism to a wide variety of environmental and social factors including diet. A number of studies provide evidence that natural bioactive compounds found in food and herbs can modulate gene expression by targeting elements of the epigenome, in particular DNA methylation, during different life stages. Increase in DNA methylation within gene promoters of tumor suppressor genes has been linked to their transcriptional silencing and is considered a hallmark of cancer. Resveratrol, a polyphenol present abundantly in grapes and red wine, as well as vitamins D and A reverse DNA promoter hypermethylation of tumor suppressor genes and lead to their re-activation in breast cancer. It robustly reduces cancer cell growth and sensitizes cells to anti-cancer agents. Nutrients that are components of one carbon metabolism such as folate, riboflavin, pyridoxine, cobalamin, choline, betaine, and methionine, affect DNA methylation by regulating levels of S-adenosyl-L-methionine that is the ubiquitous methyl donor. These compounds can potentially reverse DNA promoter hypomethylation in cancer and inactivate genes driving cancer progression and metastasis. Our findings indicate that natural compounds can change the epigenome leading to activation of tumor suppressor genes and suppression of oncogenes and pro-metastatic genes. Since epigenetic abnormalities have been shown to be both causative and contributing factors in different health conditions including cancer, individualized nutrition might play a tremendous role in cancer prevention and therapy.

Key words: Nutritional epigenetics, carcinogenesis, individualized nutrition.

LET`S IMPLEMENT PUBLIC HEALTH GENOMICS AND PERSONALIZED NUTRITION

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Over the last decade, personalized nutrition has become a buzz word, with promises piling up. Many small and large companies have tried to enter this area, not all successfully. Scientifically and technologically, personalized nutrition is feasible. Yet, the implementation requires more than this. A consumer needs to know all relevant aspects of his/her health status, and needs to have access to information and knowledge that links the personal health status to dietary advice that is pleasant, convenient, varied, etc., within a system that motivates to continue and comply. Well, we are not there yet. However, new areas of implementation emerge that combine information technology, do-it-yourself health assessment ranging from genome to glucose, intelligent algorithms that turn measurements into motivation. Yet, the real breakthrough will not come for personalized nutrition in isolation, but as part of a paradigm shift in health(care) comprising 6 aspects:

- from a reductionist to a systems view on society and health
- from disease management to health promotion;
- from medicine-focus only to include lifestyle, nutrition, psychology;
- from a generic to a personalized approach;
- from the patient as "case" to an empowered person (self-management).
- from passive patient to an optimally participating citizen.

This requires a massive change in our approach on science. I will demonstrate how in Europe, nutrition scientists are taking a lead in this shift by creating the "Nutrition Researchers Cohort", as a significant step in implementing public health genomics and personalized nutrition.

Key words: Epigenomics, nutrigenomics,personalized nutrition.

GENETIC, EPIGENETIC AND NUTRITIONAL INTERACTION IN NEUROLOGICAL DISORDERS

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The global burden of disease related to neurology is considerable and projected to rise in the future. Accumulating data from hypothesis free - genomic approaches including exome/genome next generation sequencing, transcriptomics, epigenomics, and other omics approaches are revolutionizing understanding of mechanisms underlying brain diseases. Evidence is

accumulating on mutual interaction among dietary molecules, genes and gene function. Moreover, epigenetic mechanisms, which are influenced by endogenous and exogenous stimuli contribute to plasticity and homeostasis of the central nervous system in health and disease. Bioinformatic tools are promising to integrate these various types of data to better understand nutrition -gene interactions. Consequently, novel approaches to prevention and treatment of neurological disorders can be envisaged.

Key words: Epigenetics, neurological disorders, nutrition.

GENOMICS, MICROBIOMICS AND EPIGENOMICS IN METABOLIC SYNDROME: A CASE STUDY IN PUBLIC HEALTH GENOMICS

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Public Health Genomics translates knowledge from molecular biology for the benefit of population health. The understanding of interactions between omic levels needs to be integrated in public health strategies. The metabolic syndrome is a good example for the need to integrate knowledge from sequence based genomic data, epigenetic mechanisms, individual microbiota, and complex gene environment interactions for an understanding of pathogenesis and therapy.

Analysis of the adaptive thermogenesis pathway in obesity suggests that multiple SNPs in genes (ADRB3, UCP1, PPARγ, Pgc1α, rXrα, c/EBPα, FaBP4, LPL) correlate with obesity. However, for almost all of these genes also an epigenetic regulation, influenced by the environment was demonstrated. Mechanisms between sequence changes and epigenetics need better understanding.

Individual characteristics of microbiota influence the development of low grade inflammation. Changes in patterns and metabolic activities of GI microbiota have been claimed as a cause of obesity. Abundance and changes of Firmicutes: Bacteroidetes, SCFA producing Clostridia and bacterial diversity seem to influence mechanisms underlying obesity and T2D. These changes in GI microbiota can be linked to an altered gene expression and epigenetic regulation, especially methylation of CpGs in promoter region of SCFA receptors, inflammatory mediators (such as IL-6 and TNF-α), and Toll like receptors.

The conclusion of these case study points to the need to respect gene - environment interactions and different omic levels for individualized health prevention and results in concepts for public health genomics.

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Key words: Genomics, epigenomics, metabolic syndrome, microbiomics, microbiota, thermogenesis, SNP.

PS4-49 Biomarkers of response to dietary interventions

ADVANCED IMAGING TECHNIQUES TO STUDY BRAIN DEVELOPMENT IN NUTRITIONAL INTERVENTION

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This talk will focus on Magnetic Resonance Imaging (MRI) techniques and how they can be used in nutrition studies of brain development. The advent of non-invasive MRI was a breakthrough to assess the human brain in vivo, greatly expanding the possibilities to investigate brain structure and function. Clinically, neuroradiologists usually interpret scans by visual inspection; however, in order to reveal more subtle features, other techniques have been developed that depend on different acquisition modalities with post-acquisition processing of the scans. Within the broad divisions of macro-, microstructural, metabolic and functional imaging, a variety of techniques have emerged from magnetic resonance (MR) leading to multimodal assessment of the brain. Therefore, the combination of MRI as a multimodal tool with post-acquisition processing techniques provides powerful technology for the study of the effects of nutrition on brain development. Further it represent an excellent translational tool from animal to human research as the same techniques can be appleid. These aspects will be presented and examples of nutrition studies in the early life spectrum that have included MRI will be discussed.

Key words: Magnetic resonance imaging, brain imaging, nutrition

APPLYING STRUCTURAL MAGNETIC RESONANCE BRAIN IMAGING IN NUTRITION STUDIES

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A number of changes in in brain and cognition take place across the lifespan. There are great individual differences. Changes can be influenced by a number of conditions, including nutrition. Brain imaging techniques have been applied to

demonstrate the effect of dietary intake patterns and nutrition interventions on brain structure and function. Biomarkers of nutrient intake and related parameters, e.g. cholesterol, can also be linked to brain imaging data. One example of dietary components studied includes long-chain polyunsaturated fatty acids. In this presentation, imaging related to nutrition, including data using MR imaging and nutrition biomarkers, limitations of these techniques and potential future applications across the lifespan will be discussed. Preliminary data will be presented on MR imaging of longitudinal brain age changes in relation to nutrition, including data on cortical thinning in relation to body mass index (BMI) and blood markers of cholesterol, DHA and vitamin D.

Key words: Biomarkers, brain imaging, magnetic resonance, nutrition.

A CONSIDERATION OF BIOMARKERS TO BE USED FOR EVALUATION OF INFLAMMATION IN HUMAN NUTRITIONAL STUDIES

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Background and objectives: Inflammation is a normal process and there are a number of cells and mediators involved. They are common to all inflammatory diseases and inflammatory responses, and to both high-grade and low-grade inflammation. Despite great advances linking nutrition to inflammatory processes, there is no consensus as to which markers of inflammation best represent low-grade inflammation or differentiate among acute and chronic inflammation or between the initiation, propagation and resolution phases of inflammatory responses.

Methods: To provide state-of-the science guidance, the ILSI Europe Nutrition and Immunity Task Force commissioned an Expert Group on Biomarkers of Inflammation, with the aim to evaluate the suitability of inflammatory markers in studies evaluating the impact of nutrition. For this project, the Expert Group identified robust and predictive markers, or patterns or clusters of markers, which can be used to assess inflammation in human nutrition studies in the general population.

Results: Guidance for use of markers in nutrition research: There are a number of modifying factors that affect the concentration of an inflammatory marker at a given time; these modifying factors include age, body fatness, physical (in)activity, sex, smoking, genetics and microbiota composition. Probably most informative is measuring concentration changes in response to a challenge. A number of inflammatory challenges reflecting metabolic stress, infection, and tissue damage have been described. However, many of these challenges are poorly standardised. Patterns and clusters may be important as robust biomarkers of inflammation.

Conclusions: The review provides guidance for future studies in the general population, specifically noting that challenge models and cluster analyses seem promising but require rigorous standardisation and testing in prospective cohorts to assess their predictive value. Overall, the guidance contributes to a better understanding of the current limitations and opportunities for assessing inflammation.

Key words: Inflammation, leukocyte, cytokine, chemokine, acute phase.

NEW METABOLOMIC STRATEGIES IN CLINICAL NUTRITION RESEARCH: FROM DIET TO REVEALING DISEASE RISK BIOMARKERS

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Backgrounds and objectives: An important challenge of modern nutrition is to correctly assess metabolic status of subjects after specific diets. Usually, evaluations of human dietary patterns (or its components) have been carried out in small or medium controlled studies; however, on few occasions have been scaled to free-living studies. The Mediterranean diet shows a complex profile (qualitative and quantitative point of view) of bioactive-rich food sources including fruits, wine, nuts, olive oil, etc. The aim was to apply a metabolomic approach to explore the relation between dietary information and metabolic profiles in producing biomarkers that allow the intake of a particular dietary pattern or component to be assessed.

Methods: The PREDIMED study (www.predimed.org) is a parallel-group, single-blind, multicenter, randomized, controlled, 5 y feeding trial assessing the effects of the Mediterranean Diet supplemented with extra-virgin olive oil (MD-EVOO) or mixed nuts (MD-Nut) on the primary prevention of coronary heart disease, compared to a control Low Fat Diet (LFD). Spot urine samples and FFQ data from the participants of the PREDIMED were studied. Urine samples were analyzed by LTQ(Thermo) followed by statistical analysis. Biomarker identifications were achieved combining computational- assisted identification (MZedDB, HMDB, Masstrix, Metlin databases and in-house-database), IT/FT-MS/MS (Thermo) data and in-silico MS/MS experiments (MetFrag).

Results: Differences between dietary patterns of intake were detected. The results reinforce the interest to combine dietary information with metabolic fingerprinting to obtain new food-related metabolome biomarkers. Application of these approaches will allow us to obtain a picture of the complex interactions between diet, health status and urinary metabolome.

Conclusions: This study reveals the interest of metabolic phenotyping strategies in the identification of biomarkers related with clinical parameters.

Key words: Biomarkers nutritional intake, exposure, metabolomic, dietary intervention.

PS5-57 Early programming and nutrition in Latin America

MATERNAL CALCIUM INTAKE AND MODELING OF FETAL BLOOD PRESSURE

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Our interest in the relationship between calcium intake and blood pressure started from the observation of indigenous women in Guatemala. Those women have a high calcium intake due to the Mayan tradition to treat corn with lime and have a very low incidence of hypertensive disorders of pregnancy. These observations led us to hypothesize that the incidence of one of the most severe forms of hypertension during pregnancy, pre-eclampsia, can be reduced in populations of low calcium intake by calcium supplementation (1). In agreement with this hypothesis, a recent meta-analyses including 11 randomized controlled trials have shown that in communities with low dietary calcium intake, calcium supplementation during pregnancy is associated with a 68 % (from 51% to 79%) reduction in the incidence of pre-eclampsia (2). Our group performed a large, randomized controlled trial of calcium supplementation during pregnancy (3) in a population with low calcium intake, and 7 years later we conducted the follow-up of children born from these mothers (4). This study showed that the offspring of calcium supplemented mothers had a lower incidence of high blood pressure than offspring of mothers receiving placebo, suggesting a role of fetal calcium restriction on the genesis of hypertension in later life. We have shown in Wistar-Kyoto rats that maternal dietary calcium intake during pregnancy has a modeling effect on offspring's blood pressure. Rats exposed in utero to a calcium deficit develop high blood pressure during adulthood (5).

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Key words: Calcium supplementation, children, pregnancy.

BODY MASS INDEX AT BIRTH, SCHOOL AGE AND ADULTHOOD AS PREDICTOR OF IMPAIRED BLOOD PRESSURE IN YOUNG ADULTS IN LATIN AMERICA

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Background and objectives: Birth weight and weight gain have been associated with high adult systolic blood pressure (BP) but not with high diastolic BP. Less well known is if the association between weight gain with high PHT or HT changes across the life cycle. The objective of this study is to assess the independent association of body mass index (BMI) measured in three points in the life cycle with adult PHT and HT.

Methods: A prospective cohort of all living born in the city of Ribeirao Preto, Brazil, was assessed at birth (1978/79), school-age (1987/88) and adulthood (2002/04). Data on neonatal variables, socioeconomic position and anthropometry of all three moments as well as adult RF for HT were present for 1143 subjects. Conditional weight analysis was performed to assess the risk of repeated-in-time measurements.

Results: Lower BMI at birth was associated with diastolic HT (RR=3.10; 95%CI 1.08-8.88). Higher BMI gain between birth and school age was associated with adult diastolic PHT & HT (respectively RR=2.78; 95%CI 1.67-4.64 & RR=6.79; 95%CI 1.82-25.46). Higher BMI gain between school age and adulthood was associated with both systolic PHT & HT (respectively RR=2.29; 95%CI 1.57-3.34 & RR=4.68; 95%CI 2.34-9.36) and diastolic PHT & HT (respectively RR=2.37; 95%CI 1.43-3.82 & RR=14.94; 95%CI 3.42-64.67). These effects were significant after adjustments for traditional HT risk factors and possible confounders.

Conclusion: Low BMI at birth, BMI gain between birth and school age, and BMI gain between school age and adulthood are all associated with adult diastolic HT. BMI gain between birth and school age is associated with both adult diastolic PHT and HT, whereas BMI gain between school age and adulthood is associated with systolic and diastolic PHT and HT.

Key words: Cohort, body mass index, hypertension, life course epidemiology.

MATERNAL OBESITY AND NEONATAL INSULIN RESISTANCE IN THE ORIGIN OF METABOLIC SYNDROME IN CHILDHOOD

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Obesity during pregnancy has been recognized as an independent risk factor for maternal and fetal complications, including congenital anomalies, gestational diabetes mellitus, gestational hypertension and preeclampsia, caesarean delivery, macrosomia (birth weight > 4000 g), increased neonatal adiposity and hyperinsulinemia. In addition to perinatal complications associated to maternal obesity, rising epidemiological evidence has suggested the intrauterine programming of whole body insulin resistance (IR) in the offspring of obese pregnant woman, evaluated both at early neonatal stage and at young adulthood. Our cohort data showed association among elevated neonatal anthropometry measurements (birth weight and height) and increased levels of waist circumpherence and blood pressure in childohood, two components of the metabolic syndrome (MetS). In the other hand, the homeostasis model assesment index of insulin resistance (HOMA-IR) was correlated to the number of MetS components in this population. In order to describe potential mechanisms of relationship between maternal obesity and future development of MetS, we have evaluated modulators of neonatal insulin signaling pathway in human and animal models of maternal obesity. We have found increased levels of neonatal insulin secretion (serum C-peptide) and sub-clinical markers of cellular insulin resistance and endoplasmic reticulum stress (ER-stress) in offsprings of women with maternal weight excess. The ER stress response has been related to IR and diabetes mellitus development in multiple models of obesity. Thus, a mechanistic link could be proposed between maternal obesity, ER stress and IR in fetal tissues as part of the physiopathology route that connects abnormal intrauterine nutrition with elevated risk of MetS in childhood.

Acknowledgement: FONDECYT (1121145, 1110977, 1090594), CONICYT (ACT-73 PIA).

Key words: Maternal obesity, insulin resistance, er stress, metabolic syndrome.

FOLLOW UP OF A COHORT OF MALNOURISHED CHILDREN AT AGE 20-30 YEARS

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Infant malnutrition was highly prevalent in Chile during the first half of the 20th century, reaching 20% in 1970. In order to alleviate hospital overcrowding a corporation (CONIN) was created in 1977 that housed children below 2 years of age once they were stabilized in public hospitals. The residences provided food, child and medical care and nutrition education to the mothers. A cohort from Curicó, a city 180 km south of Santiago is being formed with adults that suffered moderate and severe protein-calorie malnutrition (PCM) in their first 2 years of life and currently are 20-30 years old. 256 charts available were examined and 180 were selected from children moderately and severely malnourished (Gomez classification) during the first two years of life. Weight at birth, gestational age, lactation, weight progression and complete medical records during their residence were available in the charts. Adults were evaluated for socioeconomic level, food intake, insulin resistance and anthropometry. They had 148 days of residence at the center. 40 % were women. The formation of the cohort will allow to assess the effect of early PCM on adults and their progeny.

Key words: Infant malnutrition, cohort, adults, follow-up.

EARLY GROWTH AND BIOLOGICAL MATURATION

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Increasing evidence indicates that excess adiposity is associated with accelerated skeletal and sexual maturation although results are not always consistent across sexes or ethnic groups. Also, it has been also suggested that some of these relationships would originate in the first years of life. Since 2006 we have followed ~1100 Chilean children (50% girls) from low-middle socioeconomic class in the Growth and Obesity Chilean Cohort Study (GOCS). In these children we have collected detailed anthropometric information from birth to 10y of age and we have also characterized biological maturation with ultrasound bone age, DHEAS concentrations, and Tanner staging. We will present data that shows that obese prepubertal GOCS children compared to normal counterparts have accelerated maturation, particularly in terms of skeletal maturation. We will also present evidence that linear and ponderal growth during infancy is associated with maturation status in childhood, although magnitude and direction of the associations vary by sex and by type of indicator assessed. Taken altogether, we believe our results suggest that maturation status is a key component for judging the adequacy of growth.

Key words: Early growth, obesity, skeletal maturation, adrenarche.

A NEW STANDARD FOR INSULIN RESISTANCE AND ITS ASSOCIATION WITH THE METABOLIC SYNDROME IN CHILEAN SCHOOL AGE CHILDREN

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Insulin Resistance (RI) has been proposed like the common pathogenic mechanism for the different risk factors that constitute the Metabolic Syndrome (MS). In studies of adult population the estimation of RI by means of Homeostasis Metabolic Assessment index(HOMA)has allowed to find an association to cardiovascular risk and especially to evaluate and follow the development of type 2 Diabetes Mellitus. Generally agreed insulin or HOMA cut-off levels for the pediatric population do not exist. This is due in part because the measurement of insulinemia presents a significant inter and intra-individual variation, and has a high dependency of the used technique. In addition, in children it is influenced by sex, age, pubertal maturation and also by genetic and cultural factors, which makes necessary to have local standards. The objective of this talk is to briefly present the development of a new standard of reference for insulinemia and HOMA, in a Chilean population of children and adolescents*. This reference enables a better clinical interpretation of RI, suggesting cut-off points for identifying children with higher risk according to sex and pubertal maturation. Its relationship to abdominal obesity and the agreement with different criteria for MS are also presented.

*Barja S, Arnaíz P, Domínguez MA, Villarroel L, Cassis B, Castillo O, Salomó G, Farías M, Goycoolea M, Quiroga T, Mardones F. Normal plasma insulin and HOMA values among Chilean children and adolescents. Rev Med Chile 2011; 139: 1444-1452.

Key words: Insulin,insulin resistance,children,metabolic syndrome.

ASSOCIATION OF PRE AND POST NATAL GROWTH WITH METABOLIC SYNDROME COMPONENTS DURING CHILDHOOD

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Background and objectives: Fast weight gain and linear growth in children in the first two years of life have been recently proven to result in substantial gains in height in schooling in relatively poor countries (Adair LS et al. Lancet 2013; published online). We aimed to assess the relative influence of weight gain and linear growth at 6 and 10-13 years old on metabolic syndrome (MS) components and insulin resistance (IR).

Methods: We used data of 20 public schools (n=1556) from a relatively low income area of Santiago, Chile. Retrospective information on perinatal variables and anthropometry at 6 years old was obtained. Present data on MS and HOMA-IR was also obtained. In order to account for linear growth in height and weight on the MS components, we used the so-called conditional weight gain method. To quantify the odds ratio (OR) of non normal values, logistic regression models were used.

Results: Birth length (BL) was almost significantly associated with waist circumference (WC), decreasing the odds of WC (OR: 0.93 (0.87-1.00)). Birth weight (BW), relative or conditional on BL, also decreased the odds of WC (0.45 (0.35-0.57)).Relative height gain at 6 years old increased the odds of triglycerides (TG) (1,04(1,02-1,06)), IR (1,05(1,03-1,08)) and MS (1,05(1,01-1,09)).Relative weight gain at 6 years old increased the odds of HDL (1.05(1.01-1.09)), TG (1.11(1.07-1.15)), blood pressure (BP) (1.07(1.03-1.12)), IR (1.22(1.17-1.27)) and MS (1.21(1.15-1.28)).Height gain to present examinations increased the odds of glycemia (GLI) (1,08(1,05-1,11)), HDL (1,02(1,001-1,05)) and IR (1,09(1,07-1,11)). Relative weight gain to actual examination increased the odds of HDL (1.05(1.03-1.07)), TG (1.07(1.06-1.09)), BP (1.04(1.02-1.06)), HOMA (1.15(1.13-1.18)) and MS (1.13 (1.10-1.16)). All variables were inversely associated to WC.

Conclusion: Linear excess height gain and relative weight gain increases the risk of having MS at 10-13 years old, and its components, except for WC that performs in the opposite way.

Key words: Childhood, metabolic syndrome, obesity, anthropometry, insulin resistance, blood lipids, blood pressure.

PS5-65 Metabolic and nutritional aspects of genetic diseases

THERAPEUTIC STRATEGIES IN ORGANIC ACIDURIAS

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Propionic (PA) and methylmalonic acidurias (MMA) are the most frequent forms of branched-chain organic acidurias. PA is caused by genetic defects in either alpha or beta subunits of the nuclear encoded mitochondrial protein propionyl-CoA carboxylase (PCC) and four defects involved in B12 transport, synthesis of active cofactor adenosylcobalamin (AdoCbl) and for the apoenzyme methylmalonyl-CoA mutase (MUT) causing MMA. Currently there is no cure for these diseases and therapeutic options include dietary restriction of substrates and carnitin and pharmacological biotin and cobalamin supplementation is part of the usual treatment. Efforts are now being directed towards exploring alternative therapies based on identifying new targets in the context of personalized medicine. The analysis of the mitochondrial dysfunction performed in the primary dermal fibroblasts have revealed the presence of high doses of ROS species and subsequent release of apoptosis pathway and also mitochondrial bioenergetic impairment and fission of the mitochondrial reticulum. Multiple combinations of conventional and novel pharmacological and nutritional interventions to improve the oxygen consumption which increase energy metabolism and to ROS scavenger in specific tissues organs will be necessary. In fact, the vitamin B12 and others antioxidants ameliorate the ROS content in patients-derived fibroblast. Additionally, we have obtained promising results on antisense therapy to rescue and modulate the splicing process caused by deep intronic mutations and we have also generated a proof-of-concept to use read-through drugs to translate transcripts bearing nonsense changes. Finally, we have detected some pharmacological chaperones, small compounds which are able to increase the activity of the some destabilizing mutant forms of adenosylcobalamin transferase protein affected in MMA cblB. In summary, the knowledge gained from the comprehensive study of the genetic and functional basis of these diseases has enabled us to generate proof-of-principles to use genetic and pharmacological drugs as possible therapeutic interventions for PA and MMA.

Key words: Adenosylcobalamin, propionic aciduria, methylmalonic aciduria, vitamin B12.

NUTRITIONAL ASPECTS OF PHENYLKETONURIA AND METHYLMALONIC ACIDEMIA

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Phenylketonuria (PKU) and Methylmalonic Acidemia (MMA) are inborn errors of metabolism with an autosomal recessive inheritance. In a 95% of PKU cases is due to the absence or deficiency of the enzyme phenylalanine hydroxylase. If not diagnosed and treated during the neonatal period, there is a progressive deterioration of the central nervous system (CNS) causing severe mental retardation (MR). The hydroxylase gen is in chromosome 12q22-q24.1. There are more than 600 mutations described. Treatment consists on a phenylalanine (Phe) restricted diet, based on special formulas free of Phe. MR is prevented if the Phe levels are maintained below 8.0 mg/dl, through life time. Because this is a very strict diet during school age and adolescence, the adherence to treatment diminishes considerably. For this reason new alternatives of treatment have been developed, such us the use of neutral amino acids (LNAA), glycomacropeptides (GMP) and tetrahydropterin (BH4). This last one has been very effective in variant mutations. MMA is due to the deficit of the enzyme methylmalonyl CoA or a defect in its cofactors: cblA, cblB, cblC all dependent of vitamin B12. Clinical presentation consists of hyperammonemia, metabolic acidosis, progressive CNS dysfunction leading to coma and death. Treatment in the acute phase requires a rapid removal of methylmalonic acid and ammonia by extracorporeal methods. During the chronic phase a special diet is indicated, restricted in the amino acids methionine, threonine, valine and isoleucine (MTVI). Tolerance for intact protein is low. Patients must be supplemented with special formula free of MTVI, L-carnitine (100 mg/kg/day) and B12 (10 mg/day oral or 1 mg/day intramuscular). It is important to point at the fact that an early and well controlled treatment permits normal growth and development.

Key words: Inborn errors of metabolism, methylmalonic acidemia, phenylketonuria.

OMEGA-3 FATTY ACIDS AND INBORN ERRORS OF METABOLISM

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N-3 polyunsaturated fatty acids have multiple functions under investigation in metabolic inborn errors. In premature infants and neonates, functions in visual and neurological development have been shown; however, their effects are still being studied on certain chronic neurological diseases, inflammatory and metabolic disorders. Docosahexaenoic acid (DHA) is a n-3 polyunsaturated fatty acid with multiple functions conferred under study. The DHA requirements are not fixed but recommendations must be based on inputs that mimic the composition of breastfeeding, and in older children and pregnants or in lactation, ensure to intake a similar quantity as the intake of oily fish at least twice a week. It is essential to recognize the need for supplementation of DHA in some diseases that restricted diets or may induce altered metabolism resulting in deficit, and to found scientific evidence on its effects. The aim of this review is to examine the effects of long chain polyunsaturated fatty acids supplementation in preventing cognitive impairment or retarding its progress, and nutritional deficits, in children with inborn errors of metabolism. All double-blind, placebo-controlled, randomized trials, and other studies in which supplements of omega-3 were administered in children with inborn errors, or studies that evaluate omega-3 fatty acids status in plasma in these pathologies, were analyzed. Few randomized controlled trials fulfilled the inclusion criteria for this specialized review but there is evidence that, in several inborn errors in children, there is a deficit in omega-3 fatty acids, and supplementation may improve function, or prevent the progression of impairment. Nonetheless, further investigations are needed on this issue.

Key words: Amino acid metabolism, children, docosahexaenoic acid, omega-3 fatty acids, peroxisomal disorders, urea cycle disorders.

STRATEGIES FOR SEARCHING GENETIC CAUSES OF NUTRITION-RELATED EXTREME METABOLIC PHENOTYPES

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The arrival of novel genetic technologies offers an unprecedented capacity for the analysis of the human genome and for the understanding both rare and common human diseases. In the last years, the combination of exome/genome sequencing, analysis of the genome-wide landscape of insertions-deletions, linkage analysis, and the application of -omics disciplines (notably metabolomics) have been used as a powerful weapon to disentangle genetic causes of metabolic diseases. As an example of the application of these technologies, a syndrome characterized by epilepsy and neurological impairment was linked to mutations in the enzyme Branched-Chain Ketoacid Deshydrogenase Kinase (Novarino et al. Science 2012; 338: 394-397), opening the possibility of a personalized treatment based on the dietary supplementation of branched-chain amino acids. A number of genetic strategies have been used in the discovery of new genetic mutations causing metabolic diseases in Chile. We show the identification of mutations in Chilean families with multiple affected cases of early-onset cholesterol gallstone disease through whole-exome sequencing. Through a genome-wide analysis of genetic markers, we identified a nonsense mutation in the APOA5 gene in a Chilean consanguineous family with multiple affected cases of severe hypertriglyceridemia. Using a targeted-sequencing approach, we have also found mutations involved in the Lecithin: Cholesterol Acyltransferase deficiency characterized by very-low plasma HDL-cholesterol levels, congenital generalized lipodystrophy causing diabetes and extreme leanness, bile acid inborn errors such as cerebrotendinous xantomathosis, Niemann-Pick Type B disease and monogenic forms of diabetes and obesity. The combination of cutting-edge genomic, metabolomic and molecular technologies constitutes a powerful weapon to find causes of genetic disorders, with potential application in common multifactorial nutrition-related diseases. The identification of genetic causes of rare metabolic conditions leads to accurate molecular diagnoses and, in some cases, to personalized nutritional or pharmacological treatments.

Key words: Metabolic diseases, genetics, diabetes, obesity, lipid disorders.

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T2 NUTRITION THROUGH LIFE COURSE

NPS1-2 Efficacy of lipid-based nutrient supplements for prevention of maternal and infant undernutrition in Africa: Results of the iLiNS Project

INTRODUCTION TO THE INTERNATIONAL LIPID-BASED NUTRIENT SUPPLEMENTS (ILINS) PROJECT

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Tackling undernutrition, including micronutrient deficiencies, is a high priority and potentially high-return development investment. Infants, young children and pregnant and lactating women in lower income countries are most vulnerable due to their high nutrient requirements and limited access to nutrient-rich foods. For these groups, innovative and low-cost approaches are needed to fill gaps in essential nutrients. The goal of the iLiNS Project is to provide information on the use of lipid-based nutrient supplements (LNS) to reduce undernutrition. LNS are a family of products designed to deliver nutrients to vulnerable groups. In addition to providing multiple micronutrients, LNS also provide energy, protein, and essential fatty acids. Drawing on the positive experience with LNS for the treatment of acute malnutrition, the iLiNS Project focuses on developing LNS products for prevention of undernutrition, particularly child stunting, and evaluating their impact. The iLiNS Project includes four randomized controlled efficacy trials in Malawi, Ghana, and Burkina Faso, designed to answer key questions about the efficacy of "small-quantity" LNS (generally 20 g/d, ~118 kcal/d). The trial LNS products were developed to be mixed with and enrich locally available foods, and not to replace them. Two of the trials (iLiNS-DOSE and iLiNS-ZINC) targeted children beginning at 6 or 9 months of age, respectively, following them to 18 months of age. Two other trials (iLiNS-DYAD) are evaluating the impact of LNS developed especially for and given to women during pregnancy and the first 6 mo of lactation, as well as child-LNS provided to their children from 6 to 18 months. The iLiNS Project also extends beyond efficacy trials to explore a range of socioeconomic issues, including cost-effectiveness, willingness to pay for the LNS products, and possible product delivery systems.

Acknowledgement: Bill & Melinda Gates Foundation and the U.S. Agency for International Development's FANTA project, managed by FHI 360.

Key words: Infants, lipids, women, pregnancy, undernutrition.

EFFICACY OF REDUCED-COST LNS FORMULATIONS FOR INFANTS AND YOUNG CHILDREN IN MALAWI: THE ILINS-DOSE TRIAL

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Background and objectives: Complementation of infant diet with lipid-based nutrient supplements (LNS) has been suggested to improve growth and reduce morbidity. The daily quantity and the milk content of LNS affect its cost . The iLiNS Project developed different formulations of lipid-based nutrient supplements (10, 20 or 40g/d, with and without milk powder) for infants and children, to enrich complementary food with essential fatty acids, high quality protein and micronutrients. To evaluate the efficacy and safety of various formulations of LNS in infants and children.

Methods: Randomized single blind controlled trial enrolling six month old infants. Infants were randomized to one of six groups to receive daily 10, 20, or 40 g of LNS containing milk powder, 20 or 40 g of milk-free LNS, or no supplement until 18 mo of age. The daily ration contained approximately 1 RDA of micronutrients and 56 to 243 kcal of energy. The food supplements were delivered at home at 2 week intervals. Participants underwent a morbidity evaluation weekly, a limited development assessment 4-weekly, anthropometric evaluation at 26-week intervals and laboratory analyses at enrollment and at

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18 mo. Growth and complete developmental assessments were done at 18 months.

Results: In total 1932 infants were enrolled of whom 1556 completed follow up at 18 months. During the follow-up period 81 children died while 295 dropped out for various reasons. The effects of the intervention on length, changes in anthropometric indices, anaemia and incidence of adverse events will be presented.

Conclusion: The effect of various doses of LNS in comparison to no supplementation will be discussed.

Acknowledgement: Bill & Melinda Gates Foundation

Key words: Lipid-based nutrient supplements, child growth, efficacy.

SMALL-QUANTITY LIPID-BASED NUTRIENT SUPPLEMENTS TOGETHER WITH MALARIA AND DIARRHEA TREATMENT IMPROVE GROWTH AND NEUROBEHAVIORAL DEVELOPMENT IN YOUNG BURKINABE CHILDREN

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Background and objectives: Supplementing young children's diets with small-quantity lipid-based nutrient supplements (SQ-LNS) is a promising strategy to prevent growth restriction and improve development, but the optimal amount of zinc to include in these products is uncertain. We assessed zinc-related functional responses among young Burkinabe children who received micronutrient products (SQ-LNS containing 0, 5 or 10 mg of zinc and 5 mg zinc or placebo tablets) provided with or between meals.

Methods: In a partially masked, placebo-controlled, randomized trial, 34 communities were assigned to immediate (II) or delayed intervention (DI). 2469 eligible II children were randomly assigned to receive 20g LNS/d with varying contents of zinc along with zinc or placebo tablets, and treatment of malaria and diarrhea from 9-18 months of age. Children in DI (n=797) received neither SQ-LNS nor morbidity treatment. Length, weight and mid-upper arm circumference (MUAC) were measured at 9 and 18 months in all children. Motor, language, and personal-social development was assessed at 18 months in a randomly selected subgroup (n=747 II; n=376 DI).

Results: Reported compliance was 95% for SQ-LNS and tablets. Length, weight, MUAC, and developmental scores were significantly greater at 18 months in children who received SQ-LNS and morbidity treatment ($p<0.001$) compared to children in DI. Stunting prevalence at 18 months was 39% in children in DI and significantly reduced to 24 – 33% in children in the II groups ($p<0.0001$). There was no difference in growth, stunting prevalence or development among the four II groups, which are still blinded.

Conclusions: Providing 20g of LNS daily with or without zinc along with malaria and diarrhea treatment significantly improved growth and motor, language, and personal-social development and reduced stunting prevalence in young Burkinabe children.

Acknowledgement: Funded by the Bill & Melinda Gates Foundation.

Key words: lipid-based nutrient supplement, LNS, growth, stunting, neurobehavioral development.

EFFICACY OF LNS PRODUCTS FOR PREGNANT AND LACTATING WOMEN: PREGNANCY OUTCOMES FROM THE ILINS-DYAD STUDIES IN GHANA AND MALAWI

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Background and objectives: Nutrient deficiencies are common among pregnant women in low-income countries. The iLiNS Project developed small-quantity lipid-based nutrient supplements (LNS, 20 g/d, ~118 kcal) for pregnant and lactating women, to enrich local diets with essential fatty acids, high-quality protein and micronutrients. To examine the effects of LNS, multiple micronutrient (MMN) tablets, and iron-folic acid (IFA) tablets on pregnancy outcomes in Ghana and Malawi.

Methods: Randomized, partially double-blind, controlled trial enrolling pregnant women < 20 wk gestation) attending ante-natal clinics. In all, 1320 women in Ghana and 1391 in Malawi were randomized to one of three treatments daily: (a) IFA (60 mg Fe, 400 mcg folic acid); (b) MMN containing 1-2 RDA of 18 micronutrients including 20 mg Fe, and (c) LNS with similar micronutrient content as MMN, plus Ca, P, K,

Mg. Baseline data were collected at enrollment. Women were visited biweekly until delivery. Blood and urine samples were collected at enrollment and at 36 wk gestation. Birth weight was measured within 48 h after delivery; other measurements (length, head circumference) were generally performed within 48 h in Ghana and within 14 days in Malawi.

Results: Mean gestational age at enrollment was 16 wk in both sites. In total, 1294 women in Ghana and 1302 women in Malawi were followed through delivery (or termination of pregnancy). Attrition was mainly due to permanent relocation from the study site. Pregnancy outcome data are currently being analyzed. The effects of the intervention on birth weight and length, duration of pregnancy and maternal anemia will be presented.

Conclusion: The effect of LNS in comparison to MMN and IFA on pregnancy outcomes will be discussed.

Acknowledgement: Bill & Melinda Gates Foundation and the U.S. Agency for International Development's FANTA project, managed by FHI 360.

Key words: Lipid-based nutrient supplements, multiple micronutrients, pregnancy outcomes.

WILLINGNESS-TO-PAY FOR LNS PRODUCTS AND COST-EFFECTIVENESS ESTIMATES FOR THE ILINS PROJECT SITES

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Background and Objectives: Households' perceived benefits, i.e., their stated willingness-to-pay (WTP), from consuming small-quantity lipid-based nutrient supplements (LNS) influence the economic viability of retail outlets for them, and, alongside comprehensive estimates of the products' cost-effectiveness (CE), can help guide public policy action when WTP falls short of LNS costs. This presentation will provide preliminary evidence on WTP and CE estimates for LNS products tested in the context of the International Lipid-Based Nutrient Supplements (iLiNS) Project in Malawi, Ghana and Burkina Faso.

Methods: Field-based contingent valuation methods provide estimates of WTP for LNS for pregnant/lactating women (LNS-P&L) and for children 6-24 mo of age (LNS-child). Experimental auctions provide incentive-compatible estimates of WTP for LNS-P&L (Ghana). Estimates of LNS production, transportation, distribution and household consumption costs are taken from iLiNS Project sites. CE estimates will be reported for birth outcomes (Malawi and Ghana), and for linear growth (Burkina Faso and Malawi-DOSE).

Results: Hypothetical WTP at baseline for LNS-child (one 20g sachet) was approximately US$0.39 (Ghana), US$0.23 (Burkina Faso) and US$0.20 (Malawi-DOSE). Hypothetical WTP at baseline for LNS-P&L (one 20g sachet) was approximately US$0.56 (Ghana) and US$0.17 (Malawi-DYAD). Experimental WTP for LNS-P&L was approximately US$0.25 per 20g sachet (Ghana). Several household characteristics that could be used for programmatic targeting, e.g., number of children under five years of age, were associated with WTP. CE results are still in progress.

Conclusions: Hypothetical WTP is greater than zero for most respondents in all study areas and average WTP is above expected average national production costs for all LNS products; hence, LNS products may be commercially viable. However, significant proportions of respondents reported WTP below expected average production costs, especially in Malawi, signaling the need for alternative mechanisms for reaching resource-poor households.

Acknowledgement: Funded by the Bill & Melinda Gates Foundation.

Key words: Willingness-to-Pay; LNS Products; Cost-Effectiveness.

THE BREASTFEEDING, ANTIRETROVIRALS, AND NUTRITION (BAN) STUDY IN MALAWI: USE OF QUALITATIVE METHODS TO GUIDE STUDY DESIGN AND EVALUATION OF A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Qualitative research can be used to ensure that study interventions are culturally appropriate and that they have been implemented as expected. To use qualitative methods to inform the design and evaluate the implementation of the Breastfeeding, Antiretrovirals, and Nutrition (BAN) study.

Methods: In-depth interviews with HIV-infected mothers, health providers and community leaders (n=73); focus group discussions with pregnant women, fathers, and grandmothers (n=12); home observation visits, including 24h dietary recalls (n=35); and taste tests of maternal nutritional supplements (n=52) guided study design. In-depth interviews with women who had completed the BAN study (n=45) assessed the acceptance and feasibility of exclusive breastfeeding for 6 months and of using lipid-based nutrient supplements (LNS) as a breastmilk replacement in 24-48 week infants.

Results: Based on formative research, the original BAN study design was modified in several ways: a pictorial guide was developed for the consent process, the amount of blood drawn from infants was kept to a minimum, the period of weaning was lengthened from a few days to 4 weeks, a nutritional supplement for weaned infants was added, and a nutritional supplement for lactating mothers was selected. Interviews after the study indicated that exclusive breastfeeding and early weaning were feasible and women felt supported by study nurses. LNS was accepted as a breastmilk replacement and incorporated into usual infant diets.

Conclusions: Qualitative research conducted before and after the BAN study proved beneficial in assuring the cultural acceptance of study procedures and allowed researchers to assess the success of study implementation.

Key words: Antirretrovirals, breastfeeding, infants, nutrition, weaning.

PS1-2 Nutrition and lifestyle in adolescents: The HELENA study

VITAMIN STATUS IN ADOLESCENTS: IS THERE A NEED FOR INTERVENTION?

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Research in recent years has shown that vitamin biological activities are much broader than expected, specifically during childhood and adolescence, in the setting of risk factors. In the frame of the HELENA study, selected B-vitamins and antioxidant vitamins have been analysed. Mean concentrations were: Retinol: 356.4±107.9 ng/mL; α-tocopherol: 9.9 ± 2.1 ìg/mL; vitamin C: 10.3 ± 3.3 mg/L; and β-carotene: 245.6 ± 169.6 ng/mL. 25% had β-carotene deficiency and less than 5% for á tocopherol deficiency. Females showed higher α-tocopherol and vitamin C values compared with males and 17-year-old boys had higher retinol levels than the same-aged girls (p = 0.018). Retinol serum concentrations increased significantly according to age in both gender, but girls had also significantly increasing â-carotene levels by age. Almost 80% of the sample had suboptimal 25-hydroxyvitamin D [25(OH)D] levels (39% had insufficient, 27% deficient and 15% severely deficient levels). Vitamin D concentrations increased with age (p<0.01) and tended to decrease according to BMI. Following the current cut-off for adults, 2% of the adolescents had low cobalamin and 5% had low holo-transcobalamin concentrations. Approximately 35% of the subjects had plasma folate insufficiency with levels <13.6 nmol/L and 15% PF deficiency with levels <10.2 nmol/L. 27% of the adolescents could have insufficient RBC folate levels (<566 nmol/L). Five percent had PLP concentrations <20 nmol/L and 20% <30 nmol/L. Moreover, 5% had high tHcy. THcy increased (P < .001) and PF (P < .001) concentrations decreased across age categories. 71% of the females had RBC folate concentrations below the cut-off of 906 nmol/L (400 ng/mL) that is the protective level set against folate-dependent neural tube defects. Our results indicate that vitamin D deficiency is highly prevalent condition in European adolescents and should be a matter of concern for public health authorities. Followed by â-carotene, folate and vitamin B6 concentrations.

Key words: Cobalamin, folate, homocysteine, neural defects, vitamin D.

PS2-10 Energy balance and active living

PERSPECTIVE ON THE INFLUENCE OF PHYSICAL ACTIVITY ON HUMAN APPETITE AND ENERGY BALANCE

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The effect of physical activity (PA) on energy balance (EB) goes beyond the measurement of energy expended (EE) in exercise or daily activities (sometimes referred to as NEAT). This is because PA influences not only EE but also has an impact of energy intake (EI). Does sedentariness downregulate EI to prevent a positive energy balance? and does PA upregulate EI to prevent a negative energy balance? Logic suggests that a sedentary lifestyle promotes weight gain. Although not all large scale surveys or cross cultural studies have supported this concept, it seems likely that when people change from an active to a sedentary lifestyle, eating habits are not adjusted therefore favouring a positive EB and tendency for weight gain. The effect of raising PA EE through exercise is also intensively under investigation. One classic view is that when PA EE is increased then compensation occurs (decrease in non-exercise EE or increase in EI) to prevent any change in EB. In intervention studies in which exercise is both mandatory and supervised a weight loss is normally observed. However, the individual variability is very large with some people losing large amounts of weight and others (approximately 15%) gaining weight. The important fact is that the weight lost is almost entirely fat tissue whereas the weight gained is lean tissue (fat-free mass).

This indicates that body weight itself is a very poor indicator of the response to PA and should not be given importance. More significant is the change in body composition. Moreover, following PA (even in those people who gain weight) there are significant health benefits including reductions in blood pressure and heart rate, plasma insulin, waist circumference (and therefore visceral fat) and increases in cardiovascular fitness.

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Key words: Appetite, body composition, physical activity, energy balance, exercise.

COMPLEXITY OF METHODOLOGIES FOR STUDYING ENERGY BALANCE

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The study of energy balance can involve many difficult and specific questions. These questions may relate to whether energy compensation occurs under a particular set of circumstances, whether some circumstances cause differential energy compensation to a perturbation than other circumstances, precise measurement of the amount of compensation that occurs, or the behavioral, biological, or energetic mechanisms through which any compensation occurs. Methodology will need to vary as a function of the question asked. Pertinent factors will include sample size consideration, selection of appropriate control conditions, and especially measurement issues. Theoretical and empirical aspects will be discussed and examples provided.

Key words: Enegry balance, energy compensation.

PHYSICAL ACTIVITY: IMPACT ON MORTALITY AND MORBIDITY

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Sedentary habits are highly prevalent in most countries of the world. In the U.S. approximately 25-35% of adults are inactive, meaning that they have sedentary jobs, no regular physical activity program, and are generally sedentary around the house and yard. Given that sedentary and unfit individuals are at approximately two-fold higher risk for many health conditions than those who are moderately active and fit, the population attributable risk (PAR) of inactivity is high. In the Aerobics Center Longitudinal Study (ACLS) the PAR for low fitness in more than 50,000 women and men followed for many years is 16-17% of deaths. This is far higher than other putative risk factors for mortality. For example, obesity accounts for 2-3% of deaths in this cohort. Another example from the ACLS is that in 3,293 obese men (BMI „d30.0), 27% of the deaths might have been avoided if none of the men had prevalent cardiovascular disease at baseline whereas 44% of the deaths might have been avoided if none of the men had been unfit. The independent relative risks for death are comparable for prevalent cardiovascular disease (RR=2.4) and for low fitness (RR=2.3). Over the past few decades we have largely engineered the need for physical activity at home, on the job, and during leisure-time out of the daily lives of most people in industrialized societies. To address the major public health problem of physical inactivity we will need to consider and evaluate societal, environmental, and individual approaches to making physical activity more common for more people more of the time.

Key words: Exercise, inactivity, physical activity, sedentarism, cardiovascular disease

PERSPECTIVE ON THE INFLUENCE OF DIET/FOOD CONSUMPTION ON ENERGY BALANCE

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Energy balance refers to the integrated effects of diet, physical activity, and genetics on growth and body weight over an individual's lifetime. Energy density is a relatively new concept that has been identified as an important factor in body weight control in adults and in children and adolescents. Environmental changes over the past two decades have increased sedentary behaviors, decreased physical activity, and increased consumption of more energy dense foods and larger portion sizes. Although an imbalance in energy consumption and expenditure are required to promote inappropriate weight gain, the relative contributions of each remain not well characterized, mainly due to the lack of appropriate methodology to evaluate energy balance or lacking of updated data for many countries. An important gap in knowledge concerns the role of diet composition in energy balance. Moreover, since diet is increasingly being more complex and not well known. The role of macronutrients in energy balance will be discussed. Moreover, some nutrients have been proposed to have bioactive attributes that may differentially impact energy balance (e.g. dietary resistant starch or some amino acids). Studies addressing the impact of diets varying in levels of protein, carbohydrate, fat, phytochemicals, or ethanol on appetite, food selection and intake, and energy expenditure will be evaluated, but also studies assessing life-stage, racial/ethnic, and gender-related factors underlying response to diet composition, including studies in

children, adolescents, and adults of various ages. Finally, a picture of food consumption (availability) evolution, both globally and for different regions of the world, along with the drivers largely responsible for these observed consumption trends are also attempted, mainly how may be affecting energy balance maintenance.

Key words: Energy balance, energy density, diet, nutrients, physical activity

PS2-18 Healthy life style promotion

LIFESTYLE INTERVENTIONS ON WEIGHT LOSS AND CARDIOMETABOLIC RISK FACTORS

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Obesity and low physical activity have both been implicated in insulin resistance and type 2 diabetes mellitus as well as impaired muscle function with normal aging. Evaluating the potential of weight loss and exercise interventions to improve cardiometabolic risk is clearly relevant to the prevention or treatment of diabetes and cardiovascular diseases and age-related dysfunction. This presentation provides an overview and critical evaluation of the effects of weight loss and exercise interventions on skeletal muscle metabolism, along with implications for insulin resistance, obesity, type 2 diabetes and aging. The available literature strongly suggests that insulin resistance and impaired energy metabolism associated with obesity, type 2 diabetes and aging is not an irreversible lesion. However, it us unclear whether weight loss is sufficient to improve or normalize this, or whether increased physical activity is requisite or additive in its effect. In summary, studies of diet and exercise training have advanced our understanding of the links among obesity, physical fitness, insulin resistance, obesity, type 2 diabetes and aging. Nevertheless, additional inquiry is necessary to establish the significance and clinical relevance of those perturbations, which could lead to targeted therapies for a myriad of conditions and diseases.

Key words: Obesity, diabetes, aging, weight loss, exercise

COMBINED EFFECT OF EXERCISE AND DIET ON FAT MASS AND LEPTIN RESISTANCE

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Obesity should be treated by reducing energy intake and/or increasing energy expenditure to achieve a negative energy balance. One of these interventions alone produces only a moderate loss in mean weight (2-3 kg or less); while dieting in combination with exercise for 3-12 months reduces body weight by an average of 1.1 kg more than simply dieting. A more pronounced reduction in body mass can be achieved much more rapidly (i.e., within 3-10 days) by combining severe caloric restriction, with extensive daily exercise. The latter approach sustained during 30 weeks has led to fat mass losses comparable to bariatric surgery. Leptin is a hormone produced by the adipocytes that regulates appetite, basal metabolic rate and muscle fat oxidation. Plasma leptin concentration is proportional to fat mass. However, with severe energy deficit, plasma leptin concentration is remarkably decreased, far beyond the reduction in fat mass. Moreover, we have observed a progressive increase of leptin plasma concentration after a short period of a severe energy deficit (~6000 Kcal/day) as soon as the energy intake was increased, despite a persistent negative energy balance. This could indicate some degree of leptin resistance or just an elevation of leptin concentration in response to reduced physical activity. In fact, plasma leptin concentration increases after bed rest even without significant increases in fat mass. Skeletal muscle leptin receptors (LPR) show great plasticity. LPR are reduced in skeletal muscles of obese, while are increased by chronic overload in the dominant arm of tennis players. Under severe energy deficit, the expression of LPR is reduced in skeletal muscle, but this effect is blunted by exercise. Thus, the combination of exercise with diet, not only allows a faster and greater loss of fat mass, but also tends to preserve skeletal muscle leptin sensitivity to a greater degree.

Key words: Exercise, fat mass, leptin, obesity

GENE HEALTHY LIFESTYLE INTERACTIONS IN TYPE 2 DIABETES

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Obesity and type 2 diabetes are major global health concerns owing to their rapidly increasing prevalences and the se-

vere burden they impose on affected individuals and healthcare systems. These diseases share behavioral and genetic determinants, with obesity frequently preceding the onset of diabetes. Genome-wide association studies (GWASs) have motivated a major transition in the way single nucleotide polymorphisms (SNPs) that predispose to obesity, diabetes and many other complex traits are discovered. For almost all common complex diseases, the number of confirmed genetic risk variants has increased manifold in the past three years. Until 2006, only a handful of SNPs had been equivocally associated with type 2 diabetes or common obesity. Today, the identities of >60 independent diabetes or obesity predisposing loci are known, most of which were discovered using GWASs. These discoveries have rejuvenated interest in the role of genetics in personalized medicine. However, the successful translation of this information into the clinical setting is predicated on two assumptions; i) the level of risk conveyed by a genetic variant is clinically meaningful, and ii) if so, genetic risk can be offset through clinical intervention. Few studies have evaluated these points. Moreover, if gene variants exist that exert their effects in the presence of certain environmental conditions/lifestyle behaviors and not in others, many risk variants may be undetectable when using conventional gene-discovery approaches. Thus, novel approaches accounting for lifestyle-dependent effects may uncover new risk variants, indicate ways in which genetic risk can be ameliorated, and identify the most susceptible subgroups of the population in which early intervention may be appropriate.

In my talk I will define the concept of interaction as used in population genetic research; I will overview the evolutionary background to why gene variants might act in lifestyle-dependent ways (i.e. interact with diet and exercise) to influence disease risk; I will provide examples of interaction effects from experimental and observational studies; and I will outline some of the factors that inhibit the detection, interpretation and clinical translation of interaction effects.

Key words: Genes, gene variants, GWAs , obesity, type 2 diabetes, SNPs

PS3-26 Scaling up nutrition to improve infant and young child feeding (IYCF) (Alive & Thrive)

MOTIVATING FRONTLINE WORKERS TO DELIVER IMPROVED INFANT AND YOUNG CHILD NUTRITION SERVICES: A CROSS-COUNTRY PERSPECTIVE

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Background and objectives: Frontline health workers (FHW), paid or volunteer, are the first, and often only, point of contact with health care systems for millions of people. They deliver lifesaving interventions, including counseling to change health behaviors. Although limited knowledge, skills, incentives, supervision, and time can lead to inadequate infant and young child feeding (IYCF) services, little is known about nutrition-related skills, motivations and capacities of FHWs worldwide. Our objective was to document FHW technical knowledge about IYCF practices, study IYCF-related activities and assess factors associated with FHW motivation.

Methods: We used data from surveys of 5 types of FHWs and 3 supervisor-level staff from 3 countries - Bangladesh, Ethiopia, and Viet Nam. Data were gathered on FHW knowledge about nutrition, training exposure, and perceptions about supervision and job motivation. We developed scales to measure motivation and conducted regression analysis to identify major predictors of motivation.

Results: FHW knowledge was good for breastfeeding, but gaps existed in knowledge about complementary feeding. Training exposure in IYCF across the 3 countries was variable, with greater exposure to training about breastfeeding in Ethiopia than the other two countries. FHWs uniformly noted high levels of intrinsic motivators, like feeling valued by the community, but high work pressure and extrinsic motivators like financial remuneration and training could affect performance. FHWs seem well connected with and well supported by supervisory systems in all three countries. Regression results demonstrate that supportive supervision and training are associated with higher scores on motivation scales for all three countries.

Conclusion: Our results signal important gaps in IYCF knowledge of FHWs in all three contexts, and suggest that establishing solid training programs and supervision systems are important to build capacity and maintain FHW motivation.

Acknowledgement: Funded by the Bill & Melinda Gates Foundation to Alive & Thrive, managed by FHI 360.

Key words: Fontline health workers, child feeding, infants

ALTERNATIVES TO RANDOMIZED CONTROL DESIGNS: EVALUATION OF A MASS MEDIA CAMPAIGN WHERE TELEVISION IS UNIVERSAL, LESSONS FROM VIET NAM

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In 2009, when Alive & Thrive began operating in VietNam, the exclusive breastfeeding rate nationally was 17%. In addition to providing counseling on infant and young child feeding to pregnant women and new mothers, a nationwide mass media

campaign promoted six months of exclusive breastfeeding. The campaign focused on television, viewership of which is near universal, and targeted women's knowledge of breastfeeding, prevalent misconceptions, and social norms. Without the possibility for a control group, this posed a challenge to designing an evaluation to determine the extent to which such a campaign could influence breastfeeding behaviors.

Rather than a single design, evaluators opted to implement multiple approaches to the evaluation to build evidence for the plausibility that changes were attributable to the campaign. These approaches included: 1. Trend analysis, using annual national nutrition data, comparing the slope of breastfeeding trends before, during and after the campaign; 2. Trend analysis of behaviors, knowledge, misconceptions and beliefs about social norms through repeated household surveys implemented during the airing of the campaign and comparing these trends among women who reported exposure to the campaign and those who did not; 3. A constructed cohort design, which uses post-campaign data to predict the likelihood of exposure among women surveyed before the campaign, to proxy an "unexposed" comparison group at baseline. 4. Using the natural geographical variation in exposure to the campaign to compare breastfeeding behaviors in high and low exposure areas. Lessons learned to date from the implementation of these four approaches will be shared. Results of three rounds of household surveys will be presented focusing on defining various exposure categories and comparing breastfeeding knowledge, misconceptions, beliefs about social norms and ultimately behaviors across these categories.

Acknowledgement: Funded by Gates Foundation to Alive & Thrive, managed by FHI 360.

Key words: Mass media, breastfeeding, evaluation, Vietnam

EVIDENCE LINKING HANDWASHING TO IMPROVED CHILD FEEDING OUTCOME

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Background and objectives: Handwashing with soap can prevent childhood infections; reduced infections and improved complementary feeding can reduce malnutrition. We describe formative research to link handwashing with soap to complementary feeding and an intervention trial.

Methods: A formative study on perceptions, practices, barriers and motivators, among households across three districts in Bangladesh, with a child 6-23 months of age given complementary food included video data collection, motivational exercises, indepth interviews, and focus group discussions. An intervention trial of an integrated handwashing and complementary feeding included qualitative studies and baseline-endline surveys among up to 450 households.

Results: Distant location of soap and water from the child feeding place was a common barrier to handwashing with soap before child feeding; commonly water only was used. Limited knowledge of the link between handwashing with soap around food events and childhood disease prevention was detected. Facilities that brought soap and water together, located near the kitchen was a motivator and reminder for handwashing with soap. By the trial end, 65% of participants were observed washing hands with soap at key times, 75% reported that they intended to adopt and continue, 83% followed complementary feeding recommendations, the main motivators being child health and convenience. Trial target handwashing practice was associated with intervention component exposure, handwashing facility near the kitchen and perceived link between disease and handwashing. Acceptable complementary feeding was associated with wealth, older child age and intervention component exposure.

Conclusions: The integrated handwashing and improved complementary feeding intervention was acceptable and feasible. Handwashing facilities location increase convenience and facilitate handwashing. Increasing knowledge on complementary feeding and links between handwashing and disease prevention were incorporated into a national media campaign to motivate behavior change.

Acknowledgement: Funding was provided by the Gates Foundation through Alive & Thrive, managed by FHI 360.

Key words: Complementary feeding, handwashing

PS3-34A Nutrients and exercise performance – What is the evidence behind recent claims of major benefits?

REVISITING THE ERGOGENIC PROPERTIES OF L-CARNITINE

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More than 95% of the body's carnitine is found in skeletal muscle where it translocates fatty acids into the mitochondrial matrix for β-oxidation via carnitine palmitoyltransferase 1 (CPT1), and buffers excess acetyl-CoA from the pyruvate dehydrogenase complex (PDC) during high glycolytic flux as a via carnitine acetyltransferase. Not surprisingly oral L-carnitine feeding has been advocated as an ergogenic aid. However, scientific interest in L-carnitine as an ergogenic aid declined

during the 1990s when it became apparent that oral (2-6 g per day for 1 day to 4 months) or intravenous (up to 5 g) administration of L-carnitine alone does not increase muscle carnitine content or alter fuel utilisation during exercise. We have recently demonstrated that insulin stimulates muscle carnitine uptake, and that 12-24 weeks of L-carnitine feeding in combination with a carbohydrate beverage in order to stimulate insulin release (1.4 g L-carnitine + 80 g carbohydrate twice daily) can increase the muscle carnitine store by 20-30% and have some remarkable effects upon fuel utilisation compared to carbohydrate feeding alone. For example, the increase in muscle carnitine content in these studies resulted in reduction in muscle glycogen utilisation, and an increase in whole-body fat oxidation and energy expenditure during low intensity exercise (cycling at 50% VO2max), which is consistent with the premise that carnitine availability is limiting to CPT1. On the other hand, during high intensity exercise (cycling at 80% VO2max) an increase muscle carnitine content results in greater buffering of acetyl groups and a better matching of glycolytic flux to mitochondrial ATP production, as evidenced by increased muscle PDC activation and reduced muscle lactate accumulation. Manipulating both of these metabolic roles of carnitine will have implications for exercise performance.

Key words: Carnitine, skeletal muscle, exercise,fat oxidation,carbohydrate oxidation.

DOES PROTEIN SUPPLEMENTATION AUGMENT MUSCLE MASS AND STRENGTH?

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Dietary protein consumption following a bout of endurance or resistance type exercise stimulates muscle protein synthesis, inhibits protein breakdown and, as such, stimulates net muscle protein accretion during post-exercise recovery. Protein ingestion during and/or immediately after exercise is believed to facilitate the skeletal muscle adaptive response to each exercise session, resulting in more effective muscle reconditioning. A few basic guidelines can be defined with regard to the preferred type and amount of dietary protein and the timing by which protein should be ingested. Whey protein appears to be most effective protein source to augment post-exercise muscle protein synthesis rates. The latter is likely attributed to its rapid digestion and absorption kinetics and specific amino acid composition. Ingestion of ~20 g of a high quality dietary protein during and/or immediately after exercise is sufficient to maximize post-exercise muscle protein synthesis rates. Additional ingestion of large amounts of carbohydrate does not further augment post-exercise muscle protein synthesis rates when ample amounts of dietary protein are already ingested. Dietary protein should be ingested during and/or immediately after cessation of exercise to allow muscle protein synthesis rates to reach maximal levels. Future research should focus on the impact of the timing of protein provision throughout the day on the adaptive response to more prolonged exercise training.

Key words: exercise, nutrition, protein, muscle, strength

DIETARY NITRATE SUPPLEMENTATION AND EXERCISE PERFORMANCE

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Inorganic nitrate (NO3-)is abundant in our everyday diet and traditionally this anion has been associated with negative health effects most notable gastric cancer (Tannenbaum Nature 1985). Nitrate is also an oxidation product of nitric oxide (NO) generated endogenously, and as such it has been regarded as completely inert (Moncada NEJM 1993). Research ndsly atroviovthe(p)-

that RONS scavenging may delay fatigue during submaximal prolonged exercise but fail at high contraction intensities. In humans, N-acetylcysteine (NAC) delays muscle fatigue during submaximal exercise, but not at high intensities. However, the majority of studies in humans with antioxidant vitamins have shown no ergogenic effect during prolonged exercise. Most studies have shown that antioxidant supplementation attenuates exercise-induced oxidative stress. Several animal and human studies (but not all) indicate that regular ingestion of antioxidants may reduce the benefits of training for health and performance. This is likely due to the antioxidant inhibition of critical signaling events, like AMPK, JNK and CaMKII phosphorylation, necessary to induce the gene expression program necessary for the training structural adaptations. In addition, chronic antioxidant supplementation during training may blunt the enhancement of endogenous antioxidant systems, in part due to blunted NF-kappaB activation, increasing the vulnerability against the exhaustive nature of competitions. Ingestion of antioxidants before sprint exercise may decrease the glycolytic rate and attenuate the drop in intracellular pH, ameliorating muscle efficiency. This may reduce RONS-mediated oxidative damage, as reflected by reduced protein carbonylation in muscle and plasma. Although sprint performance depends on fast twitch (Type II) muscle fibers, which are more sensitive to RONS, exercise sprint performance is not improved by antioxidant supplementation. Well-trained athletes have increased antioxidant capacity, i.e., they should be less prone to exercise-induced oxidative stress. It remains to be determined if acute antioxidant supplementation may be more ergogenic is some populations at higher risk of increased exercise-induced oxidative stress.

Key words: Atioxidants, exercise, oxidative stres

PS3-34B Past and current experiences in leveraging multiple program and partner platforms to scale-up nutrition interventions (The SPRING project)

LEARNING FROM PAST SUCCESSES IN SCALING-UP INTEGRATED NUTRITION PROGRAMS TO INFORM FUTURE EFFORTS: DESIGN AND DELIVERY CONSIDERATIONS

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There have only been a handful of success stories in achieving large scale coverage, impact and sustained reductions in undernutrition through integrated nutrition programs. Notable successes in changing key infant feeding practices have been achieved under the LINKAGES Project in Bolivia, Ghana and Madagascar and under the Essential System for Health in Ethiopia (ESHE) Project. Additional successes in integrated nutrition programming are emerging under current USAID-funded projects, both globally and at the country level, in Nepal, Ethiopia and Bangladesh.

Many more success stories exist on scaling-up single intervention programs, such as vitamin A supplementation and breastfeeding, and with interventions delivered through the social services sector. The Strengthening Partnerships Results and Innovations in Nutrition Globally (SPRING) USAID-funded project will present a retrospective and current review of USAID investments in nutrition, including infant and young child feeding (e.g. Wellstart, LINKAGES, IYCN projects), micronutrients (OMNI, MOST, A2Z projects), nutrition and HIV (PEPFAR) and the Food for Peace program.

SPRING will present how USAID has leveraged multiple platforms for scale-up and outline promising directions for the future. More recently, USAID has prioritized leveraging agriculture programs to improve nutrition through its Feed the Future initiative. SPRING, with the support of USAID, conducted a series of Agriculture-Nutrition Global Learning Evidence Exchange (AgN- GLEE) workshops that identified and shared practical emerging best practices in linking agriculture and nutrition. Key elements of success identified through the AgN-GLEE will be highlighted. With a view toward on-going efforts in nutrition scale-up, including USAID's Feed the Future and Global Health Initiatives and within the Scaling Up Nutrition movement, SPRING will outline key steps to be considered for current and future nutrition scale-up projects, including to document achievements, measures of success that go beyond coverage and impact to include dimensions of quality, capacity building and sustainability.

Key words: Capacity building,nutrition, integration, scale-up, sustainability.

USING LESSONS LEARNED FROM EARLIER NUTRITION EFFORTS IN NEPAL TO DESIGN A MULTI-PLATFORM NATIONAL SCALE INTEGRATED NUTRITION PROJECT

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Nepal is committed to addressing chronic malnutrition through the development of the Multisectoral Nutrition Plan for Accelerating Reduction of Maternal and Child Undernutrition. The USAID-funded Suaahara project is designed to support this initiative by addressing undernutrition in women and children under-two years in 20 targeted districts (250,000 households). In partnership with Government of Nepal, particu-

larly health, agriculture, water and local development sectors, Suaahara focuses on improving health and nutrition behaviors through promotion of Essential Nutrition Actions (ENA), especially Infant and Young Child Feeding (IYCF), as well as addressing availability and access to food, hygiene, quality health care, child spacing and socio-cultural factors. It also aims to strengthen nutrition policies and programs.

Learning from a range of interventions in Nepal, Suaahara's strategy drew from Saving Newborn Lives a SCI initiative; USAID-HKI's Action Against Malnutrition through Agriculture (AAMA) and the DFID-funded Support to Safe Motherhood Program where JHU/CCP strengthened localized approaches to reach marginalized populations.

Suaahara implements behavior change at all levels to create demand for improved ENA+ policies and practices, strengthens nutrition counseling in national programs and works closely with district-level actors and community structures to build linkages across sectors. In districts that are severely food insecure, Suaahara is implementing an enhanced homestead food production model for households with pregnant women and children under two. Families receive support from village model farms, a model adapted from AAMA project that has successfully mainstreamed the ENA framework into agriculture production and created strong links with community health workers. Suaahara also promotes hygiene and sanitation behaviors through inter-personal communication in schools, events, and mass media and is expanding UNICEF's successful Community Led Total Sanitation (CLTS) approach to improve access to and use of latrines.

Key words: ENA, bBehavior change, integration

SCALING-UP NUTRITION USING SYNERGY BETWEEN HEALTH AND AGRICULTURE PLATFORMS IN BANGLADESH

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The USAID-funded SPRING Project is a five year integrated nutrition program, which aligns with the Government of the People's Republic in Bangladesh's Health, Population and Nutrition Sector Development Program as well as the US Government's Global Health and Feed the Future Initiatives. Using the 1000-day approach, the goal of SPRING/Bangladesh is to improve the nutritional status of pregnant and lactating women and children under the age of 2 in Barisal and Khulna divisions.

In an effort to scale-up nutrition, SPRING has synergized Bangladesh's existing health and agriculture platforms by building on the experience of implementing partners and carrying out several qualitative research activities. First, SPRING undertook a "Pathways to change" exercise to identifythe determinants of undernutrition among rural populations in Bangladesh. Second, SPRING reviewed the existing knowledge baseincludingUNICEF's conceptual framework on malnutrition, Helen Keller International(HKI) and John Snow, Inc.'s (JSI) experiences withimplementing essential nutrition actions(ENA),and the LINKAGES Project's experience using multiple contacts in Madagascar. Third, current health, agriculture and nutrition interventions in SPRING targeted sub-districts were mapped. Fourth, SPRING adaptedexisting materials includingthe JSI/HKI/CORE ENA trilogy, Alive &Thrive'sinfant and young child feeding and advocacy materials, WASH+ "tippy taps" model to improve hygiene practices, andthe farmer field school methodology used by the Regional Fisheries and Livestock Development Component.

This approach has allowed SPRING to identify existing resources and determine strategic partnerships. Within one year of implementation, SPRING formalized 11 partnerships across the agricultureand health sectors with government directoratesand non-governmental projects funded by diverse donors including the Bill &Melinda Gates Foundation, DANIDAand USAID. SPRING's investment in a broad strategic review of existing knowledge, practices and partnerships has allowed for improvements in project efficiency, reach, sustainability and comprehensiveness.

Key words: Nutrition, hygiene, agriculture, Bangladesh

BUILDING CAPACITY ACROSS MULTIPLE SYSTEMS TO ENHANCE NUTRITION OUTCOMES: THE ENGINE PROJECT'S APPROACH TO CAPACITY BUILDING IN ETHIOPIA

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The USAID-funded ENGINE project is a five year integrated nutrition program, which builds upon the Government of Ethiopia's existing initiatives and renewed commitment to nutrition as well as the US Government's Global Health and Feed the Future Initiatives. ENGINE supports the revision and implementation of the new National Nutrition Program and works on a number of inter-related fronts to build capacity at different levels. This includes strengthening multi-sectoral coordination, building capacity at the policy and implementation levels, strengthening pre-service education and training, supporting large-scale behavior change communication for nutrition, linking nutrition, livelihoods and food security interventions, and integrating health and nutrition with private-

public partnerships. For example, ENGINE has increased the capacity of agriculture-focused projects to integrate nutrition into their existing portfolio using an agriculture-to-nutrition pathway as an innovative approach to reveal the untapped potential of such projects to implement nutrition sensitive interventions at multiple levels. To operationalize coordination efforts, ENGINE launched a multi-sector nutrition technical working group as a forum to engage agriculture and nutrition partners in using this pathway as a practical framework to synergize and build on existing efforts to enhance nutritional outcomes in a shared zone of influence. Through this multi-partner and multi-platform approach, it is estimated that over the period from 2011 to 2016 the ENGINE project will reach about 2.7 million households with improved support to high impact nutrition interventions.

Key words: Multi-sector coordination, capacity building, nutrition.

PS4-42A Complimentary feeding and infant health (FAO)

BENFITS OF LONGER BREASTFEEDING

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The evidence is well established that breastfeeding results in a reduction of certain health risks. Debate has arisen, however, about the optimal duration of exclusive breastfeeding. The general recommendation is to breastfeed newborn babies for 6 months exclusively and then to introduce complementary foods and continue breastfeeding. In industrialized countries, earlier introduction of complementary foods is recommended for preventing food allergy. There are data suggesting such a risk reduction and therefore the argument must be taken seriously.

Considering the evidence about earlier introduction of complementary foods, it remains unclear how long the children have been exclusively and partially breastfed. It may well be that children who are breastfed exclusively for 3 months or less benefit from an introduction of complementary foods as long as they still receive partial breastfeeding. If this is true, it remains the first priority to advocate and advise for longer breastfeeding. Only if this fails, the mothers may be advised to introduce complementary foods at a time when they still breastfeed.

Key words: Breastfeeding recommendation, prevention, food allergy.

INTRODUCTION OF SOLIDS AND SEMI-SOLID FOODS: CRITICAL NUTRIENT AND ENERGY DENSITY

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In developing countries, the growth of infants is usually adequate during the first 6 months when exclusive breast feeding is practiced. However growth faltering sets in the second half of infancy when complementary feeding is introduced. Traditional complementary foods given to top up breastmilk are often low in energy and nutrient densities. Thus meeting the energy and micronutrient needs even when these foods are consumed in addition to breastmilk is a challenge. Additionally being entirely of plant source, these diets have low nutrient bioavailabilities. It is critical to examine options by which diets based on traditional foods for infants can be augmented. Intervention studies employing the use of fortified foods, home-fortification of local foods and their impact on child growth and micronutrient status are examined. Although these products are efficacious and relatively cheap, their use in national programs in developing countries is limited. These interventions have the potential to fill the gap while efforts are made to promote other food based strategies such as dietary diversification.

Key words: Complementary feeding, micronutrient deficiency, fortification, infants

NUTRITION EDUCATION AND INFANT FEEDING

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Promoting agriculture and food-based solutions to alleviate hunger and malnutrition is a major aim of The Food and Agriculture Organization (FAO). Interventions which focus on optimal nutrition during the first two years of life are recognized as essential in order to capitalize on the window of opportunity for preventing stunting and building healthy and productive future lives. FAO has been promoting improved complementary feeding for children 6-23 months by empowering rural families to enrich young children's diets using local foods. FAO uses practical hands-on learning approaches that aim at behaviour change in complementary feeding. The trials of improved practices (TIPs) method is used to provide a comprehensive assessment of current dietary practices and to test feasible culturally acceptable solutions and behaviours with mothers, fathers and other caregivers in a real home environment. Using community-based multi-sectoral approaches families learn how to: 1) grow different nutritious foods; 2) store, process and prepa-

re foods to preserve nutrient content; 3) vary complementary foods based on taste, seasonal availability and price;) introduce nutritious complementary food in a timely manner, feed age appropriate quantities of complementary foods to children and continue breastfeeding; and 5) practice basic hygiene and sanitation. None of these actions are intuitive and frequently require learning of new knowledge and practical hands-on skills. Recognising that good eating habits are learnt during the early years, good complementary feeding can form a basis for lifelong healthy eating patterns and may prevent the onset of diet-related diseases in the future. FAO is currently exploring how these improvements in complementary feeding are most readily adopted on a larger scale and how health and agricultural extension workers and community nutrition promoters can be trained to assist in scaling up the process.

Key words: Complementary feeding, nutrition education, TIPs.

HEALTH RISKS ASSOCIATED WITH INFANT FEEDING PRACTICES

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Poor nutritional status in early infancy is associated with growth faltering and increased risk for morbidity. Main causes for undernutrition are a diet poor in quality and quantity, poor feeding practices and poor hygiene conditions, as well as insufficient access to health services. Breastmilk is considered to be the best diet for an infant below 6 months even in countries heavily affected by HIV/Aids. The initiation of breastfeeding within few hours after birth is considered the first step to prevent childhood malnutrition. The initiation is also related to successful exclusive breastfeeding for 6 months.

WHO recommends to introduce complementary food to healthy children at the age of 6 months. At the age of 9-12 months the children might be introduced to the family food stepwise – and in addition to breastmilk which should be given for the first two years of life.

In cross sectional baseline surveys on infant feeding in Malawi and Cambodia breastfeeding and complementary feeding behaviour as well as growth and markers of inflammation were assessed in a total of about 2.000 children between 3 and 23 months of age. The risk estimations indicate that exclusive breastfeeding as well as adequate complementary feeding practices are associated with better growth and health. Microbial contamination of infant feeds through inappropriate food processing, lack of safe drinking water and poor food storing are important determinants for food safety. They need to be addressed in any programme aiming at improved infant feeding practices. However, such programmes should emphasize on affordable ways for improving dietary diversity and meal frequency which can be followed by families, irrespective of their economic means. The research was conducted within the IMCF Project of FAO which is funded by the Federal Ministry of Food, Agriculture and Consumer Protection of Germany.

Key words: Breast feeding, complementary feeding, feeding practices, health risks.

ASSESSMENT OF INFANT AND YOUNG CHILDREN FEEDING PRACTICES IN ZANZIBAR USING THE PROCESS FOR THE PROMOTION OF CHILD FEEDING (ProPAN) TOOL

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Abstract

Malnutrition in Zanzibar has remained a great challenge despite the success achieved in reduction of other childhood diseases like malaria and helminths infestation.

A study was carried out to understand and identify the current feeding practices among families with children below two years of age using the ProPAN tool in Unguja island in Zanzibar. Consultative research methods based on the ProPAN procedure were used to collect information from caregivers on current infant and young child feeding practices and factors such as environment and culture that promote or act as barriers to ideal feeding practices. Breastfeeding was a common practice (97%). Pre-lacteal feeding was practiced by 21% of mothers. Mothers (53%) reported inadequate support from health workers and family members to initiate breastfeeding. There was early initiation of complementary feeding (2 – 6 months). Energy and protein supply was adequate but key micronutrients such as iron, zinc and vitamin A were inadequate in the diets consumed by children aged 11-23 months despite diverse varieties of locally available foods in Zanzibar. Mothers/caregivers lack knowledge on child feeding and recipe formulation. There is need to strengthen IYCF education in the antenatal clinic regime and or establish community centres where women will be given information about child care and feeding. Fundamentally, the problem is not only on lack of awareness and limited information on child feeding, it is also about the limited skills for food preparation and feeding. Fruits and vegetables are seldom fed to infants and children below two years of age. Thus, dietary inadequacies, inadequate care practices,

irresponsive feeding, use of pre-lacteals, early introduction of complementary foods and low rate of exclusive breastfeeding were common among caregivers. Most of the caregivers are not aware of the existing opportunities to improve IYCF due to limited knowledge on infant nutrient requirements and limited skills on food preparation and feeding using locally available resources.

Key words: ProPAN, infant feeding practices, Zanzibar.

PS4-42B Generating evidence of impact for integrated programs aimed to improve child nutrition during the first 1000 days (IFPRI)

THE USE OF AN INTEGRATED RESEARCH APPROACH TO EVALUATE HELEN KELLER INTERNATIONAL'S ENHANCED-HOMESTEAD FOOD PRODUCTION PROGRAM IN BURKINA FASO

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In Burkina Faso, Helen Keller International (HKI) implemented an enhanced-homestead food production (E-HFP) program with the objectives of improving women's agricultural production of nutrient-rich foods as well children's nutritional status. This program was expected to achieve these objectives through a set of production and nutrition interventions through three primary program impact pathways which revolved around increasing production of nutrient-rich foods, increasing income through the sale of surplus foods and improving maternal knowledge of optimal health and nutrition-related practices. The International Food Policy Research Institute (IFPRI) worked with HKI to use an integrated research approach to evaluate the impact of the E-HFP program. This integrated approach included a rigorous impact evaluation, two rounds of process evaluation and gender-specific qualitative research. It is envisioned that the results from the impact evaluation, process evaluations and gender-specific qualitative research will be used to inform HKI's future E-HFP programs in Burkina Faso as well as elsewhere by emphasizing the importance of using a program theory framework in the design of the program and evaluation and using an integrated research approach for the evaluation of the program. Furthermore, it is expected that this type of partnership and integrated research approach can be used as an example of how program implementers and researchers can work together to improve program design, implementation and utilization to optimize the potential for impact, to generate the necessary rigorous evidence to attribute impact to programs, and to explain how and why impacts were achieved or were not achieved.

Key words: Homestead food production, integrated research approach, impact evaluation, process evaluation.

USING A PROGRAM IMPACT PATHWAY (PIP) ANALYSIS TO TRACE EARLY IMPACT IN THE ALIVE & THRIVE INITIATIVE IN BANGLADESH

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Background and objectives: In Bangladesh, the Alive & Thrive (A&T) initiative aims to improve infant and young child feeding (IYCF) practices of mothers through intensive counseling by trained frontline health workers (FHWs) who follow a schedule of routine home visits, and through a nationwide mass-media campaign focusing on six key IYCF messages.

To describe the development and use of theory-driven process evaluation methods, within the context of a cluster randomized impact evaluation design of a BCC intervention in Bangladesh, to trace critical program processes using a program impact pathway (PIP) model to help explain how early impacts are being achieved.

Methods: The following steps were taken as part of the overall evaluation approach:

1) developing PIPs; 2) identifying domains and research questions within each PIP; 3) linking data collection activities with implementation timelines; and 4) linking data collection to PIPs utilizing mixed methods, collection at multiple levels, and using multiple data sources. We map data (qualitative and survey-based) collected between 2010-2013, against five broad domains in the PIP: 1) training and management, 2) service delivery, 3) exposure and coverage, 4) service utilization, and 5) behavioral impact.

Results: IYCF training of FHWs was thorough, and knowledge among these FHWs significantly improved. Household reach by trained FHWs was high, and contacts more frequent, compared to households exposed to the mass-media campaign alone. Differences in exposure to specific IYCF messages can be traced to the source - either FHWs or mass media alone. Maternal IYCF knowledge and practices improved across the program, but improvements were greater in areas where households were exposed to both trained FHWs and mass media.

Conclusions: Use of theory-driven process evaluation methods allows evaluators and programmers to trace key processes that help explain how programs may be achieving impact, and to identify factors that might hamper or enable greater impact.

Key words: Infant feeding, nutrition intervention evaluation.

ADDING VALUE TO EVALUATION: ANSWERING "WHY" AND "HOW" ALONG WITH "DID OR DIDN'T"

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The experiences in Burkina Faso, Burundi and Bangladesh that are part of this panel, as well as those from other countries, show how to design evaluations that determine not only whether a program "did or didn't" work but also "why" and "how." Designing evaluations to answer these questions requires a high level of phasing, integration, and complexity, along with analytical rigor. Elements of process and "impact" evaluations and of qualitative and quantitative methods are common – and necessary to answer the questions that are of greatest utility to policy makers and development practitioners. Such integrated approaches are thus more appealing to these key audiences, who are the ones actually making decisions about how to design, implement, and operate programs to be more effective. Integrated evaluations tend to focus on how to improve the design and operation of all points along the impact pathway, since a weakness at any point affects the final outcome. The results, therefore, highlight the need for good management and institutional capacity in ways that standard impact analyses do not. Importantly, these analyses then also provide decision-makers, technicians and managers with actionable information they can use now to change and improve programs, a focus that has been somewhat lost with recent impact evaluations. These country experiences examined also provide important lessons for how to increase the impact of results, by, for example, incorporating users from the beginning to identify needs, adopting a range of communication strategies to get information in usable form to specific audiences, and by strengthening leadership and management capacities.

Key words: Management, institutional capacity, program evaluation.

THE EVALUATION OF TUBARAMURE IN BURUNDI: AN INTEGRATED FOOD AID PROGRAM

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The objective of the Tubaramure program, which uses the Preventing Malnutrition in children under 2 years of Age approach (PM2A), is to improve the health and nutritional status of pregnant and lactating women and children under 2 years of age. The program is implemented in two provinces in eastern Burundi suffering from extremely high levels of malnutrition. It provides mothers during pregnancy and children up to the age of 2 years with a package of health and nutrition interventions designed to address the underlying determinants of malnutrition (inadequate food, health, and care). This package includes individual and family food rations, the required use of preventive health services, and the required participation of beneficiaries in behavior change communication activities focused on improving health- and nutrition-related behaviors. In order to generate scientifically sound and programmatically relevant evidence on the impact of this integrated program, a comprehensive evaluation based on Tubaramure's program theory is used. First, a cluster randomized controlled design is used to evaluate the program's effectiveness. Communities were randomly assigned to one of the 3 treatment arms (varying the timing of duration of treatment) and a control arm. Second, in-depth process evaluation focusing on the delivery and utilization of the programs' 3 components provides information used by the program implementer to improve operations; the findings are also invaluable in the correct interpretation of the impact results. Finally, an Activity Based Costing approach is used to estimate the cost of all program activities, to estimate the programs' cost-effectiveness and to compare cost-effectiveness across treatment arms. The presentation will show how the comprehensive evaluation approach has provided results and insights we would not have obtained with a classic "Does it work?" evaluation design. We will also present common challenges in conducting these comprehensive evaluations and discuss how they can be overcome.

Key words: Children, malnutrition, nutrition intervention programs.

DATA FOR DELIVERY

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In the implementation community there can be resistance to investing in robust program evaluation based on a perception that it is an academic exercise. However, if we are going to

be serious about making progress in tackling undernutrition we need to be serious about measuring that progress. No one would question a business spending resources to make sure it understands its profit and loss – I would argue our bottom line is even more important – it is measured in terms of lives saved and futures secured. Program evaluation is too often conducted as an audit with a good or bad outcome at the end of a project. We need to change the dynamic to design evaluations that identify key levers in the program impact pathway that can be used as proxies for impact when programs are scaled up. Evaluation methods need to capture not just impact by explain the elements of success or failure to enable course correction. This is particularly important in integrated programs where the program impact pathways are very complex and there are potentially multiple benefits. Purposeful teaming up of implementers with researchers creates a win-win environment, however there are challenges in making it successful including aligning research needs and program roll-out, engaging stakeholders in research design to facilitate uptake of results, ensuring timely analysis and reporting of results, management of conflicts of interest and ownership of intellectual property. Both parties must listen to and respect other points of views. The implementer needs to have an institutional commitment to using results to improve programs. The researcher needs to have an institutional commitment to generate data to serve programs. The presentation will draw on lessons-learned in partnership between Helen Keller International and the International Food Policy Research Institute in Burkina Faso.

Key words: Children,nutrition intervention programs, malnutrition, nutrition, research, integrated programs.

PS4-50 Early diet is critical for later development - New research into changing early eating habits (HABEAT and VIVA)

CRITICAL PERIODS FOR EATING HABIT DEVELOPMENT; RESULTS FROM COHORT STUDIES IN FRANCE, PORTUGAL, GREECE AND UK

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Early feeding practices and their relationship with childhood diet have been investigated in four European cohorts: the British Avon Longitudinal Study of Parents and Children (ALSPAC), the French EDEN study, the Portuguese Generation XXI Birth Cohort, and the Greek EUROPREVALL study. Two outcomes variables were considered: Food variety of healthy foods and fruit and vegetable (F&V) intake. Both variables were assessed by FFQ in the child up to 4 years in all cohorts and in the mother in ALSPAC and EDEN only. Breastfeeding duration and timing of complementary feeding were assessed by questionnaire. Logistic regression analysis was performed in parallel in each cohort and adjusted for likely confounders. Most children consumed less than five portions of F&V and had a less varied diet than recommended. Variety was measured on a scale of 0 to 5; 2-year-olds scored 2.3 to 2.9 and 4-year-olds 3.2 to 4.1 with Portuguese children the highest. We found longer breastfeeding duration in Portugal and earlier introduction to complementary foods in the UK. Longer breastfeeding duration was quite consistently related to higher F&V intake across the cohorts. Breastfeeding for <3 months or not all was associated with lower variety of healthy foods. Timing of complementary feeding was consistently associated with both outcomes in the UK but not in the other cohorts. Maternal diet, in the UK and France, was strongly associated with F&V eating and dietary variety in the children but breastfeeding associations were independent of it. The consistent relationship we have found across countries between breastfeeding duration and childhood diet suggests that efforts to promote breastfeeding may be beneficial to long term diet. This collaboration has shown that working across cohorts in different countries can increase confidence in research findings.

Acknowledgements: European Community's Seventh Framework Program (FP7/ 2007-2013) n°FP7-245012-HabEat.

Key words: Variety, fruit, vegetables, breastfeeding, maternal diet.

LEARNING TO LIKE VEGETABLES: APPLYING LEARNING THEORY TO THE ACQUISITION OF PREFERENCES FOR NOVEL VEGETABLES FROM 6 – 36M.RESULTS FROM HABEAT AND VIVA

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Children's consumption of vegetables falls below recommendations across Europe. This might be due to attributes of the food (bitter taste, low energy density), characteristics of the child (fussy eating, neophobia), or parenting practices (vegetables offered infrequently). In a series of systematic studies involving infants from weaning age to 36m, partners in Denmark, France, Greece, Netherlands, Portugal and the UK set out to test the effects of early taste exposure, different forms of learning strategies (including repeated exposure, flavour-flavour learning and flavour-nutrient learning), and sensory manipulations on learning to like and to consume vegetables.

Results across studies from both HabEat and VIVA projects demonstrated that early, varied and repeated exposure is the most effective technique for promoting vegetable intake in infants and young children. At weaning, early exposure to the taste of vegetables is most effective where vegetables are rarely offered as a first food. This is confirmed when vegetables are added to milk just before weaning. Across studies between 7 and 15 exposures were used to familiarise with novel vegetables in different forms, but changes in intake were significant at around 5 exposures. Adding seasoning, offering dips, increasing energy (with oil or maltodextrin) or pairing with an existing liked flavour are strategies used to improve intake of vegetables. However, the consistent finding across countries and projects suggests that repeated exposure and familiarization to the novel vegetable is most successful in promoting preference from weaning to early childhood.

The first year of life may be optimal for the introduction of a variety of vegetables into the habitual diet because novel food acceptance is a more difficult task after 2 years when neophobia begins. Since infants tend to eat foods they prefer, offering vegetables as a first food, offering often and providing variety will increase liking and therefore intake.

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Key words: Repeated exposure, variety, vegetables, flavour flavour learning, flavour nutrient learning.

RESULTS OF TASTE STUDY: INTERVENTION TO INCREASE VEGETABLE LIKING AND CONSUMPTION BY EXPOSURE TO A VARIETY OF VEGETABLES AT WEANING

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Recent research indicates that weaning is a critical period for increasing children's acceptance, liking and consumption of new foods as they grow up. The aim of TASTE study was to investigate the effectiveness of an intervention providing guidance to parents in the early repeated exposure of their infants to a variety of vegetables on later intake and liking of fruits and vegetables by children. A community sample of mothers of 4-6 month old infants in UK (n=97), Portugal (n=97) and Greece (n=89) were randomised to either an intervention group, who were given guidance on introducing a variety of vegetables as first weaning foods, or a control group who received no such guidance. Intervention was delivered shortly before initiation of complementary feeding by mothers. Infants' liking and consumption of unfamiliar vegetable followed by an unfamiliar fruit was assessed at 'taste tests', one- and six-months post-intervention (randomly selected subgroup of infants). Additional questionnaires were completed by mothers at one-, six- and nine-month post-intervention follow-ups. TASTE intervention was successful in increasing intake and liking of an unfamiliar vegetable one month post-intervention in the UK [Intake (g): 32.3 vs.16.3, P=0.012; liking rating by mother: 6.7 vs. 4.3, P<0.001; liking rating by researcher: 6.7 vs. 4.6, P<0.001 in intervention vs. control group]. No effect was found for intake or liking six months post-intervention in any of the three countries. Results from Greece showed positive intervention effect on the variety of vegetables consumed by infants at all post-intervention follow-ups.

TASTE study was effective in increasing vegetable consumption in the short term in UK, and variety of vegetables consumed by infants in Greece. Future research should incorporate longer follow-ups in order to investigate long-term effects on liking and consumption.

Acknowledgements: European Community's Seventh Framework Program (FP7/ 2007-2013) n°FP7-245012-HabEat.

Key words: Intervention, Weaning, Variety, Fruits, Vegetables, Repeated Exposure.

STRATEGIES TO INCREASE VEGETABLE CONSUMPTION IN 3- TO 6-YEAR-OLDS: THEORY AND PRACTICE

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Young children's vegetable consumption is below the recommended intake across Europe. After the age of two years, neophobia and pickiness begin to impact eating behavior. Efforts to increase vegetable consumption at this age range is therefore particularly challenging. In a series of studies aimed at three- to six-year-olds, different strategies were applied with the aim to increase children's vegetable consumption, including mere exposure in combination with sensory variation in Denmark and the Netherlands, imitation of a role model in the Netherlands and Greece, freedom of choice in Greece, Denmark and the Netherlands, and participation in vegetable preparation in the Netherlands. Most studies were executed in nurseries or in the first years of primary school.

Results showed that offering vegetables at school can contribute to children's daily intake of vegetables, in particular in countries where vegetables are predominantly consumed at dinner time. However, achieving an increase in vegetable intake was difficult. Preliminary results show that mere exposure works at this age, although multiple factors influence the success of mere exposure. Imitation of a role model such as a teacher or a popular (TV) character showed some, although limited, promise. Participation in cooking did not lead to an increased vegetable intake at dinner time. In all studies aimed at this age range, large variation in eating patterns was observed. A considerable group of non-eaters were unresponsive to the tested strategies and alternative strategies might be necessary for this particular group of children. Acknowlegements: European Community's Seventh Framework Program (FP7/ 2007-2013) n°FP7-245012-HabEat.

Key words: Children, nutrition stategies, vegetable consumption, vegetablechoice.

CALORIC COMPENSATION AND EATING IN THE ABSENCE OF HUNGER IN EARLY CHILDHOOD: IMPACT OF PARENTAL FEEDING PRACTICES

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The aims were to measure caloric compensation (CC) and eating in the absence of hunger (EAH) in 2 to 6 year-old French children in a realistic context and to link these measurements with individual characteristics and parental feeding practices. Three identical lunches were offered to 236 children in school canteens. Food intake was measured at individual level. First lunch was a control session. For CC situation, thirty minutes before the second lunch children were offered a preload (137 kcal). For EAH situation, ten minutes after the third lunch children were exposed to palatable foods (430 kcal). Six types of parental feeding practices were measured by questionnaires. Parents were clustered in two groups based on their feeding practices. On average children partially compensated the preload and ate in the absence of hunger about a quarter of the energy that they had consumed during their lunch. These measurements were not correlated with each other. EAH and CC did not vary with age or adiposity. EAH was higher in boys than in girls. Parents who used feeding practices such as food as reward, emotional regulation, pressure, and child control more often had children who ate more in absence of hunger than parents who used restriction for weight and monitoring more often. No link was found between CC and parental feeding practices. This study provides evidence that CC and EAH are two distinct eating behaviours. CC may be mostly driven by homeostatic factors while EAH may be influenced by external factors such as parental feeding practices. Results may be used to develop interventions to educate parents to provide an eating environment likely to prevent development of overweight.

Acknowledgements: Funded by European Community's Seventh Framework Program (FP7/2007-2013) n°FP7-245012-HabEat.

Key words: Caloric compensation,eating in absence of hunger,; children,food intake regulation, BMI.

PS5-58 NUAGE research

A RANDOMIZED TRIAL ON THE EFFECT OF A FULL DIETARY INTERVENTION ON AGEING IN EUROPEAN ELDERLY PEOPLE: THE NU-AGE STUDY

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Background and objectives: The proportion of elderly in Europe is expected to increase to approximately 30% in 2050. Specific individual dietary components may reduce risk of disease and improve quality of life of the elderly. When combined these dietary components may modulate many processes that are involved in ageing and so it is likely that a whole diet approach might have greater impact on age-related decline than individual components. The aim of this intervention is to study the effects of a whole diet on health and quality of life in people aged 65 years and older.

Methods: The NU-AGE study is a randomized trial. The intervention comprises a period of one year in 1250 apparently healthy, independently living European subjects aged 65 to 80 years. The elderly are randomised into either the diet group or the control group. Participants in the control group received no dietary advice. Participants in the diet group received dietary advice aimed at meeting the nutritional requirement of the ageing population, foods and a vitamin D supplement. Special attention was paid to nutrients that may be inadequate or limiting in diets of elderly people.

Conclusions: The NU-AGE study is the first dietary intervention study investigating the effect of a whole diet and providing targeted nutritional recommendations for optimal health and quality of life in apparently healthy European elderly men and women. Results of this intervention will provide evidence on the effect of a whole diet on the prevention of age related decline at the cellular, organ, and whole body level.

Acknowledgments: This project is supported by the European Union's Seventh Framework Program under grant agreement no. 266486 ('NU-AGE: New dietary strategies addressing the specific needs of the elderly population for healthy ageing in Europe').

Key words: Nutrition, ageing, iIntervention, elderly.

DIET-MICROBIOTA-HEALTH INTERACTIONS IN OLDER PERSONS - THE ELDERMET STUDY AND PROBING CAUSALITY IN THE NUAGE PROJECT

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The microbiota associated with the human body is now intensively studied as an environmental risk factor for disease, and a modulator of health. The development of culture-independent methods for microbiota analysis has allowed identification of alterations in the microbiota associated with the extremes of life, with functional gastrointestinal diseases, with endocrine disease, with antibiotic therapy, and with habitual diet, and evidence is accumulating for linkages other conditions and syndromes. In a baseline analysis of the faecal microbiota composition of 161 older persons, we previously reported a core microbiota and aggregate composition that was distinct from younger persons (Claesson et al., PNAS 2011). We also identified significant inter-individual variation at phylum level, the reasons for which were then unclear. To investigate further, we analyzed the microbiota composition of 178 elderly subjects, none receiving antibiotics, and for whom we had collected dietary intake information. The data revealed distinct microbiota composition groups. Clustering of subjects was also distinguishable by analysis of faecal metabolites and shot-gun metagenomic data. Major separations in the microbiota correlated with selected clinical measurements. Novel constellations of microbiota subtypes were identified. Correlations in the data between diet, microbiota and health status suggest a causative axis (Claesson et al., Nature 2012). However, distinction between cause and consequence requires a large-scale intervention and prospective analysis of subjects for microbiota-related pathophysiologies. The NuAge project combines multinational participation to take account of ethnic and geographical factors, with a defined nutritional intervention of a well characterized cohort at baseline, to identify diet-microbiota-health causative linkages. Available data from the NuAge project will be presented, in conjunction with NuAge partners.

Key words: Ageing, microbiota, metagenome, inflammation.

NUTRITIONAL METABONOMICS: DEVELOPMENT AND VALIDATION OF AGEING BIOMARKERS

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Ageing is characterized by a progressive, generalized impairment of biological functions resulting in an increased vulnerability to environmental challenge and a higher risk of disease and death. Variations in the biological functions and processes during ageing do not appear in isolation, but instead are embedded in a large network of physiological and genetic interactions. Within these reasons, understanding the physiology of ageing is of tremendous importance to allow populations to grow old, prevent or delay the onset of disease and maintain a high quality of life. Metabonomics is a well-established systems approach to characterize metabolic phenotypes, which result from a coordinated physiological response to various intrinsic and extrinsic parameters like the environment, including diet and lifestyle, genetics, the human microbiome, and drugs. Clinical ageing research: By combining metabonomics and lipidomics we report recent efforts in characterizing the metabolic phenotype of longevity and aging in a well characterized human cohort comprising centenarians, elderly and young individuals. Our results underpin profound differences in the longevity phenotype with activation of specific lipid mediator mechanisms. Preclinical ageing research: As caloric restriction (CR) is has been shown to be to date the most potent dietary means of modulating and possibly slowing the ageing process, we report a comprehensive metabolic phenoytping across several strains of mice to determine the effects of moderate CR. We revealed tissue-specific panels of biomarkers that are commonly affected by CR. Moreover, metabonomics was applied to blood plasma in multiple mouse strains to evaluate early CR-associated metabolic regulations, which may translate into long-term benefits for longevity. Identification of pathways activated by caloric restriction could facilitate the development of nutritional interventions and dietary programs mimicking the health benefits of CR.

Key words: Ageing, caloric restriction, elderly, lipids, metabonomics.

SOCIO-ECONOMIC DETERMINANTS OF DIET QUALITY AND HEALTH OF THE EU ELDERLY

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To better understand how to effect dietary change for healthy ageing, we investigate the determinants of food choices, diet quality and health of the EU elderly. A literature review indicates that although many factors are thought to be at work, their relative importance and interactions remain poorly understood. Thus, we investigate empirically the determinants of diet quality of older people in four EU countries (Finland, Italy, Sweden and the UK) using secondary cross-sectional datasets. A modified Diet Quality Index measuring nutritional quality is regressed on the same socio-economic and demographic factors in the four countries. We show that diet quality among the EU elderly is both low on average and heterogeneous, with differences in observable socio-demographic variables explaining only a small but significant fraction of the heterogeneity. There is little support for the proposition that poor diet quality is driven by a lack of economic resources among the EU elderly. However, education, not living alone, and being a female are characteristics that are positively associated with diet quality after controlling for other socio-demographic factors. Regional differences in diet quality are evident, while the relationship of age and retirement status to diet quality is weak, hence suggesting that food preferences and habits are largely set in the latter part of life. The framework of analysis is then extended to investigate the full continuum of relationships from the socio-economic status of elderly individuals to their dietary choices and health status. The results establish that the causal relationship between diet quality and health is bi-directional: diet quality influences health but health influences diet quality. Although intuitive, this result implies that feedback mechanisms in the relationship between diet quality and health should be consi-

dered carefully when analysing the benefits from promoting healthy eating to the elderly.

Key words: Ageing, diet quality, elderly, food preferences, health.

PS5-66A Trace elements and chronic diseases
MICRONUTRIENTS DEFICIENCY AND OBESITY

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Recent studies have demonstrated that the risk of obesity might be increased when individuals have micronutrient deficiencies. Specific micronutrient deficiencies involved include Zinc, Iron, Vitamin E and Vitamin C. Deficiency of these micronutrients is common in populations in Mexico and other Latin American countries. Possible mechanisms for these associations involving Leptin and perhaps other hormones are reviewed, they may explain the role of these micronutrients on fat deposition and fat metabolism. In a prospective study with 136 obese Mexican women micronutrient supplementation of a milk formula product increased the effectiveness of an energy restricted diet to reduce body weight and body fat. In other studies in women in China micronutrients addition to calcium supplements increased body weight loss and decreased blood lipids. These and other investigations suggest that some micronutrient deficiencies increase fat deposition and that in populations with a high incidence of micronutrient deficiencies, micronutrient supplementation is effective to increase fat losses in obese individuals. The precise role of micronutrients deficiency on obesity and fat homeostasis remains to be elucidated.

Key words: Micronutrients deficiency, obesity iron, vitamin E ,vitamin C, zinc.

IRON AND INFLAMMATION IN TYPE-2 DIABETES

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Type 2 Diabetes mellitus (T2D) is a disease associated with inflammation and oxidative stress. Iron (Fe) is one of the major catalysts for the occurrence of free radicals and oxidative stress. The pancreatic beta-cells are the primary affected in the advanced DM2, they present minor antioxidant activity and therefore they are more sensitive to substrates such as oxidants and oxidation catalysts.

T2D patients present increased iron storage (measured as ferritin, transferrin receptor and total body iron) and altered levels of oxidative stress parameters (heme oxygenase activity, SOD, GSH and TBARS). The same behavior is observed by sons of T2D patients. This characteristic may contribute in the future to a greater susceptibility to develop T2D.

We have shown that 2DM patients and their sons share a microsatellite polymorphism in the HO1 gene, characterized by a high frequency of the SM genotype, which is a risk factor for T2D development T2D and obesity share a pro-inflammatory profile (altered expression of TNF-α, IL6 and TLR2) and an increased expression of hepcidin, a regulator of iron nutrition.

High levels of ferritin, heme oxygenase activity and elevated expression of hepcidin and TLR2 mRNA are a risk factor for 2DM development. Low levels of TLR4 and mTOR mRNA are a protective factor for T2D and obesity..

Acknowledgement: Funded by Grant: FONDECYT Nº1110080, Chile.

Key words: Ferritin, hepcidin, inflammation, diabetes mellitus, obesity.

ZINC, INFLAMMATION AND TYPE 2 DIABETES

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Zinc(Zn) is an essential trace element that has been related in the last years with chronic disease, such as diabetes. Zn is known to favor the interaction between insulin and its receptor, facilitate glucose transport through membranes and increase insulin function in peripheral tissues. Diabetes has been associated with low Zn concentration possible due to an impaired active transport of Zn in the kidney. Zn deficiency increases the expression of IL6, IL1, IL8 and TNF-a, increasing the risk of cardiovascular disease observed in diabetes. IL6, in turn, affects methalothionein homeostasis, thus affecting further Zn metabolism. Also, increased proinflammatory citokynes in diabetes may play an important role in Zn metabolism through the regulation of Zn transporters, particularly, ZnT8 and ZiP14. The effect of zinc supplementation on inflammation in diabetic patients needs to be further explored.

Key words: Cytokines, diabetes, glucose transport, insulin, methalotionein, zinc.

ZINC AS A COADJUVANT IN TYPE-2 DIABETES TREATMENT

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Type-2 diabetes is a chronic condition responsible for long-term severe dysfunction of several organs, including kidneys, heart, blood vessels, and eyes. This condition is highly prevalent in populations having high overweight/obesity rates. While there is a number of pharmacologic products in the market to treat the most prominent features of this disease (insulin resistance and impaired insulin secretion), interventions directed to preserving the integrity and function of β-cell in the long-term are less available. The use of some nutrients with important cellular protective roles that may lead to a preservation of β-cell has not fully tested. Given its insulin mimetic action, as well as its role as regulator of oxidative stress, inflammation, apoptosis, and insulin secretion, zinc is an interesting candidate to become a co-adjuvant to diabetes therapy. It is reviewed the available information on the use of zinc as part of diabetes therapy. According to two meta analyses recently published, zinc supplementation may have beneficial effects on glycemic control, as indicated by a modest but significant reduction of fasting glucose and a trend to decreased HbA1c. Nevertheless, among the studies considered the vast majority lasted for 6 months or less, suggesting the importance of conducting long duration studies given the characteristics of type-2 diabetes as a chronic disease.

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Key words: Type 2 diabetes, zincpancreas, insulin.

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T3 PUBLIC HEALTH NUTRITION AND ENVIROMENT

NPS1-3 Nutrition and enviromental sustainability (FAO)

TRADITIONAL FOOD SYSTEMS OF INDIGENOUS PEOPLES

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Indigenous Peoples who have cultural homelands in rural areas have knowledge of vast biodiversities that have developed within their heritage regions to provide food resources for food and nutrition security. Despite formidable environmental and cultural challenges to the use of this wealth of knowledge, Indigenous Peoples are aware that their original diets and local foods can provide cultural expression, self-identity, health and well-being. Research has given recognition to the vast array of unique food species and subspecies/varieties/cultivars within food systems of Indigenous Peoples and the nutritional contributions they make. With focus on 12 cultures in defined ecosystems in different parts of the world, participatory research with communities and interdisciplinary scholars was used to document the local food resources and how they have been culturally used. This knowledge was then applied at the community level to develop methods, processes and activities to mobilize leaders and communities to encourage interventions and policies that improve health and well-being. Central to Indigenous Peoples using their food resources is attention to environmental integrity and sustainability.

Knowledge on traditional wildlife animal and plant harvests and agriculture based in traditional crops must be promoted within communities and transmitted to youth to ensure future provisioning. This benefits from advocacy to create activities that build local cultural pride, and the development of cross-sectoral government planning and action. Keeping Indigenous Peoples' food systems vital not only ensures their continuing contribution to community well-being, but also creates the imperative for cultural and ecosystem protection and sustainability. Lessons learned with Indigenous Peoples' food systems contribute important knowledge on how and why to address challenges to maintaining ecosystem integrity for environmental sustainability, and for the food and nutrition security of the entire planet.

Key words: Indigenous peoples, food systems, sustainability.

FOOD-NATURAL RESOURCES NEXUS IN THE MEDITERRANEAN REGION: EXPLORING THE ENVIRONMENTAL FOOTPRINTS OF THE CURRENT DIETARY PATTERNS

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Environmental degradation - whose primary driving forces are population, consumption and technology - has reached in the Mediterranean proportions that require immediate action. Unsustainable food consumption patterns are putting increasing stress on ecosystems and human social systems. Food consumption patterns are important drivers of land degradation, declining soil fertility, unsustainable water use, marine environment degradation, climate change, biodiversity loss, etc. The paper aims at exploring the environmental footprints of the current Mediterranean consumption and production patterns with a particular focus on the current dietary patterns. The work is mainly based on secondary data from different sources e.g. FAOSTAT, the World Development Indicators, the Water Footprint Network (WFN), the Global Footprint Network. The analysis regards 21 Northern, Southern and Eastern Mediterranean countries. The paper describes the main environmental challenges in the Mediterranean region e.g. water scarcity, land degradation, climate change and biodiversity loss. It provides an overview of the ecological, carbon and water footprints of the current regional consumption patterns as well as national virtual water balances. The paper characterizes the Mediterranean dietary patterns using Food Balance Sheets data. The WF of food supply is calculated for Bosnia, Egypt, Italy, Morocco and Turkey and the contribution of vegetal- and animal-based food product groups is highlighted. The paper compares the WF of the current Italian diet with that of the proposed Mediterranean one. It also analyses fertilizer consumption and

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nitrogen fertilizers use trends. High resource use intensity is exacerbated by food waste implying the loss of large amounts of precious resources and inputs such as water, land, energy and fertilisers. The transition to more sustainable diets and food consumption patterns in the Mediterranean – implying an increased adherence to the traditional Mediterranean diet – and the reduction of food losses and waste can contribute to easing pressure on the scarce resources of the region.

Key words: dietary patterns, environmental footprints, natural resources, Mediterranean region.

PS2-11 Global challenges in maternal and child nutrition for today and the future

NUTRITION-SENSITIVE INTERVENTIONS AND PROGRAMS: HOW CAN THEY HELP ACCELERATE PROGRESS IN IMPROVING MATERNAL AND CHILD NUTRITION?

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Accelerating progress in improving nutrition will require effective and large-scale nutrition-sensitive programs that address key underlying causes of undernutrition and enhance the coverage and effectiveness of nutrition-specific interventions. We reviewed programs in four sectors - agriculture, social safety nets (SSNs), early child development (ECD) and classroom education. Targeted agricultural programs support livelihoods, food security and diet diversity, but evidence of their impact on child nutritional status is inconclusive, with the exception of vitamin A from biofortification of orange sweet potatoes; poor-quality evaluations prevent firm conclusionson nutritional impact. SSNs are a powerful poverty reduction tool but pooled estimates show no overall impact on nutrition outcomes; although some cash transfers have improved nutrition among younger and poorer children exposed for longer durations, the lack of overall impact is attributed to weaknesses in nutrition goals and inputs and in service delivery (supply). Combining ECD and nutrition interventions can have additive or synergistic impacts on child development and nutrition outcomes. Thus, programs combining ECD and nutrition inputs could lead to significant gains in cost, program efficiency and nutrition and development outcomes. Parental schooling is a strong determinant of nutrition outcomes, but school curriculum seldom includes nutrition training and when it does, evaluations of impacts on knowledge acquisition and future parental skills are lacking. Many of the programs reviewed were not originally designed to improve nutrition, yet they have great potential to do so. Ways to enhancethe nutrition-sensitivity of programs include: improve targeting; useconditionalities if feasible; strengthen nutrition goals and incorporate well-designed and implemented nutrition-sensitive actions;and focus on optimizing women's nutrition, time allocation, physical and mental health, and social status and empowerment. Nutrition-sensitive programs can play a pivotal role in invigorating nutrition-specific interventions and creating a stimulating environment for young children to grow and develop to their full potential.

Key words: Agriculture,early child development, nutrition-sensitive programs, schooling,social safety nets.

THE POLITICS OF REDUCING MALNUTRITION: BUILDING COMMITMENT AND ACCELERATING IMPACT

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Political discourse on the challenge of malnutrition has ramped up markedly in recent years, at both national and international levels. The Scaling Up Nutrition (SUN) movement has both driven, and been driven by, this developing momentum. While knowledge of the critical factors and processes for effectively operationalizing and scaling up nutrition-specific and nutrition-sensitive interventions is increasing, we know less about the politics of reducing malnutrition. How can political and policy processes and "enabling environments" be cultivated, sustained and ultimately translated into nutritional impact on the ground? In our review of the limited but growing evidence base we use a six cell framework to structure our discussion of the ways in which three domains (knowledge and evidence, politics and governance, and capacity and resources) are pivotal for a) creating and sustaining political momentum, and b) translating it into nutritional impact in high-burden countries. We show how political calculations lie behind effective coordination between sectors, between national and subnational levels, private sector engagement, resource mobilization, and state accountability to its citizens – all hugely important for nutrition-relevant action. Political commitment can be proactively built—there is no need to wait for it -- but converting such commitment to impact requires a different set of strategies and skills. It will simply not be possible to accelerate and sustain progress without national and global support to a long-term process of strengthening systemic and organizational capacities, and to nurturing and strengthening leadership in high-burden countries. The private sector has significant positive potential but there remains a lack of trust and a lack of

evidence, both of which need to be addressed. Finally, we argue that operational research on delivery, implementation and upscaling of interventions, and more contextual analyses on how to shape and sustain enabling environments, is essential as the focus shifts toward action.

Key words: Malnutrition, nutrition policies.

PS2-19 Confronting the global epidemic of non-communicable diseases: Findings from the NHLBI/UHG Global Network

THE NIH NHLBI/UHG CENTERS OF EXCELLENCE: A MODEL FOR INTERNATIONAL RESEARCH COLLABORATION

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Chronic non-communicable diseases (NCDs) account for 63% of deaths around the world. In 2008, 80% of NCD-related deaths occurred in low and middle income countries. Cardiovascular disease (CVD) comprises 30% of global mortality, followed by cancer, COPD and diabetes. Unhealthy diet has been identified as a risk factor to the four disease categories, providing an opportunity to develop common approaches to NCD prevention. Accumulation of risk for NCDs begins during prenatal development and continues through early life, childhood, adolescence, and adulthood. In June 2009, The National Heart, Lung and Blood Institute (NHLBI) and UnitedHealth Group (UHG), established a network of eleven Centers of Excellence (COE) across the globe. The Centers are located in developing countries and have strong partnerships with institutions around the world. The goals of this program are to enable research capacity building, train future chronic cardiovascular and pulmonary disease investigators and conduct research, programs and measures to prevent or treat chronic cardiovascular and pulmonary diseases. The COEs are leveraging their expertise and infrastructures built on the areas of maternal/child health and infectious diseases, to develop and carry out the NCD agenda. The COEs are key players in the area of nutrition and are linked to Birth Cohorts like the Matlab cohort in Bangladesh and the Consortium of Health Oriented Research in Transitional Societies (COHORTS) in Brazil, Guatemala, India, Philippines and South Africa. The COEs are also in close communication with local, state and national governments and policy makers.

The COE program has received international attention and it is considered a unique and innovative model of research collaborations at the global level. The COE program is designed to serve as a platform to develop research-based evidence for strategies that can be implemented not only in developing countries, but that can also informed research agendas across the world.

Key words: Child heaalth, Infectious diseases, Research collaboration, The National Heart, Lung and Blood Institute.

PRIMARY PREVENTION OF NUTRITION-RELATED CHRONIC DISEASES: INNOVATIVE INTERVENTIONS IN LATIN AMERICA

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Nutrition-related chronic diseases (NRCD), such as cardiovascular diseases, diabetes, and some types of cancer, are the main cause of mortality and morbidity across all Latin American countries, even exceeding the prevalence of many developed countries. Even worse, age at onset of NRCD risk factors and death is declining, due to early and rapid changes in lifestyle patterns. Population-based innovative strategies for preventing NRCD risk factors in developing countries are scarce. The INCAP Comprehensive Center for the Prevention of Chronic Diseases (CIIPEC) has recently leaded few intervention studies on NRCD prevention in Latin America. We have developed a culturally appropriate, community-based intervention to improve cardiovascular health in elementary school-age Guatemalan children through the promotion of healthful eating behaviors and physical activity, as well as the prevention of tobacco use and alcohol consumption. We have also evaluated the effectiveness of an affordable and sustainable primary health care intervention, based on mobile health (mHealth) technology, to reduce blood pressure and prevent progression from pre-hypertensive status to hypertension in individuals at poor urban clinics in three Latin American countries (Argentina, Guatemala, and Peru). Another two projects have assessed intervention models to determine how well primary health care (PHC) workers can correctly identify and refer subjects at high risk of cardiovascular diseases in Guatemala, and to improve adherence to treatment and healthy lifestyles in diabetic and/or hypertensive patients who assist to PHC facilities in Costa Rica and Southern Mexico. Main preliminary results of those studies will be presented in this session.

Acknowledgements: This work was supported by the National Heart, Lung and Blood Institute (NHLBI, HHSN268200900028C) and the UnitedHealth Group Chronic Disease Initiative.

Key words: Nutrition, chronic diseases, intervention, Latin America.

CHINA RURAL HEALTH INITIATIVE – SODIUM REDUCTION STUDY: A CLUSTER RANDOMIZED TRIAL ON A COMMUNITY-BASED DIETARY SODIUM REDUCTION PROGRAM

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Background and objectives: Cardiovascular diseases are the leading cause of death in rural China with high bloodpressure being a major determinant of risk. Excess intake of dietary sodium, a modifiable risk factor for high blood pressure, is widespread with most added as salt during the cooking or preservation of food in the home. The aim of this study is to determine the effects of a multi-faceted community-based sodium reduction program on sodium and blood pressure.

Methods: The China Rural Health Initiativeis a large-scale, cluster-randomized, trial done in five Northern Chinese provinces. Two counties have been selected from each province and 12 townships enrolled in each county making a total of 120 clusters. One village from each township was selected for participation in the study. Randomization was stratified by county with 60 villages receiving the intervention and 60 continuing with usual practices.The sodium reduction program comprises community health education and a food supply strategy designed to promote the use of salt substitute through the village convenience stores.Subsidization of the price of salt-substitute is provided to 30 intervention villages. The primary outcomes for the study is dietary sodium intake levels estimated from assays of 24-hour urine samples and blood pressure.

Results: The trial randomized 120 villages in April 2011 and the intervention was implemented from May 2011 to October 2012. All data have been collected and are currently being cleaned and analyzed. We expect to have trial results to share by August 2013.

Conclusions: This sodium reduction study is a major new initiative designed to identify a nutrition-based, practical, scalable strategy for vascular disease prevention in rural China. If proved effective, this sodium reduction program will provide an evidencebase for policy and programs in China and potentially other countries and substantial health gains when scaled up.

Key words: Sodium reduction, cardiovascular disease, health education, salt substitute, community-based program.

BASELINE CHARACTERISTICS OF A SCHOOL BASED INTERVENTION TO PROMOTE HEALTHY DIET IN SOUSSE, TUNISIA

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Background and objectives: In this study, we will focus on diet habits among schoolchildren. This is a component of a community based intervention to promote healthy lifestyles in school settings. It consists on a school based intervention with the aim to improve knowledge, attitudes and behaviors concerning healthy diet. The study design, implementation and baseline results are presented.

Methods: The study design was a quasi experimental design, intervention with pre post assessment and control group. The study concerned pupils of colleges of Sousse aged 11 to 16 years old in 7th and 9th grade. The pre-assessment concerned a random sample of schoolchildren. The proportional and stratified sample was composed of 4003 schoolchildren with 1929 and 2074 respectively in intervention and control groups. We used chi square test to compare prevalences with 0.05 as level of significance.

Results: Sex ratio was respectively 1 in the intervention group and 0.87 in control group. The mean age of the study population was 13.48±1.29 and 13.24±1.25 respectively in intervention and control groups. The proportion of schoolchildren who knew that it's recommended to eat at least 5 fruits and vegetables daily was 35.6% in intervention group and 23.6% in control group. Concerning eating habits, the schoolchildren reported frequency (number of days per week) of consuming various foods and beverages included respectively in the intervention and control group: vegetables 3.9 days/week and 4.81 days/week, fruits 5.41 days/week and 5.7 days/week, high fat food 2.49 days/week and 2.48 days/week, sweetened beverage 3.84 days/week and 3.3 days/week, sweets 4.33 days/week and 4.57 days/week.

Conclusion: Integrated and sustainable interventions to promote healthy diet in this region are needed to prevent obesity and non communicable diseases early in childhood. Acknowledgment: This project is funded by UnitedHealth Group. The intervention is cofunded by Geneva University Hospitals

Key words: Diet intervention, lifestyles, prevention, schools.

PS3-27 Community-based programme to prevent obesity: Lessons and perspectives from 20 years of experience (EPODE International Network)

EFFECT OF VITAMIN B12 AND N-3 POLYUNSATURATED FATTY ACIDS ON PLASMA HOMOCYSTEINE, AND OTHER CARDIOVASCULAR RISK FACTORS: A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Vitamin B12and n-3 polyunsaturated fatty acids (PUFA) decrease blood homocysteine (Hcy) concentration. However, the combined effect of these nutrients on Hcy and ferritin, and C-reactive protein is limited and inconclusive. The objective was to examine the synergistic effect of vitamin B12 in combination of n-3 PUFA on plasma Hcy, ferritin, and other biochemical markers.

Methods: In a randomized controlled trial, thirty eligible subjects were randomly divided into three groups, and assigned to receive 1000 µg of vitamin B12, 2g fish oil, or 1000 µg vitamin B12 and 2g fish oil respectively for 8 weeks. Plasma phospholipid (PL) fatty acids and biochemical markers were determined.

Results: Plasma PL 20:5n-3, 22:6n-3 and n-3 PUFA were increased after 4 and 8 week supplementation of fish oil, and vitamin B12+fish oil. Plasma concentrations of triacylglycerol, uric acid, and ferritin were significantly decreased after 4 and 8 week supplementation of fish oil, and vitamin B12+fish oil. In all groups, significant changes in plasma Hcy were observed during the study period. Vitamin B12, fish oil, and vitamin B12+fish oil supplementation lowered plasma Hcy concentrations by 22%, 19%, and 39%, respectively. **Conclusions:** Combination of vitamin B12 and fish oil have synergistic effect on lowering plasma concentrations of Hcy and ferritin.

Key words: Homocysteine, fish oil, vitamin B12.

COMMUNITY-BASED PROGRAMMES TO PREVENT OBESITY

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Childhood obesity is one of the main public health challenges of the 21th century. Preventive efforts should include community-based interventions (CBIs) using social marketing campaigns targeting families, children and key stakeholders within the community and the broader environment of the child.Indeed, childhoodobesityis a complexissue and needscomplexsystemwith a multistakeholderinvolvement at alllevelstofosterhealthierlifestyles in a sustainableway. The EPODE methodologycontributestothisapproach.

Withnow 20 years of experience,thismethodologyisnowimplemented in more than 300 towns in 8 countries (France, Belgium, Spain, Greece, TheNetherlands, South Australia, Mexico and Romania) and concerns more than 20 millionpeople. Theaddedvalue of themethodologyisbasedon a strongscientific input, institutional and politicalendorsement, evidencebase and social marketing techniques, sustainableresources, branddynamics and evaluation.

At childleveltheprevalence of overweight and obesity in childrenaged 5 to 12 ismonitored. In the 8 French pilottowns, theprevalence of childrenoverweightincludingobesitydecreasedby 10% between 2005 and 2009 ($p<0.0001$). In Belgiumpilottowns, theprevalence of childrenoverweightsignificantlydecreasedby 22% between 2008 and 2010 ($p<0,04$) in comparisonwith control towns.

The EPODE International Network (EIN) is a non-governmental organization which has been created to support Community-Based Programmes (CBPs) aimed at preventingobesity. Today, 29 CBPs are memberof thisnetwork (10 in Europe, 13 in America and 6 in Asia-Pacificregion).

Key words: Prevention, obesity, social marketing, nutrition, diet, lifestyle, community-basedprogramme, sustainability.

PS3-35 Promoting healthy growth and preventing childhood stunting – a WHO initiative

PROMOTING HEALTHY GROWTH AND PREVENTING CHILDHOOD STUNTING

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Linear growth faltering, increased susceptibility to infection and impaired neurobehavioral function are characteristically associated with an increased risk that children fail to achieve their developmental potential. These are features of stunted growth and stunted development, both outcomes of biological (e.g., nutritional deficiencies and infections) and psychosocial deprivations that restrict physiological growth and intellectual development. The period from conception through the first 2-3 postnatal years is highly sensitive because it is programmed for rapid growth and developmental processes which if disrupted carry potential long-term effects on physical growth and the brain's structural and functional capacity. Stunting serves as a composite measure of the degree of physical and developmental wellbeing and has concurrent, short-term and long-term health and economic consequences. The risk of stunting is affected by interdependent influences rooted in the political economy, health and health care, education, society and culture, agriculture and food systems, water and sanitation, and the environment. Therefore, the interventions required to prevent stunting are anchored in many different sectors. This reality is acknowledged by the multiplicity of actors attempting to address stunting. What pauses some challenge is establishing a common agenda within which different sectors recognize their roles and how each can contribute synergistically to stunting prevention.

Through the project Promoting healthy growth and preventing childhood stunting the World Health Organization is seeking to collaborate with governments and other agencies to shift programmatic focus towards considering nutrition as a long-term development investment. The presentation will describe the efforts being undertaken towards setting and implementing stunting reduction agendas, with emphasis on strengthening the weakest components of infant and young child feeding and the assessment of associated linear growth.

Acknowledgement: The project is supported by funds from the Bill and Melinda Gates Foundation

Key words: stunting, child growth, multisectoral interventions.

PROMISING INTERVENTIONS AND RESEARCH AREAS IN COMPLEMENTARY FEEDING AND HEALTHY GROWTH PROMOTION

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Stunted growth and development is caused by a broad range of factors as outlined in the WHO conceptual framework on childhood stunting. This presentation will focus on promising interventions and research within complementary feeding and healthy growth promotion. Especially in low-income countries optimal breastfeeding practices have an important impact on growth, development and survival and it is important that breastfeeding is continued during the complementary feeding period. Animal source foods (ASF) are effective in promoting linear growth and development as they have high micronutrient content, high protein quality, no anti-nutrients, high energy density and high n-3 fatty acids content. ASF e.g. milk and meat are often expensive and not available, but affordable, sustainable and locally available sources like small dried fish have shown promising effects and should be promoted. However, there is a need to determine the amount of ASF needed to make an impact. It is recognized that appropriate consistency of complementary foods is important but a better understanding of the interaction between acceptability, taste preferences, texture and regulation of satiety during the transition to family food is likely to also have long term effects on feeding habits. The growth pattern during the complementary feeding period is complex and strongly influenced by diet. Breastfed infants have a different growth pattern, regarded as a more optimal pattern, compared to non-breastfed infants. There are differences in linear growth patterns, gain in fat and lean mass and hormonal regulation of growth. Furthermore, new data suggest that the composition of intestinal microbiota, which is strongly influenced by diet, has an impact on both over- and undernutrition. Although much is known about how to optimize growth through complementary feeding, there is still a need for research to better understand the mechanisms behind the effect of diet on growth.

Key words: Breastfeeding, Animal source foods, body composition, microbiota.

MONITORING CHILD GROWTH AND INFANT AND YOUNG CHILD FEEDING PRACTICES

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In May 2012 the World Health Organization (WHO) adopted a resolution on maternal, infant and young child nutrition including six global targets to reduce the high burden of disease associated with malnutrition, particularly during the critical period from conception to 24 months of age. Four of the targets (i.e., stunting, wasting, overweight and low birth weight) are related to child growth and all six will require improved infant and young child feeding practices for their achievement. The Comprehensive Implementation Plan (2012-2025) on Maternal, Infant and Young Child Nutrition adopted with the resolution, will require the development of an accountability framework and the strengthening of existing surveillance systems to monitor adherence to commitments and the degree to which targets are achieved. Currently many countries have national child growth monitoring programs and/or nutrition surveillance systems but most of them are weak (e.g. do not use standardized, state-of-the-art methodologies) and only a few include indicators of infant and young child feeding practices (IYCF) — despite the existence of a comprehensive set of IYCF indicators. The presentation will describe standardized methods of data collection, analysis and interpretation that provide valid and reliable information to feed into decision making processes to address child malnutrition. Similarly, it will discuss the standardized collection of comprehensive data on IYCF practices based on the experience and lessons learned from the incorporation of the WHO-IYCF indicators into Vietnam's National Nutrition Surveillance System. The data have been used in developing provincial plans for nutrition and advocacy for extension of maternity leave. Capacity building at all levels will also be critical to ensure high quality data and appropriate use and interpretation of information for planning, advocacy and monitoring of trends.

Key words: Child growth, child feeding practices, child nutrition, maternal nutrition.

PS4-43 Nutrition Porfiling (WHO)

IS IT POSSIBLE TO DEVELOP A GLOBAL NUTRIENT PROFILE MODEL?

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Nutrient profiling is 'The science of classifying or ranking foods according to their nutritional composition for reasons related to preventing disease and promoting health'. This presentation will: (i) briefly outline the principles of nutrient profiling; (ii) briefly describe the uses of nutrient profiling; (iii) briefly discuss the development and validation ofnutrient profile models; (iv) describe some results of comparing different models used, or which potentially could be used, for regulating the marketing of foods to children; (v) discuss whether a single nutrient profile model for all applications and for all countries is possible; (vi) discuss the process of achieving a more consistent approach to nutrient profiling.

Key words: ?Nutrient profiling, food marketing, food labelling.

PS4-51 Nutrition, physical activity and the prevalence of NCDs in the Middle-East and North-Africa

NUTRITION AS A RISK FACTOR OF CARDIOVASCULAR DISEASES IN COUNTRIES OF THE MIDDLE EAST

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New evidence is pointing out to pre and post natal nutrition as playing a pivotal role in the development of non-communicable diseases (NCDs). Recent epidemiological, observational and experimental studies suggest that suboptimal feeding patterns and practices during the first two years of infancy could be key determinants of adult disease. Under and over nutrition during critical periods (in utero/infancy) has been shown to be associated with metabolic 'programming', possibly increasing the risk of adult obesity, cardiovascular diseases (CVD), type II diabetes, hypertension, and metabolic syndrome. Recent research studies revealed that infants introduced to solid foods before 4 months had a six-fold increase in odds of obesity at three years of age. In addition, excessive food intakes during infancy have been associated with the risk of obesity and CVD risk factors in adulthood. In the Middle East region, eviden-

ce shows that current complementary feeding practices fall below global recommendations. The majority of the Kuwaiti (54%) and Lebanese (52.6%) infants receive solid foods before 4 months. In the Kingdom of Saudi Arabia (KSA), 81.5% of infants receive complementary foods between 4 and 6 months of age, whereas in Iraq and the United Arab Emirates (UAE) the figures are 78.6% and 70%; respectively. In parallel to faulty feeding patterns, the rates of CVD in countries of the Middle East have been increasing rapidly and currently account for 25 to 45% of total mortality with the highest mortality rates being recorded in the Arab countries of this region (Iraq, Syria, Lebanon, Jordan, and the Palestinian territories). Hence, enhancing infant/young child feeding practices may contribute to reduced morbidities and mortalities from NCDs, ultimately decreasing the region's high burden of these diseases.

Key words: Infant nutrition, complementary feeding, non-communicable diseases, cardiovascular diseases, Middle East.

NUTRITION AND NCDS IN NORTH AFRICA

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Countries of North Africa have experienced significant demographic, social and economic changes over the past decades that have greatly influenced the nutrition and health patterns of their populations. Not different from the rest of developing world, these societies are faced with rapidly growing population and urbanization, changes in food availability and cost and lifestyle changes resulting in nutrition transition that has shifted once traditional to a modern diet. While undernutrition still exists as a problem, particularly in the younger population, overweight and obesity are increasing at alarming rates and have reached dramatic levels. In 2008, the prevalence of overweight among adults was estimated to be 45,5% in Algeria, 46,8% in Morocco, 53,7% in Tunisia, 61,9% in Libya and 67,9% in Egypt with higher rates among women in all countries. High levels of overweight/obesity, going hand-in-hand with adverse changes in dietary patterns and physical inactivity are important contributors to high epidemiology of non-communicable diseases. In 2008, the prevalence of raised cholesterol in the region ranged from 33% to 39%, raised blood pressure 35-43% and raised blood glucose 6-12%. Proportionally, non-communicable diseases were estimated to account for the greatest percentage of all deaths, ranging from 63% in Algeria to 82% in Egypt, with cardiovascular diseases as single largest NCD. With the growing burden of overweight, countries are challenged to implement effective nutritional policies and action plans to combat this malnutrition form. Although some nutrition policies already exist, they are often not supported by a clear strategic plan of implementation. Strong political commitment, structured policy frameworks, health expertise, adequate budget allocation and institutional capacity building should be pillars when developing and monitoring the implementation and sustainability of future nutrition programmes.

Key words: Nutrition, non-communicable diseases, obesity, undernutrition.

PHYSICAL ACTIVITY AND LIFESTYLE HABITS OF ARAB ADOLESCENTS: PRELIMINARY FINDINGS FROM THE ARAB TEENS LIFESTYLE STUDY

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Background and objectives: The dramatic lifestyle transformation experienced by major Arab cities can have a considerable negative health impact. Therefore, the objective of the Arab Teens Lifestyle Study (ATLS) was to investigate the lifestyle habits of Arab adolescents living in major urban cities. Materials and

Methods: About 9800 young participants were randomly selected from 12 participating cities in the Arab countries, including Riyadh, Jeddah, and Al-khobar (Saudi Arabia), Dubai (UAE), Kuwait, Bahrain, Amman (Jordan), Mosel (Iraq), Muscat (Oman), Doha (Qatar), Tunisia (Tunisia) and Kenitra (Morocco). Measurements included anthropometry, physical activity (PA), sedentary behaviors (SB), sleep duration (SD) and dietary habits (DH).

Results: The findings from the first patch of data, representing 8 cities; Riyadh, Jeddah, Al-khobar, Dubai, Kuwait, Amman, Mosel and Muscat, are presented. Adolescent obesity ranged from 5.2% in Mosel to about 24% in Kuwait. Obesity plus overweight prevalence ranged from 15.2% in Muscat to 48.7% in Kuwait. Participants from the Arabian Gulf (GCC) countries, except Muscat, have higher obesity and overweight levels than those from Amman or Mosel. PA-related energy expenditure (MET-min/week) was the lowest in teens from GCC cities. In addition, girls were significantly less active than boys in all participating cities. Time spent on daily SB ranged from 3.3 hours in Mosel to 7.5 hours in Kuwait. The proportion of youth sleeping for less than 7 hours/day ranged from 27-81%. Only 18-48% of the sample eats daily breakfast and about 10-60% have daily vegetables or fruit. Consumption of fast foods or sugar-sweetened drinks 3 times or more/week ranged from 30-54% and 65-85%, respectively.

Conclusion: Arab adolescents demonstrated some similarities and differences in their lifestyles. The ATLS provide invaluable baseline data for public health providers and policy

make to be utilized in health promotion and disease prevention.

Key words: Arab adolescents, physical activity, dietary habits, sedentary behaviors.

BUILDING RESEARCH CAPACITY IN NUTRITION TO PREVENT NCDS IN THE MIDDLE-EAST AND NORTH-AFRICA

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Non-communicable diseases are the most common death cause worldwide especially in low and middle-income countries where limited health care resources make them a particular burden. Without counteractive actions, the WHO expects the strongest increments (almost 25 %) in the African and the Eastern Mediterranean Region. The high prevalence of overweight and obesity in many countries of the region is a major causative factor of NCDs like diabetes mellitus type 2. At the same time, micronutrient malnutrition (hidden hunger) occurs frequently. The effects of nutrition on NCDs are currently the field of intense research worldwide, offering a promising and less expensive approach to prevention through weight reduction and improved diet quality. Building research capacity in nutrition in the MENA region is therefore of great importance. Indeed, the development of effective intervention programs requires knowledge about the specific nutritional problems of the region that can only be gained from well-designed nutritional surveys. A priority in this regard is the development of the necessary tools such as regional food composition databases, food intake protocols, and calculation programs. These tools can also serve to evaluate the efficacy of fortification programs aimed at improved micronutrient supply that are currently widely applied. An emerging research field is the influence of genetic variance on metabolism, requirements, and health effects of nutrients that can account for ethnic differences in disease pattern. Molecular markers can also be used as indicators of NCD prevalence and risk. Institutional capacity building in nutrition in the MENA countries needs further development, both in education and research. This recommendation must be pronounced although scientific research generally suffers from the political instability in the region that is also a cause for aggravating of nutritional issues and may present an obstacle to international cooperation.

Key words: Eastern Mediterranean, North Africa, NCD, nutrition, capacity building.

THE PALESTINIAN MICRONUTRIENT SURVEY (PMS) - FIRST REPRESENTATIVE NATIONAL NUTRITIONAL STUDY

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Background and objectives: Selective micronutrient deficiencies especially anemia are of public health concern in the occupied Palestinian Territories. The prevalence of anemia is high in Palestine, despite the flour fortification program with iron, zinc, vitamins A, D, B1, B2, B6, B12, folic acid, and niacin, which was implemented in 2006. Most affected are children <5 y, schoolchildren (6-16 y), and pregnant women (59 %, 30 %, and 34 % on average, respectively) with people in the Gaza-Strip more affected than the West-Bank. Reports categorized most cases of the diagnosed anemia as moderate or mild. Our aim was to assess and characterize the prevalent anemia and explore its causes. A representative national nutritional survey (n=6.000) was planned and conducted as a cooperation project between UNICEF and the Palestinian Ministry of Health and the University of Vienna with financial support from the European Union.

Methods: In a randomized cross sectional survey in the regions (Gaza-Strip and West-Bank), children of both genders aged <5, 6-14 and 15-18 years in different school types (UNRWA, Government, private), pregnant (22-24 weeks of gestation) and lactating women were considered. Intake including the use of supplements (interview) and the status of Fe, Zn, folic acid, vitamins B12, A, E and D are to be assessed using standard/validated assays. The erythrometric parameters (Hb, MCV, MCH, MCHC), CRP and anthropometric measurements will be analyzed. The fieldwork has just begun and will last 3-4 months.

Results and **conclusions:** Data of this project are important to explain the potential causes of anemia and inform about the efficiency of the ongoing flour fortification program in Palestine. This study can also be seen as an example for a systematic and science-based capacity development in the Middle-East and North-Africa-Region.

Key words: Micronutrient status, anemia prevalence, flour fortification, cooperation project UNICEF-Palestine.

PS5-59 Food insecurity and obesity across the life cycle

HOUSEHOLD FOOD INSECURITY AND OBESITY ACROSS THE LIFE CYCLE: CONCEPTUAL FRAMEWORK AND BIOLOGICAL PLAUSIBILITY

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Global epidemiological evidence indicates that Household Food Insecurity (HFI) and obesity co-exist at least in some population sub groups. Thus, it is crucial to understand if this is a spurious or a causal relationship. Research in animal models and humans indicate that there are diet related and stress related pathways that may help understand how HFI affects obesity risk. Also epigenetic mechanisms may help understand how HFI affects offspring obesity risk through its effect on parental obesity. HFI in the context of countries undergoing or being at the post phase of the nutrition transition may lead to higher consumption of lower cost highly energy dense diets of low nutritional value. HFI may lead to disordered eating patterns as economic resources to acquire food become depleted during the month. These maladaptive eating patterns may be associated with monthly cyclical fluctuations in body weight and fat regulation hormones (e.g., insulin) that promote the cumulative retention of body fat over time. HFI is a major stressor that can increase the levels of stress hormones, such as cortisol, that promote fat deposition. In addition HFI has been consistently associated with depression, a condition that may significantly reduce physical activity levels. Parental obesity has been linked to an increased risk of obesity in the offspring via epigenetic mechanisms that may be triggered during the pre- and peri- conception periods, gestation and early infancy. Thus, children's obesity risk related to HFI may also be affected indirectly by the influence of HFI on parental body fat accumulation. In conclusion, there are clear direct and indirect biologically plausible pathways supporting the hypothesis that HFI is likely to affect obesity risk of humans across the life cycle.

Key words: Household food insecurity, life cycle, obesity

HOUSEHOLD FOOF INSECURITY AND EXCESSIVE WEIGHT AMONG BRAZILIAN SUBJECTS: A LIFE-COURSE APPROACH

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Household food insecurity (HFI) may increase obesity risk but results are not consistent across the life course and between developed/underdeveloped settings. The objective of this paper is to review findings from previous analyses in Brazil among adult women, female adolescents and children under five. Data were derived from the 2006-07 Brazilian Demographic and Health Survey. Associations between HFI, measured using the Brazilian Food Insecurity Scale, with excess weight/obesity were investigated through Poisson regression models. Whereas severe HFI was associated with obesity risk among adult women [PR: 1.49; 95% CI: 1.17â±1.90], moderate HFI was associated with excess weight among female adolescents [PR: 1.96; 95% CI: 1.18â±3.27]. There was no association between HFI and obesity among children of both genders. It is possible that the nutrition transition process in Brazil may be shaping the differential deleterious effect of HFI on body fat accumulation across the life-course, being the association evident among female adolescents and adult women but not yet among children.

Key words: Adolescents, children, food insecurity, women

FOOD SECURITY AND OBESITY RISK THROUGHOUT LIFE CYCLE STAGES IN MEXICO

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Background and objectives: Food security situation in Mexico suggest a complex and contrasting scenario. National Health and Nutrition Survey 2012 (ENSANUT 2012) reported that almost one in every three households suffer food insecurity (FI) in moderate or severe degree. This work objective is to describe the Food Security magnitude in Mexico from the feeding access and consumption perspective and its relation with overweight and obesity throughout the different life cycle stages (children, teenagers and adults), using (ENSANUT 2012) information.

Methods: Data for this analysis comes from ENSANUT 2012 . Food Insecurity status was measured using the last harmonized version of ELCSA (Latin American and Caribbean

Food Insecurity Scale Overweight and Obesity: In children and teenagers was determined by the z-score for the Body Mass Index (BMI=kg/m2) for Age indicator using the WHO Growth Reference. . In adults categories proposed by the WHO .

Results: In children under five years old no association was found between FI and overweight, however, wasting (<-2Z Weight/Age) was 2.17 times greater when the household was in severe FI condition (p=0.027). Stunting was also associated to households with moderate (p=0.019) and severe (p<0.001) FI. In the women between 20 and 59 years group the risk of suffer obesity increased 2.5 times when their household was in severe FI in contrast with an 1.3 times increase in overweight and obesity for the same group but in a household with food security conditions.

Conclusions: In Mexico, food insecurity increases not only the malnutrition risk in children but also contributes in important way in the incidence of overweight and obesity in other population groups.

Key words: Children, food insecurity, overweight, obesity,life cycle, Mexico.

HOUSEHOLD FOOD INSECURITY AND OBESITY RISK ACROSS THE LIFE COURSE: USA

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Household food insecurity (HFI) is experienced when there is uncertainty about future food availability and access, insufficiency in the amount and kind of food required for healthy life, or the need to use socially unacceptable ways to acquire food. Hunger and malnutrition (i.e., undernutrition or obesity) are possible, although not necessary, consequences of HFI. Other closely linked consequences besides hunger are part of the experience of food insecurity: 1) worry and anxiety, 2) feelings of alienation and deprivation, and 3) distress and adverse changes in family and social interactions. These three closely linked consequences represent non-nutritional mechanisms leading to poor physical and mental health. Some behaviors potentially resulting from experiences of food insecurity are reductions in investments, risk avoidance, and survival strategies. Food needs compete with other needs, and trade-offs involving food are sometimes made to ensure long-term livelihood. Therefore, there are several potential mechanisms through which HFI may lead to obesity. In the USA, studies have reported substantial variability in the association of HFI with obesity. This variability can be understood using four perspectives. First, household and individual circumstances determine the relative importance of nutritional and non-nutritional mechanisms. Second, severity of HFI matters; severe HFI leads to weight deficit, but moderate HFI leads to weight excess. Third, the association of HFI with obesity reflects developmental changes as children progress through adolescence to adulthood. Fourth, individuals have different experiences with different consequences across the life course. HFI is a form of material deprivation. Since material deprivation leads to poor outcomes in many domains, obesity is an expected consequence of HFI for some subpopulations and at some ages.

Key words: Food insecurity, weight, obesity

PS5-67 Type 2 diabetes in Asia's rapid growth is due to genetic or dietary change?

EFFECTS OF NUTRITION, LIFESTYLE AND GENETIC FACTORS ON METABOLIC ABNORMALITIES AMONG CHINESE

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Background and objectives: With a dramatic nutrition transition in last few decades, China is facing the challenge of an epidemic of obesity-related diseases like metabolic syndrome (MetS) and type 2 diabetes (T2D). However, few studies have systematically investigated roles of genetic variants and diet/lifestyle factors in the pathogenesis of metabolic diseases among Chinese. Thus, a population-based prospective study was conducted.

Methods: Baseline data included 3,289 men and women aged 50-70 years from Beijing and Shanghai, China and 2,198 of them participated in the 6-year follow-up study.

Results: Our baseline data showed significant north-south and urban-rural differences for the prevalence of MetS and T2D, even at given adipose levels. Multiple environmental and genetic variants, obese phenotype, inflammatory biomarkers and adipokines were found to be significantly associated with the risks of MetS and T2D. Among these factors, circulating of 25(OH)D and erythrocyte docosahexaenoic acid was inversely, while plasma ferritin was positively associated with the risk of MetS. However the levels of 25(OH)D, ferritin and n-3 polyunsaturated fatty acids were modified by genes variants in related metabolic pathway(s). Ethnical differences on genotypes (FTO, CDKAL1and GRK5), phenotype (C-reactive protein), and sources of trans-fatty acids were also observed between Chinese and Caucasians. In our follow-up study, multiple nutrient biomarkers were confirmed to predict the development of MetS and T2D, independent of established risk factors. For instance, plasma ferritin was independently associated with 60% increased risk of developing MetS (relative risk [RR] 1.60; 95% confidence interval [CI] 1.16-2.20), while erythrocyte trans-fatty acid trans-18:1 was associated with reduced diabetes incidence

(RR 0.59; 95% CI 0.45-0.79) by comparing extreme tertiles in multivariate models (all P<0.01 for linear trend).

Conclusions: Our studies provided important insights regarding the complicated relationships of gene-nutrition and gene-phenotype with metabolic abnormalities in Chinese population.

Key words: Nutrition, genetic, metabolic abnormalities, China.

ASIANS ARE MUCH MORE VULNERABLE TO DIETARY CHANGE DUE TO LOWER INSULIN SECRETION

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The increasing number of patients with diabetes is a worldwide serious problem, which is most eminent in Asia. Now, one third of diabetic patients are in Asia. According to International Diabetes Federation (IDF), the prevalence of diabetes in Western Pacific Region is 8.0%, with the number of patients being 132.2 million, which is expected to increase to 187.9 million in 2030. Clinical evidences suggest that Asians are much more susceptible to developing diabetes. Impaired insulin secretion and increased insulin resistance are both responsible for ,. In Caucasians, the importance of insulin resistance is advocated, whereas insulin secretory capacity is much lower in Asians than in Caucasians. Higher insulin secretion is associated with increased fat deposition and obesity. In contrast, in those with lower insulin secretion, hyperglycemia would be prolonged since lipid synthesis and fat deposition is not much enough. Thus, Asians are at higher risk of developing diabetes even at slightly increased body mass index (BMI). These ethnic differences might be explained by the different life styles, especially the different dietary tradition. The meat and the dairy product consumption, and the carbohydrate consumption have been large in Caucasians and Asians, respectively. Now that the Asian dietary habit is rapidly westernized, pancreatic beta-cell in Asians is likely to unable to adapt to the new circumstance.

Thus the current research question if type 2 diabetes in Asia and rapid growth is due to genetic or dietary change is both yes. Many Asians, with genetically lower insulin secretory activity and susceptibility to developing diabetes, have developed diabetes triggered by the dietary change.

Key words: Dietary habits, insulin resistance, type 2 diabetes.

OVERWEIGHT AND DIABETES IN INDIA

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In the past two decades, the prevalence of diabetes has doubled in both urban and rural areas in India. The increase in the rural population is noteworthy as it is large in India. In general the change can be attributed to economic growth and urbanization resulting in changes in behaviour and lifestyle. The prevalence of overweight/obesity in Indian adults has increased, and is greater in women than men. The notion that overweight and diabetes are brought on by unhealthy lifestyles is intuitive. Surveys have documented a gradual decrease in the daily consumption of cereals and pulses, with relatively little change in the calories consumed, indicating substitution with other sources of energy such as fats. Factors driving such consumption patterns can be deduced from the fact that the greatest increases in area under cultivation and production over the last 50 years has been for sugar cane and oil seeds. Food price stability is also of concern; prices of sugar, edible oils and milk and dairy products have been more stable compared to vegetables and pulses over the last decade. In contrast to food intake, information on physical activity from India is scant. Access to open spaces or parks for leisure-time physical activity is poor in Indian cities, and the walkability of Indian cities is extremely poor. The use of non-motorised modes like cycling and walking is risky, since these modes have to share the same right of way with motorized modes. As the use of virtual modes for social interactions catches up in India in the information age, physical activity levels are likely to decrease further. Given the low priority accorded to chronic diseases in general by central and state governments, advocacy focussed towards securing political commitment and adequate policy and funding support is vital.

Key words: Obesity, diabetes, India

EFFECT OF VITAMIN B12 AND N-3 POLYUNSATURATED FATTY ACIDS ON PLASMA HOMOCYSTEINE, AND OTHER CARDIOVASCULAR RISK FACTORS: RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Vitamin B12and n-3 polyunsaturated fatty acids (PUFA) decrease blood homocysteine (Hcy) concentration. However, the combined effect of these nutrients on Hcy and ferritin, and C-reactive protein is limited and inconclusive. The objective was to examine the synergistic effect of vitamin B12 in combination of n-3 PUFA on plasma Hcy, ferritin, and other biochemical markers.

Methods: In a randomized controlled trial, thirty eligible subjects were randomly divided into three groups, and assigned to receive 1000 μg of vitamin B12, 2g fish oil, or 1000 μg vitamin B12 and 2g fish oil respectively for 8 weeks. Plasma phospholipid (PL) fatty acids and biochemical markers were determined.

Results: Plasma PL 20:5n-3, 22:6n-3 and n-3 PUFA were increased after 4 and 8 week supplementation of fish oil, and vitamin B12+fish oil. Plasma concentrations of triacylglycerol, uric acid, and ferritin were significantly decreased after 4 and 8 week supplementation of fish oil, and vitamin B12+fish oil. In all groups, significant changes in plasma Hcy were observed during the study period. Vitamin B12, fish oil, and vitamin B12+fish oil supplementation lowered plasma Hcy concentrations by 22%, 19%, and 39%, respectively.

Conclusions: Combination of vitamin B12 and fish oil have synergistic effect on lowering plasma concentrations of Hcy and ferritin.

Key words: Homocysteine, fish oil, vitamin B12

INSULIN RESISTANCE IN GLUCOSE TOLERANT OBESE ADOLESCENTS ARE ASSOCIATED WITH INCREASED LEVEL OF PLASMA HSCRP AND URIC ACID

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Background and objectives: The increasing prevalence of insulin resistance and obesity has also affected adolescent. This study aimed to compare the level of insulin resistance and metabolic disorder indicators between obese and non-obese male adolescent.

Methods: Thirty nine male Indonesian adolescent students with no family history of type 2 diabetes were enrolled in this study. They were classified as obese, overweight, and normal weight according to International criteria. After a 12-h overnight fast, blood vein was taken for measurement of fasting blood glucose, insulin, hsCRP, uric acid, and antioxidant status (AOS) and OGTT was performed.

Results: Of 39 subjects 9 were obese, 16 were overweight and 14 were normal weight. Obese subjects were clearly insulin resistant compare to overweight and normal weight subjects evidenced by higher insulin level with value of 14.177±6.921, 6.55±4.72, and 4.48±4.51 respectively ($p<0.001$) and higher HOMA-IR i.e., 2.66±1.464, 1.193±0.891, and 0.607±0.347 respectively ($p<0.001$). Interestingly, these were associated with significant higher level of hsCRP and uric acid in obese subjects. Level of hsCRP in obese, overweight, and normoweight subjects were 2.32± 2.23, 1.10±0.43, and 0.56±0.40 respectively ($p<0.003$). Whereas uric acid level for obese, overweight, and normal weight subjects were 7.406±1.3025, 6.878±1.1959, and 5.704±1.0406 respectively ($p<0.001$). The values of 2 h-pp blood glucose level during OGTT in obese, overweight, and normal weight subjects were 96.90±17.38, 98.92±17.49, and 90.65±14.46 respectively ($p<0.433$). Similarly, insignificant difference of AOS was observed between obese, overweight, and normal weight subjects with value of 1.98±0.34, 1.96±0.33, and 1.99±0.35 respectively ($p=1.232$).

Conclusions: There was a clear association between high IMT with insulin resistance markers and increased plasma uric acid level and are moreover associated with increased level of

plasma hsCRP in male adolescents with normal glucose tolerance.

Key words: Adolescents, obesity, insulin resistance, hsCRP, uric acid.

GLOBAL DIETARY WHOLE GRAIN RECOMMENDTIONS: A HARMONISED OR MULTIFARIOUS MESSAGE?

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Background and objectives: Dietary recommendations for whole grain intake exist in a number of countries worldwide, however, the nature and wording of these recommendations have not been characterized to date.

Methods: Using a combination of literature searches and direct enquiry, this research reviewed current whole grain recommendations around the globe to assess presence/absence, rationale and diversity in emphasis and wording.

Results: The level of emphasis placed on dietary whole grain intake is hugely variable globally. For some countries, clearly defined dietary recommendations for whole grain intake exist which are supported by policy and health promotion campaigns. In these instances, quantitative recommendations may co-exist whereby a numerical value is ascribed providing a benchmark or 'target' for population intakes. However, this value can vary between countries and is sometimes related to a gram intake (e.g. 48g/d) or number of servings per day (e.g. 3 x 16 servings). In other countries, whole grain-specific dietary recommendations may be deemed as secondary, whereby they usually form part of broader guidelines on carbohydrate and/or fibre intakes or even general healthy eating guidelines. Where this occurs, the recommendations are typically less prescriptive and may be more difficult to disentangle from the primary recommendation. This can make the impact of any public health campaigns difficult to assess. Finally, in some regions, dietary recommendations for whole grain intake do not exist at all.

Conclusion: This review critiques the evidence regarding dietary recommendations for whole grain intake worldwide. The results indicate that there is a lack of a harmonized message which may result in potential confusion for the consumer, lessen the impact of public health messages and pose barriers to trade for the food industry.

Key words: Dietary whole grain recommendations.

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T4 NUTRITION AND MANGEMENT OF DISEASES

NPS1-4 Dietary lipids and the risk of common diseases

BENEFICIAL EFFECTS OF DIETARY PHOSPHOLIPIDS ON METABOLIC SYNDROME

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Background and objectives: Metabolic syndrome (MS) is associated with obesity, disorder of lipid metabolism, diabetes, and increased risk of developing cardiovascular disease. Recent evidence showed that the quality of food components is important modulators in terms of risks with metabolic syndrome. In addition, growing evidence showed that dietary phospholipids have beneficial effects on health compared with dietary triacylglycerols (TAG). We evaluated the physiological functions and molecular actions of bioactive phospholipids, phosphatidlyinositol (PI) and phosphatidylcholine (PC), in the development of fatty liver and inflammation of experimental animal models.

Results: Intake of purified soybean PI (2%) suppressed the accumulation of body fats and alleviated metabolic syndrome through the transcriptional regulation of lipid and glucose metabolism in Zucker (fa/fa) rats. Additionally, when rats were fed semisynthetic diets that contained either 5% corn oil + 2% Egg-PC, or 5% corn oil + 2% DHA-PC, DHA-PC diet DHA-PC diet significantly decreased omental WAT weight, and markedly alleviated hepatomegaly and hepatic lipid accumulation in obese OLETF rats. These effects were attributable to the suppression of fatty acid synthesis and the enhancement of fatty acid beta-oxidation in the liver.

Conclusions: These results indicate that dietary phospholipids would be useful to prevent or alleviate metabolic syndrome.

Key words: Phospholipids, metabolic syndrome, lipid metabolism , DHA-Phospholipid, phosphatidylinositol.

POSTPRANDIAL METABOLISM OF DOCOSAPENTAENOIC ACID (DPA, 22:5N-3) AND EICOSAPENTAENOIC ACID (EPA, 20:5N-3) IN HUMANS

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Background and objectives: The study of the metabolism of docosapentaenoic acid (DPA, 22:5n-3) in humans has been limited by the unavailability of pure DPA and the fact that DPA is found in combination with eicosapentaenoic acid (EPA, 20:5n-3) and docosahexaenoic acid (DHA, 22:6n-3) in natural products.

Methods: Pure DPA and EPA were incorporated in meals served to healthy female volunteers in a double blind cross over study. Mass spectrometric methods were used to study the chylomicron lipidomics.

Results: Plasma chylomicronemia was significantly reduced after the meal containing DPA compared with the meal containing EPA or olive oil only. Both EPA and DPA were incorporated into chylomicron TAGs, while there was less incorporation into chylomicron phospholipids. Lipidomic analysis of the chylomicron TAGs revealed the dynamic nature of chylomicron TAGs. The main TAG species that EPA and DPA were incorporated into were EPA/18:1/18:1, DPA/18:1/16:0 and DPA/18:1/18:1. There was very limited conversion of DPA and EPA to DHA and no retroconversion of DPA to EPA during the 5 hour postprandial period.

Conclusions: EPA and DPA showed different metabolic fates, and DPA hindered the digestion, ingestion or incorporation into chylomicrons of the olive oil present in the meal.

Key words: Chylomicrons, EPA, digestion, DHA, omega-3, fatty acids.

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SIGNIFICANCE OF PHOSPHATIDYLCHOLINE HYDROPEROXIDE IN THE PATHOGENECISITY OF ATHEROSCLEROSIS

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The accumulation of phosphatidylcholine hydroperoxide (PCOOH), a primary oxidation product of phosphatidylcholine (PC), in blood plasma and tissues has been observed in various pathological conditions, including atherosclerosis. To estimate the atherogenicity, the effect of PCOOH on THP-1 monocytic cell adherence to immobilized vascular endothelial cell adhesion molecules were evaluated. THP-1 cell adhesion to intracellular adhesion molecule-1 (ICAM-1) was dose dependently increased by presence of PCOOH. Unoxidized PC, sn-2 truncated PCs, and other hydroperoxide compounds did not affect the adhesion. In the PCOOH-treated cells, obvious protruding F-actin-rich membrane structures were formed, and lymphocyte function-associated antigen-1 (LFA-1) was localized to the protruding structures. Cytochalasin D, an actin polymerization inhibitor, suppressed the PCOOH-induced cell adhesion to ICAM-1 and the membrane protrusions. Next the involvement of Rho-family GTPases in PCOOH-induced THP-1 cell adhesion to ICAM-1 was investigated. Isoprenoid depletion by fluvastatin and geranylgeranyltransferase inhibition by GGTI-286 suppressed PCOOH-induced cell adhesion to ICAM-1 and F-actin-rich membrane protrusion formation. Pull-down assays demonstrated the activation of Rac1 and Rac2 in PCOOH-treated cells. Pan-Rho-family GTPase inhibitor Clostridium difficile toxin B, Rac-specific inhibitor NSC23776, and RNA interference of the Rac isoforms suppressed the cell adhesion. These findings indicate the involvement of Rac GTPase activation in PCOOH-induced cell adhesion to ICAM-1 via actin reorganization. The results indicate that PCOOH evokes monocyte adherence to the arterial wall in the initiation of atherosclerosis. Dietary ascorbic acid, tocopherols, carotenoids and polyphenols prevents the increase of plasma PCOOH in humans.

Key words: Oxidized phospholipid, atherosclerosis, monocytes, PCOOH, tocopherols.

LIPASE-CATALYZED PRODUCTION OF STRUCTURED LIPIDS AS HUMAN MILK FAT ANALOGS

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Most of the energy that the infant needs for nutrition come from fats. The aim of producing infant formula fat analogs is to produce lipids that mimic the breast milk fatty acid composition. Our goal was to explore the use of lipases to produce lipids that mimic human milk fat (HMF) for infant nutrition. HMF analogs were enzymatically prepared using different substrates and esterification methods. The acidolysis and interesterification reactions were catalyzed by sn-1,3 specific and non-specific lipases. The products were structured lipids (SLs) with potential as infant formula fat analogs or as nutraceutical lipids for normal free-living humans and pregnant women. The SLs have high sn-2 palmitic acid content and comparable fatty acid composition to HMF. Physiologically important fatty acids such as stearidonic (SDA), eicopentaenoic (EPA), docosahexaenoic (DHA), gamma-linolenic (GLA), arachidonic (ALA), and oleic acids were important components of the HMF analogs fatty acids profile. Both DHA and ARA are important in brain development and cognitive functions of the infant. The use of HMF analogs compared to vegetable oil blends in infant formula formulations should provide better regiospecific fatty acids and enhance calcium absorption. This enhanced absorption is due to the difference in the positional distribution of palmitic acid in the triacylglycerols.

Key words: Enzymes, human milk fat, infant formula, structured lipid.

PS1-4 Scaling up prevention and treatment of malnutrition

SCALING-UP PREVENTION OF STUNTING

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With more than 175 million under-five children stunted, stunting or chronic malnutrition is the most common manifestation of childhood malnutrition. Asia alone accounts for 63% of the global burden of stunting. Stunting not only blunts cognitive potentials of children, 14.5% of all under-five deaths in developing countries can be attributed to this condition. Globally stunting is dropping at a rate of 1.8% per year. Clearly this is not enough to control the situation in which more than one-third of children worldwide suffer from this condition. The causes of stunting are multifactoral. These include prenatal causes (maternal malnutrition, anemia, hypertensive disease of pregnancy), low birth weight, postnatal causes (inappropriate feeding, repeated infections, zinc deficiency, enteropathy etc), and environmental toxins such as aflatoxin. Although food insecurity is a major underlying factor, lack of awareness regarding infant feeding is important. These determinants of stunting should therefore be the focus of programs for preventing stunting. Given the huge burden of stunting, it is imperative

also to implement programs that reverse stunting in young children.

There are examples of national programs that have successfully reduced stunting. The Progressa program in Mexico was able to improve height through a combination of conditional cash transfer and food supplementation. In a micronutrient powder supplementation program in a cyclone affected population in Bangladesh, children who consumed at least 75% of the micronutrient powder sachets had a significantly lower prevalence of stunting than those who did not. A very successful program was that run by CARE in Bangladesh that combined direct nutrition-specific interventions, such as child feeding, with nutrition-sensitive or indirect interventions that empower women, like involving women in income generating activities. This program reduced stunting by 4.5% points over less than 4 years. What we need now is focus and resources for scaling up such programs to control stunting.

Key words: Food insecurity, food supplementation, infant feeding, stunting.

SCALING-UP TREATMENT OF SEVERE ACUTE MALNUTRITION: CHALLENGES

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Severe acute malnutrition [SAM] affects approximately 25 million children under age 5 each year. Effective treatment in the form of ready-to-use therapeutic food [RUTF] has been available for more than 10 years, yet only 10% of children who need treatment are receiving it. What are the obstacles and how might they be negotiated? Discussion The sheer numbers of SAM-affected children and the pressure their care exerts on fragile health systems in parts of Sub-Saharan Africa and South Asia are a major barrier. SAM prevention via programs that combine routine vaccination services, promotion of breastfeeding, prevention and early detection of common infectious diseases and dietary supplementation beyond 6 month of age, are key to reducing the caseload of children who require SAM treatment. Unsurprisingly, when SAM prevention efforts are comprehensive, stunting prevalence decreases as well.

Secondly, SAM treatment protocols must be simplified. The majority of national protocols rely on determination of weight-for-height to identify wasted children. This approach is cumbersome and non-intuitive. Middle-upper arm circumference [MUAC] more accurately identifies children at highest risk for malnutrition-related mortality and is far easier to implement. MUAC gain parallels weight gain, thus is also a useful measure of nutritional recovery. If SAM treatment is to be incorporated into integrated pediatric healthcare, using MUAC offers a much better chance of success.

Lastly, there are major knowledge gaps in the medical science upon which treatment of the severely ill malnourished child depends. If hospital mortality rates for these children are to decline, better evidence must guide the management of fluids, electrolytes, transfusion and antibiotic prescription.

A malnourished child is, above all, a child whose health is compromised. The care and management of these children belongs squarely with medical professionals until healthy growth patterns are established.

Key words: Severe acute malnutrition, ready-to-use therapeutic food, Middle-upper arm circumference.

RESEARCH TO IMPROVE INFANT NUTRITION IN AFRICA

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Undernutrition is the underlying cause of death for 3.1 million children under five years annually. The recent Lancet series reported population attributable deaths for African children with diarrhea to 38% from underweight, 46% to stunting and 34% to wasting as underlying causes. Micronutrient deficiencies are also widespread, with about 41%, 39%, 24% and 16% of African children under five years being vitamin A, iodine, zinc and iron deficient respectively. Interventions involving the promotion of optimal breastfeeding practices, early introduction of safe and nutritionally adequate complementary foods, diversification of local diets and improving care practices as well as disease prevention continue to remain effective means to address undernutrition. However, adverse prevailing conditions such as HIV-AIDS, household food insecurity and poverty are issues to grapple with. These must be specifically dealt with as they compromise child growth and development. Report of adverse effect of iron supplementation to children in malaria endemic areas has virtually brought interventions for the management of iron to a halt in many countries in sub-Saharan Africa. The paper reviews research interventions with the potential to address undernutrition in Africa. Priority research must focus on how effective research interventions can be incorporated into country programs and scaled up for maximum effect.

Key words: Child undernutrition, micronutrient deficiency, nutrition interventions, sub-Sahara Africa.

SCALING UP NUTRITION: WINDOWS OF OPPORTUNITY

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The triple burden of malnutrition is increasingly a big challenge. Global hunger remains persistent as nearly 870 million people worldwide are undernourished. Micronutrient deficiencies, also known as "hidden hunger" affects more than 2 billion people. In addition, obesity or overnutrition now co-exists with undernutrition. The cost of malnutrition can be very high. In India, for example, the economic cost of micronutrient deficiencies amounts to about 2.5 percent of GDP. For poor and vulnerable groups in developing countries to lead healthy and productive lives, good nutrition is key. Agriculture and food systems play a critical role in improving nutrition. For example, biofortification—plant breeding to enhance the nutrient content of food crops—is a promising strategy to combat micronutrient deficiencies in developing countries. Policymakers must also work together to maximize synergies and minimize risks that lie at the intersection of agriculture and nutrition. National agricultural strategies and investment plans need to be designed using a nutrition lens in order to take advantage of the pathways through which agriculture can help to improve nutrition. To increase the availability, affordability, quality, and acceptability of nutrient-rich foods, nutrition-sensitive value chains should be explored. Similarly, the design and implementation of nutrition interventions should also incorporate agriculture and food. While challenges to cross-sectoral collaboration may exist, coordinated actions to harness opportunities must be pursued. Specifically, windows of opportunity for policy change must be exploited. This presentation will discuss what it means to leverage agriculture for better nutrition outcomes and highlight the windows of opportunity which exist to scale up nutrition.

Key words: Malnutrition, micronutrient deficiencies, biofortification, windows of opportunity.

PS2-12 Food, nutrition, physical activity and cancer – Keeping the evidence current: WCRF/AICR Continuous Update Project (CUP) - (WCRF)

EVIDENCE BASED RECOMMENDATIONS FOR PREVENTION OF CANCER AND OTHER CHRONIC DISEASES - THE 2007 AND 2009 WCRF/AICR REPORTS

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The remarkable variation in cancer incidence around the world and its plasticity, when populations migrate or over time within countries, demonstrates a strong environmental component to cancer patterns. Both epidemiologic and laboratory evidence point to food, nutrition and physical activity as key environmental determinants of cancer risk. To better explore their role in cancer, WCRF/AICR commissioned an expert report (Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective) using the most rigorous systematic approaches. Published in 2007 this report is the most authoritative review of this area. In order to translate these findings into practice WCRF also commissioned a unique and rigorous review of the evidence for effective policies and actions. The findings were published in 2009 in Policy and Action for Cancer Prevention. Recognising the ongoing accumulation of evidence, WCRF has commissioned from Imperial College London a continuous update of the evidence, which is judged by an independent expert panel (the WCRF/AICR Continuous Update Project).

Key words: Cancer, environment, epidemiology, food, nutrition, physical activity.

THE WCRF/AICR CONTINUOUS UPDATE PROJECT – AIMS AND PROCESS

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Introduction: The 2007 World Cancer Research Fund/ American Institute for Cancer Research (WCRF/AICR) report Food, Nutrition, Physical Activity and the Prevention of Cancer: a Global Perspective was based on systematic literature reviews (SLRs) conducted in nine different centres. WCRF/AICR has commissioned a team at Imperial College London (ICL) to update the evidence on a continuous basis.

Methods: Having first combined the databases for the 17 cancers reviewed for the 2007 Expert Report into one database, the ICL team conducts SLRs on food, nutrition physical activity and cancer, according to peer-reviewed protocols. The results of the SLRs are judged by a panel of experts who draw

conclusions and where necessary, give advice on whether current WCRF/AICR recommendations need amendment. The database is currently being updated through a rolling programme. A complete updated database is expected by 2015.

Results: The database is kept up-to-date for cancers of the breast, prostate, colorectal, pancreas, endometrium, ovary, kidney, bladder, liver, gallbladder, and oesophagus and updates of stomach and lung cancer are on-going. SLR's for breast, colorectal, prostate, ovary, endometrium and breast cancer survival have been evaluated by the Expert Panel and further updated SLRs will be published on other cancers. Once the SLRs for all the cancers have been updated, the database will be made publicly available, and the 2007 Expert Report recommendations reviewed.

Conclusion: The CUP will provide a unique resource synthesising epidemiological and other evidence on food, nutrition, physical activity and cancer, to facilitate related research, and underpin advice to public and policy-makers.

Key words: Cancer, nutrition, physical activity, obesity.

THE WCRF/AICR CONTINUOUS UPDATE PROJECT – SYSTEMATIC REVIEWS ON NUTRITION, WEIGHT, PHYSICAL ACTIVITY AND HEALTH OUTCOMES IN CANCER SURVIVORS

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The number of cancer survivors has greatly increased in recent decades. There are currently an estimated 28 million people living with cancer globally. This is partly because the general prevalence of cancer continues to rise, within a world population that is also rising. In addition, screening programmes for common cancers are identifying many more cases, usually at relatively early stages. Also for some cancers, treatment is increasingly successful and so cancer survivors are living long enough to develop new primary cancers or other chronic diseases. In 2007 when WCRF/AICR published its Second Expert Report 'Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective', evidence on the associations of nutrition, weight, and physical activity with cancer survivorship was not sufficiently developed for the Expert Panel to draw firm conclusions. The Expert Panel report stated that cancer survivors should follow the recommendations for prevention of cancer on diet, healthy weight and physical activity, with the guidance of their treating physicians and other medical providers. The research on nutrition, weight, and physical activity in cancer survivorship has been expanding over recent years. WCRF/AICR has developed a new protocol as part of the Continuous Update Project to capture and review the evidence, which includes that from randomised controlled trials and follow-up studies. The key outcomes are total and breast cancer mortality, and second primary breast cancer. The Continuous Update Project expert panel will use newly developed criteria specific for cancer survivorship for judging the evidence, as a basis for developing nutrition, weight, and physical activity recommendations for women who have had breast cancer, to reduce mortality and risk of further primary cancers.

Key words: Cancer, environment, epidemiology, food, nutrition, physical activity, survivors.

THE WCRF/AICR CONTINUOUS UPDATE PROJECT: SYSTEMATIC REVIEW OF MECHANISTIC STUDIES IN RELATION TO FOOD, NUTRITION, PHYSICAL ACTIVITY AND CANCER

M. Wiseman

WCRF International, London, UK

The remarkable variation in cancer incidence around the world and its plasticity, when populations migrate or over time within countries, demonstrates a strong environmental component to cancer patterns. Both epidemiologic and laboratory evidence point to food, nutrition and physical activity as key environmental determinants of cancer risk. To better explore their role in cancer, WCRF/AICR commissioned an expert report (Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective) using the most rigorous systematic approaches. Published in 2007 this report is the most authoritative review of this area. In order to translate these findings into practice WCRF also commissioned a unique and rigorous review of the evidence for effective policies and actions. The findings were published in 2009 in Policy and Action for Cancer Prevention. Recognising the ongoing accumulation of evidence, WCRF has commissioned from Imperial College London a continuous update of the evidence, which is judged by an independent expert panel (the WCRF/AICR Continuous Update Project).

Key words: Cancer, environment, epidemiology, food, nutrition, physical activity.

WCRF CONTINUOUS UPDATE PROJECT (CUP) AND FUTURE IMPLICATIONS

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In 2007 WCRF/AICR published the most comprehensive review of the world literature which demonstrated that diet, nutrition and physical inactivity cause cancer in specific sites. It was estimated that these factors account for at least 30% of cancers. In 2009 a systematic review of the evidence to support policy actions to prevent cancer was published. Since 2007 there has been an ongoing literature review to maintain the database on cancer causation up-to-date with a programme of continuous review for all cancer sites. Updates so far been completed for: breast, colorectal, pancreas, endometrial, ovary, with a review for breast cancer survivors. These are published as they are completed and mostly confirm or strengthen recommendations from 2007.There is clear evidence that individual susceptibility to cancer is in part determined by genetic factors, but a large part of the variability in risk can be related to differences in the personal metabolic phenotype. Incorporation of robust mechanistic understanding will strengthen the conclusions drawn from the epidemiological evidence and lead to new research directions and is now the subject of a new major systematic review. While much remains to be understood about how food, nutrition and physical activity influence cancer risk, progression and outcome, enough is already known to implement public health policies that will be effective in reducing the burden not only of cancer but also of other chronic diseases.

Key words: Cancer, environment, epidemiology, food, genetic factors, nutrition, physical activity, survivors.

PS2-20Tackling obesity in pre-school children: First results from the ToyBox-Study

EARLY PREVENTION OF CHILDHOOD OBESITY: REVIEW OF THE LITERATURE AND THE FIRST RESULTS OF THE TOYBOX-STUDY

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Background and objectives: To provide an overview of the literature on school-based obesity prevention programmes and introduceToyBox-study by presenting key-methodological issues and preliminary results.

Methods: Recent reviews and meta-analyses have shown that studies of high methodological quality were more likely to report positive, long-term outcomes, and that a) the use of certain behavioural models, b) targeting children's physical and social environment at home and school, c) involvement of appropriate role models, d) implementation of recreational experiential learning with total class participation and e) duration of at least six months, should guide the development of ToyBox-study. Four key-behaviours were identified to be associated with early childhood obesity: snacking and drinking habits, physical activity and sedentary behaviour. ToyBox-study was implemented in six European countries during 2012-2013. Baseline and follow-up measurements were performed, and process and cost-effectiveness were assessed during implementation.

Results:: At baseline (May-June 2012), more than 8,700 preschool children, their teachers and their families entered the study in Belgium, Bulgaria, Germany, Greece, Poland and Spain. The prevalence of overweight and obesity was found to be 10.8% and 4.1% respectively (IOTF-criteria), with higher prevalence of obesity in South- and East-Europe compared to CentralEurope, and in families with low socioeconomic-status.

Conclusions: These findings, in line with previous studies in older children and adults, indicate that the prevalence of obesity is differently distributed among regions and socioeconomic groups, reflecting not only cultural and lifestyle diffe-

rences, but also differences related to barriers and facilitators of health behaviours. Understanding these parameters when designing and implementing intervention programmes is critical to their success.

Acknowledgements: The ToyBox-study is funded by the 7th Framework Programme of the European Commission (grant 245200).

Key words: Childhood obesity, intervention, prevention, ToyBox-study.

PRE-SCHOOL CHILDREN'S PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOURS

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Background and objectives: This study aims at investigating physical activity and sedentary behaviours in a large sample of European pre-school children.

Methods: The ToyBox-study is a cluster-randomized intervention with a pre- and post-test design targeting pre-school children, their parents and their teachers. Parent questionnaires were gathered at baseline from 8709 preschool children (2 to 5 year olds) out of six European-countries: Belgium, Bulgaria, Germany, Greece, Poland and Spain.

Results: About 33% of parents report that their pre-school child is a member of a sports club, from 12% in Spain to 48% in Germany. Most popular sports were swimming (28%), preschool gymnastics (22%) and dance (11%). About 37% of preschool children walk to school, while 52% are brought by car: but only 16% were walkers in Belgium and 55% were walkers in Spain. About 25% of the pre-schoolers have a TV in their bedroom, ranging from 69% in Bulgaria to 6% in Germany, while 14% have a computer in their bedroom, ranging from 44% in Bulgaria to 2% in Germany. At weekdays, only 2% of German children watch more than 2 hours per day of TV, while highest levels were found in Bulgaria (10%) and Greece (14%). Weekend, numbers are much larger: 36% of Greek and Bulgarian children watch over 2 hours TV per day, followed by Spain (30%), Poland (28%) and Belgium (26%). Only 7% of German children watch more than 2 hours/day of TV at weekends.

Conclusions: Results show large differences in physical activity and sedentary habits in pre-school children across European countries. Interventions should be tailored to country and cultural characteristics.

Acknowlegement:The ToyBox-study is funded by the Seventh Framework Programme (CORDIS FP7) of the European Commission under grant agreement n° 245200.

Key words: Physical activity, sedentary behaviour, TV viewing, computer use, ToyBox.

PRE-SCHOOL CHILDREN'S FOOD INTAKE AND SNACKING HABITS AND THEIR DETERMINANTS

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Background and objectives: This study aims at describing food intake and snacking habits in a large sample of European pre-school children.

Methods: The ToyBox-study is a cluster-randomized intervention with a pre- and post-test design targeting pre-school children, their parents and their teachers. Parent questionnaires were gathered at baseline from 8466 preschool children (2 to 5 year olds) in six European-countries: Belgium, Bulgaria, Germany, Greece, Poland and Spain.

Results: Water is the most frequently consumed beverage (90%) overall and in each country. For other beverages, in Bulgaria, Greece and Spain fresh home-made fruit juice is largely consumed (around 10%) after water, whereas in Belgium light beverages (13%) and in Germany fruit juice (pre-packed/bottled) (15%) are more often consumed. Around 18% of the parents state their child can drink soft drinks or pre-packed juices whenever he/she asks, ranging from 7% in Greece to 18% in Poland. 75% of the parents report that their child likes to eat fruits or vegetables as a snack ranging from 43% in Spain to 86% in Germany, and 67% reported to be pleased with my child's snacking behaviour (52% in Poland to 76% in Belgium). Fruit and vegetables followed by milk (plain) are the most

commonly reported daily consumed snacks (82% and 74% respectively). Fruit and vegetable consumption as snacks varies from 74% in Greece to 89% in Germany. Consumption of milk (plain) varies from 48% in Bulgaria to 88% in Spain.

Conclusions: Variations in parental attitudes and food intake and snacking habits of pre-school children across European countries should be considered when developing intervention programs at European level.

Acknowlegement: The ToyBox-study is funded by the Seventh Framework Programme (CORDIS FP7) of the European Commission under grant agreement n° 245200.

Key words: Food intake, snacking, pre-school, children, ToyBox.

DEVELOPMENT AND IMPLEMENTATION OF THE TOYBOX INTERVENTION

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Objectives: Overweight in early childhood is an increasing public health problem and needs effective preventive intervention. ToyBox is an innovative and evidence based obesity prevention intervention scheme for children aged 4-6 years.

Methods: The development of the ToyBox intervention is guided by a stepwise process following an intervention mapping protocol. This includes the systematic assessment of children's energy balance-related behaviours and their determinants, educational strategies and behaviour models by doing systematic reviews, secondary data analyses and focus group research, as well as adoption of established successful models for prevention in this setting. A review of policies, legislation, regulations and existing health promotion activities also guided the intervention development. After identifying objectives and determinants, effective methods and strategies are designated and operationalized into practical tools. Finally a plan for the implementation was drafted. The intervention was implemented in kindergarten settings in six European countries with children from different sociodemographic backgrounds. Teachers performed the developed activities with setting their priorities on different behaviours. Parents were addressed via targeted materials.

Results: A feasible and attractive intervention programme was developed with different tools directed towards children, teachers and parents addressing four key behaviours and implemented in six European countries.

Conclusion: Developing an international intervention program is a complex process that should follow a systematic approach. It requires effort and time to develop strategies and methods addressing different conditions in participant countries. During implementation, close communication with partners is needed.

Acknowlegement: The ToyBox-study is funded by the Seventh Framework Programme (CORDIS FP7) of the European Commission under grant agreement n° 245200.

Key words: Intervention, kindergarten, obesity prevention, intervention mapping.

PS3-28 Role of dietary macronutrients on weight management. Role of protein and glycemic index in body weight regulation – Lessons from the Diogenes intervention study

BENEFITS AND MECHANISMS OF MODERATELY MIGHT PROTEIN AND HIGH FIBER INTAKE IN BODY WEIGHT LOSS AND MAINTENANCE

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Overweight and obesity management have been mainly focused on reducing food intake or increasing energy expenditure (or both) by following different dietary or behavioural strategies. Thus, very low calories diets (VLCD), low energy programmes (LED), low 'carb' or low fat energy-restricted or 'at libitum' strategies have been prescribed in order to induce body fat losses. In recent years, the role of the macronutrient distribution in slimming dietary approaches is receiving much attention. Indeed, foods with a low glycaemic index and moderately high protein dietary patterns have been shown effective in weight reduction. The mechanisms that have been claimed to explain such body weight lowering are reduced appetite, increased thermogenesis and lower energy efficiency. Interestingly, a combination of high protein (30% E) and fiber intake (low GI) as designed in the DIOGENES project have produced healthy associated benefits not only on body fat deposition, but also on the lipid profile and inflammatory markers in both adults and children. It can be concluded that the amount and distribution of specific macronutrients within hypocaloric diets may be important in designing weight loss programs, but

it is envisaged that the nutrient quality (specific carbohydrates, fatty acids and amino acids) will have an impact on tackling the obesity burden. This research is part of the DIOGENES project (EU Contract no. FP6-513946).

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Key words: Diet, thermogenesis, very low calories diets.

COMPARISON OF INTERVENTION AND COHORT STUDY OF DIETARY PROTEIN IN BODY WEIGHT REGULARTION – RECONCILING OPPOSING EVIDENCE?

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Background and objectives: Physiological evidence indicates that high protein diet may increase satiety, thermogenic response and decrease subsequent caloric intake. Thus diet high in protein might prevent weight gain and weight-regain following weight loss. Clinical trials, including the Diet, Obesity and Genes trial (DiOGenes), show such effect. Large-scale, long-term, observational cohort studies suggest the opposite effect i.e. higher protein diets may increase body weight. Discrepancy between trials and cohort studies could be that individuals recruited for trials are a subset of the population in cohort studies important for the effect of protein The aim of this study is to investigate explanations of the discrepancy by analyzing different subsets on participants in a cohort study.

Methods: Subsets (n=1872) of the Diet, Cancer and Health (DCH) cohort (n=57.055) comparable with the DiOGenes trial (n=548) was selected based on inclusion criteria of DIOGenes, matching DCH-participants with DiOGenes-participants on exposure and different possible effect-modifiers and finally analyzed similar to the DiOGenes trial. **Results:** When matching on intake of protein, carbohydrates, glycemic index and on body fat % a high protein intake was associated with better weight maintenance compared with low protein intake indicating similar effect as the DiOGenes trial. However, the association of protein on weight change did depend on matching criteria and the statistical analysis.

Conclusions: The association between dietary protein intake and subsequent body weight changes appears to depend on the selection characteristics of the participants and the statistical analysis, which may reconcile the otherwise contrasting evidence from physiological and clinical human experiments and large-scale cohort studies.

Key words: Protein, weight control, study design, opposing evidence.

CAN WE PREDICT WEIGHT LOSS AND WEIGHT MAINTENANCE SUCCESS USING THE GENOMICS AND METABOLICS TECHNOLOGIES: THE DIOGENES STUDY

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In recent years significant progress have been achieved in the elucidation of how nutrition influence energy homeostasis using the genomic/metabolomics tools. No topic can so vividly illustrates this progress as the role of energy balance in body weight regulation. DIOGENES (full title "Diet, Obesity and Genes") is one of the largest multi-centre weight loss and maintenance dietary RCT on obesity sponsored by the European Union (FP6-2005-513946). This dietary intervention trial across 8 centres in Europe consisted of an 8-week weight loss (LCD) phase (minimal 8 kg loss) and a 6-month weight maintenance phase, where subjects were allocated to five different diets varying in protein content and glycemic index. Measurements of candidate genes, GWAS, adipose tissue transcriptomics and plasma proteomics and metabolomics were executed or planned. This information will be linked to phenotypical data from the weight loss and weight maintenance period in order to predict outcome success from baseline measurements. Some examples will be presented about the candidate genes, adipose tissue transcriptomics and the metabolomics profiles in relation to weigh loss and maintenance success. In general predic-

tion of the weight loss success based on the baseline metabolomic profile was better in the morbid obese subgroup (>40 BMI) compare to the obese group (27 – 40 BMI). The combination of ~10 clinical parameters & metabolites measured by NMR and lipidomics and phenotypical data predict weight loss in morbid obese individuals with a performance of ~60%. Analysis of the candidate gene variants or GWAS did not reveal any significant effect. Most probably the lack of power or the very well controlled negative energy balance using a LCD, leaving little room for metabolic variation can explain these negative results.

Key words: Prediction weight change, Protein, Glycemic index, Genomics, Metabolomics.

PS3-36 ISCOLE: International Study of Childhood Obesity, Lifestyle and the Environment

BACKGROUND, RATIONALE AND STUDY DESIGN OF THE INTERNATIONAL STUDY OF CHILDHOOD OBESITY, LIFESTYLE AND THE ENVIRONMENT

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The primary aim of the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) is to determine the relationship between lifestyle characteristics and obesity in children, and to investigate the influence of behavioural settings and physical, social and policy environments on the observed relationships within and between countries. The targeted sample includes 6000 10-year old children from twelve countries in all major regions of the world (Asia, Africa, Europe, South America, North America, and Oceania). The protocol includes procedures to collect data at the individual level (lifestyle, diet and physical activity questionnaires, accelerometry), family and neighborhood level (parental questionnaires and Geographic Information System (GIS) analyses), and the school environment (school administrator questionnaire and school audit tool). A standard protocol has been developed for implementation in all regions of the world. Quality control is addressed through the training and certification of personnel, active monitoring of remote data entry, and site visits. A rigorous system of training and certification of personnel has been developed and implemented, including web-based training modules and regional in-person training meetings. Unique features of the ISCOLE study include the global representation of study sites with a range of low to high income countries at different stages of nutritional transition, robust, standardized training and data collection methods, and the multi-level nature of data being collected, including individual, family, neighborhood, and school levels. The results of this study will provide a robust examination of the correlates of body weight and obesity in children. The results will also provide new information to inform the development of lifestyle, environmental, and policy interventions to address childhood obesity that can be culturally adapted for implementation around the world. ISCOLE represents an international collaboration among all world regions, and represents a global effort to increase research capacity and infrastructure in childhood obesity.

Key words: Childhood obesity,diet, lifestyle, physical activity.

ISCOLE – PORTUGAL: PRELIMINARY DATA ANALYSIS LINKING WEIGHT STATUS AND THE ENVIRONMENT

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The primary aims of this presentation are fourfold: (i) present the organizational structure and implementation of ISCOLE in Portugal; (ii) show how schools, parents and children reacted to the study challenges; (iii) illustrate how the data collection was completed to achieve milestones, and (iv) demonstrate how parents, children, physical education teachers, and schools´ directors were provided with feed-back reports. Further, preliminary data analysis will be presented concerning the prevalence of overweight and obesity, and their dependence of environmental conditions, namely school settings and family surroundings, using a multilevel approach. Finally, we will offer a first overview of CINE WIZARD, a user-friendly software that is being developed to analyze and graphically display several capabilities of dealing with the complexities of physical activity patterns and their eventual links to obesity in children.

Key words: Childhood obesity,diet, lifestyle, physical activity.

THE INTERNATIONAL STUDY OF CHILDHOOD OBESITY, LIFESTYLE AND THE ENVIRONMENT: PRELIMINARY RESULTS FROM KENYA

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Childhood obesity is now a major public health challenge globally. The problem is currently on a rapid increase in developing countries, including Kenya and the problem is thought to be exacerbated by the emergence of western lifestyles which increases sedentarism and access to nutrient-poor, energy dense foods. Kenya was one of the countries that participated in the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE). This presentation is guided by the following broad objectives:

1. To describe Kenya and the Kenyan ISCOLE sample.
2. To describe the challenges, lessons and possibilities of conducting a study in a developing country.
3. To describe the school results feedback mechanism (report) and show how capacity building took place through the ISCOLE.
4. To present some statistics of body composition (underweight, normal weight, overweight and obesity) in relation to gender, environment and socio-economic status.
5. To describe on-going advocacy to address childhood overweight and sedentary lifestyle in Kenya. In conclusion, it is envisaged that Kenya, a country going through the physical activity and nutrition transition, will draw significant public health lessons from the ISCOLE study.

Key words: Kenya, childhood, obesity, physical activity.

INTERNATIONAL STUDY OF CHILDHOOD OBESITY, LIFESTYLE AND THE ENVIRONMENT (ISCOLE): METHODS AND PRELIMINARY RESULTS FROM COLOMBIA

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The increasing prevalence of overweight and obesity in children and adolescents in middle income countries is a public health concern. The objective of this study was to determine the factors associated with childhood obesity in Bogotá, Colombia as part of the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE). A cross-sectional school-based multilevel study was conducted in the year 2012. Twenty schools were randomly selected from a sampling frame stratified by socioeconomic status and private vs. public status. The study included 905 10-year-old children with a response rate of 75.5%. Data collection included characteristics of the children (lifestyle, diet and physical activity questionnaires, and accelerometry), family, neighborhood and school environment. An ancillary study to assess reproducibility and validity of the ISCOLE Food Frequency Questionnaire (FFQ) was conducted in a subsample of 128 children with a response rate of 89.1%. Children, parents, and teachers received feedback reports regarding nutrition status and physical activity. In addition, a course of healthy habits was given to children after finishing data collection.

Key words: Children, obesity, nutrition, physical activity.

METHODS OF MEASURING OVERWEIGHT AND OBESITY, AMONG 6-9 YEARS SCHOOL CHILDREN IN ALAIN CITY, UAE

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Childhood overweight and obesity is now becoming a major clinical and public health concern contributing to increasing morbidity and mortality rates for several chronic diseases. Obesity has been attributed to unhealthy lifestyle behavior, resulting from unbalanced diet, sedentary lifestyle and inconsistent knowledge, attitude and behavior. Our study aimed to test several anthropometric methods used to determine overweight and obesity among 6-9 years school children in a pilot cluster-randomized intervention study designed to address childhood obesity and its related risk factors. Methods used were weight and height; body mass index; biceps and triceps skinfold thickness; MUAC; waist and hip and waist-hip circumference ratio. The visibility and accuracy of these methods were discussed. The classification of overweight and obesity based on weight and height and body mass index (BMI) for school children was highlighted. Results indicated that out of the 1073 children participated in the study pre-intervention, the majority (71.8%) had normal body mass index (BMI). An equal percentage of children were classified as underweight (7.4%) and overweight (7.4%), while 13.5% were categorized as obese. At baseline, the average weight for all children participating in this study was 24.0 kg while the average height was 1.21 m. Mean BMI was

16.2 kg/m2. Anthropometric assessment indicates that the average measurements for biceps, triceps skin fold thickness and mid-upper arm circumference at baseline were 6 mm; 10.6 mm; and 17.2 mm respectively. Average waist and hip circumference measurements for all children pre-intervention were 54cm and 64cm respectively. No significant differences were found in those measurements pre and post intervention. Never the less, this pilot school-based intervention proved effective and can be deployed to combat obesity at larger scale or community level. Behavior modification, environmental factors and supportive public health nutrition policy are pivotal factors in managing obesity effectively.

Key words: Anthropometry, obesity, school children, UAE.

PS4-44 Nutrition in inflammatory bowel diseases. From basic to clinical application

ARTIFICIAL NUTRITION IN INFLAMMATORY BOWEL DISEASE: NUTRITIONAL THERAPY AND BEYOND?

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Since the pioneer trial by O'Moráin et al. in 1984 comparing steroids and an elemental diet in active Crohn's disease the possibility that enteral nutrition could be used as primary treatment (i.e. able, per se, to induce remission) in this disease has been a matter of debate. Four meta-analyses of the RCTs comparing enteral nutrition vs. corticosteroids in active Crohn's disease agree that steroids are better than enteral nutrition in inducing remission, but also indicate that, as a whole, enteral nutrition is able to induce clinical remission in about 50%-60% of patients, a remission rate substantially higher than that obtained with placebo in active Crohn's disease, which hardly achieves 30%. Therefore, this suggests that enteral nutrition (or, at least, some enteral formulas) would have a primary therapeutic effect in active Crohn's disease (or, at least, in some subset of patients). This could be particularly relevant in paediatric patients as suggested by two meta-analyses of data from exclusively paediatric trials which conclude that in these patients enteral nutrition is as effective as steroids in inducing remission. The wide range of remission rates obtained in different trials indicate that not every enteral diet is equally effective in inducing and/or maintaining remission. However, the mechanisms whereby enteral nutrition would have these effects remain obscure. To date, the amount and/or the type of dietary fat appears as a major candidate to account for the therapeutic effect of enteral nutrition in Crohn's disease. Experimental and clinical studies suggests that diets with very low fat content may be particularly useful. Also, diets with a substantial amount of fat as either olive oil or MCT could be effective. Omega-3 fatty acids have been scarcely evaluated in this setting.

Key words: Crohn's disease, inflammatory bowel disease, enteral nutrition, olive oil, omega-3 fatty acids ulcerative colitis.

PS4-52 International Life Sciences Institute (ILSI) Session on Food Allergy

FOOD ALLERGY RELATED PROBLEMS AND THEIR SCIENTIFIC SOLUTION

Introduction to ILSI's Food Allergy Programmes

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Operational management of allergens still suffers from the lack of an agreed set of reference values defining a tolerable level of risk. Food allergy is of growing importance to public health, affecting consumers' quality of life (mainly children) and impacting health service resources. The symptoms range from a tingling sensation in the mouth to life-threatening anaphylactic shock. An agreed set of tolerable levels of risk is still missing. Minimising the risk from allergenic foods is a shared responsibility of all the stakeholders involved (patients, clinicians, food manufacturers, retailers, caterers and regulators).

This ICN session will provide an overview of the global effort that has been undertaken to review new low-dose challenge data and tools to analyse these data and apply them to quantitative risk assessment. ILSI Europe together with ILSI North America and ILSI Japan organized a Workshop on "Food Allergy: From Thresholds to Action Levels", in September 2012, to share the work of global experts and to foster a consensus over the feasibility of defining reference values.

The ILSI North America Technical Committee on Food and Chemical Safety supported the Food Allergy Resource and Research Program's (FARRP) approach to focus on probabilistic risk assessment for establishing thresholds and commissioned a peanut data set that FARRP researched and published in 2010. This research led to further opportunities for data acquisition by the TNO (Netherlands), ILSI Europe, and the Allergen Bureau of Australia (VITAL).

Recent research on the consumer's perspective on living with food allergies will be presented. An overview of scientific approaches to evaluating novel proteins expressed in biotech products and the development of reliable and accurate methodologies for characterizing the allergenic potential of novel proteins will also be discussed.

PS5-60 Maternal nutritional supplementation of HIV-infected women during lactation: Implications for maternal and infant health in resource-poor settings

EFFECTS OF MATERNAL NUTRITION SUPPLEMENTATION AND ANTI-RETROVIRALS ON NUTRITIONAL STATUS AND BREASTMILK COMPOSITION OF HIV-INFECTED WOMEN IN THE BAN STUDY

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The Breastfeeding, Anti-retrovirals, and Nutrition (BAN) study was designed to (1) evaluate the safety and efficacy of maternal or infant ARV regimens, taken for up to 28 weeks during exclusive breastfeeding, in reducing mother-to-child postpartum transmission of HIV; (2) evaluate the efficacy of a high-calorie, micronutrient-fortified lipid-based nutritional supplement (LNS) for preventing excess maternal weight loss and micronutrient deficiencies during exclusive breastfeeding. At delivery, 2,369 HIV-infected Malawian mothers and their infants were randomized to a 28-week intervention using a 2-arm (LNS vs. no LNS) by 3-arm (maternal, infant, or no ARV) factorial design. Women exclusively breastfed for 24 weeks and weaned by 28 weeks, after which no maternal LNS or ARVs were provided. The LNS provided RDA levels of micronutrients and about 700 kcal per day. Weight change from 0-28 weeks was tested using bivariate analysis. Longitudinal models were used to examine the effects of the interventions on weight from 0-28 weeks. In a subsample of 537 mother-infant pairs, micronutrient concentrations were measured in maternal plasma, breast milk, and infant plasma at 2 or 6 weeks, and 24 weeks. Analyses included measures of iron status, vitamin A status, folate and B vitamins. A higher percentage of weight loss from 2-28 weeks was observed in women randomized to receive ARVs, but this adverse effect was mitigated by supplementation with LNS. Similarly maternal plasma folate was reduced by ARVs, but a positive effect of LNS on folate mitigated this effect. Maternal supplement also reduced the risk of maternal tissue iron depletion related to ARVs. Maternal breast milk B-vitamin levels were enhanced by LNS. More attention needs to be paid to maternal nutritional status of lactating women taking ARVs in accordance with current WHO breastfeeding recommendations for HIV-infected mothers.

Key words: HIV, maternal nutrition, micronutrients, LNS.

GROWTH AND MICRONUTRIENT STATUS OF HIV-EXPOSED INFANTS IN THE BREASTFEEDING, ANTIRETROVIRALS, AND NUTRITION STUDY DURING THE FIRST YEAR OF LIFE

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Background and objectives: HIV-infected women typically have poor nutritional and micronutrient status, which negatively impacts the growth and health of their infants during and following breastfeeding. Our aims were to evaluate how micronutrient-fortified maternal lipid-based nutrient supplements (LNS) and maternal/infant antiretrovirals (ARV) affect infant growth and micronutrient status from 0-24 weeks and to describe growth when LNS was used as a breastmilk replacement from 24-48 weeks.

Methods: Malawian mother-infant pairs were randomized to: maternal ARV+maternal LNS, maternal ARV, infant ARV+maternal LNS, infant ARV, maternal LNS, or control. Mothers were counseled to exclusively breastfeed to 24 weeks then wean from 24-28 weeks. Infants were given LNS from 24-48 weeks. Longitudinal models estimated the effect of study interventions on anthropometry from 0-24 weeks (n=2121) and 24-48 weeks (n=1619). Logistic regression was used to calculate the odds of deficiency in plasma micronutrients at 24 weeks (n=519).

Results: From 0-24 weeks, maternal LNS had no effect on infant growth, while maternal or infant ARV had a small negative effect on weight and BMI. The proportion of infants who were underweight (2 and 24 weeks, 6%; 48 weeks, 12%) or stunted (2 weeks, 13%; 24 weeks, 16%; 48 weeks, 34%) increased, but remained lower than for infants in the Malawi Demographic and Health Survey (all $p<0.01$). Following weaning, assignment to the maternal LNS arm was associated with greater length ($p<0.05$); fever and diarrhea were associated with lower weight and BMI (all $p<0.001$). Study interventions were not associated with anemia, iron deficiency, or folate, B12, or selenium deficiency at 24 weeks.

Conclusions: Supplementation of healthy HIV-infected mothers during lactation had a modest post-intervention effect on infant length, but no effect on infant micronutrient status. LNS provided to weaned HIV-exposed infants may prevent more severe growth faltering.

Key words: Infant, growth, HIV-exposed, lipid-based nutrient supplements.

MEETING THE NUTRITIONAL NEEDS OF HIV-INFECTED WOMEN AND INFANTS IN RESOURCE-POOR SETTINGS: PROGRAM AND POLICY IMPLICATIONS

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In 2011, UNAIDS and its partners put forward a bold vision: "By 2015 children everywhere can be born free of HIV and their mothers remain alive". Achieving an AIDS-free generation requires significant investments in scale up of HIV-testing and counseling, increased access to family planning, expansion of antiretroviral (ARV) therapy to improve maternal health and lower risk of mother-to-child transmission, and supportive interventions to maximize the health impacts of these investments. WHO guidelines to prevent HIV infections in children propose two options, maternal AZT prophylaxis during pregnancy followed by infant prophylaxis during breastfeeding ('option A") or maternal triple ARV prophylaxis during pregnancy and breastfeeding, with infant ARV prophylaxis for the first 6 weeks only ("option B"). Some countries, such as Malawi, are implementing a modified version of the second alternative, 'option B+", which places all HIV-positive pregnant and breastfeeding women on ARV treatment for life. This approach will undoubtedly save many women's lives and prevent infant infections but data presented in this session suggest that these potent medications alter nutritional status in unexpected ways and that complementary nutritional interventions will be needed. Particular attention needs to be paid to potential ARV and micronutrient interactions in light of findings that breast milk B-vitamins and maternal folate levels were significantly lower in women with prolonged ARV use. Micronutrient-fortified lipid based nutritional supplements (LNS) mitigated the effects of ARV exposure on these outcomes, and also prevented weight loss among HIV-infected women. LNS formulated as a replacement food for infants weaned from breast milk after 6 months was acceptable and protected them from significant growth faltering. These findings strongly support the need to make nutrition a vital component of HIV prevention and treatment policies and programs for success in achieving an AIDS-free generation.

Key words: Maternal nutrition, HIV, ARV treatment.

PS5-68 New insights in obesity, metabolic syndrome and diabetes

GENETIC SUSCEPTIBILITY TO OBESITY AND METABOLIC SYNDROME IN CHILDHOOD

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Obesity is one of the major public health problems worldwide. It is a chronic, complex, and multifactorial-origin disease characterised by body fat excess mainly due to an imbalance between dietary intake and energy expenditure. One of the major complications of obesity is metabolic syndrome, which comprises anthropometrical, clinical, and metabolic dysfunctions that predispose the affected individual to the development of type 2 diabetes mellitus and cardiovascular diseases. It is hypothesised that the variability in the susceptibility to obesity-mediated metabolic complications involves both environmental and genetic factors. Whereas advances in the knowledge of the variations in the human genome have led to the identification of susceptibility genes that contribute to obesity and related disorders, relatively few studies have specifically focused on the interactions between obesity and genetic polymorphisms and the development of metabolic complications. Despite these limited efforts, an increasing amount of evidence suggests that the effects of some gene variants on metabolic traits are modified by or present only in the setting of obesity. Furthermore, some of these loci may have larger effects on metabolic phenotypes in the presence of certain dietary or lifestyle factors. In the present manuscript, we reviewed the genes and their variants that have been evidenced to play a role in obesity-associated metabolic complications through genetic association studies, including candidate gene and genome-wide association approaches in adults and children.

Key words: Genes, gene variants, metabolic syndrome, obesity, single-nucleotide polymorphisms.

CIRCADIAN RHYTHMS, FOOD TIMING AND OBESITY

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Recent studies link energy regulation to the circadian clock at the behavioural, physiological and molecular levels, emphasizing that the timing of food intake itself may have a significant role in obesity. In this regards, there is emerging literature

in animals demonstrating a relationship between the timing of feeding and weight regulation. Unusual feeding time can produce a disruption of the circadian system which might produce unhealthy consequences in humans. In a longitudinal study, we recently showed that the timing of the main meal was predictive of the weight loss during a 20-week dietary intervention and that this effect was independent from total 24-h caloric intake. The importance of caloric distribution across the day on weight loss therapy was supported by a recent 12-week experimental study showing that subjects assigned to high caloric intake during breakfast lost significantly more weight than those assigned to high caloric intake during the dinner.

Furthermore, one of the most influential discoveries relevant for this area of research in the last years is the presence of an active circadian clock in adipose tissue. New data suggest that there is a temporal component in the regulation of adipose tissue functions. In fact, studies performed by microarrays have shown that a substantial percentage of active genes expressed in adipose tissue follow a daily rhythmic pattern. Thus, a specific temporal order in the daily patterns of these genes appears to be crucial for adipose tissue to exclusively either accumulate fat or to mobilize fat at the proper time. Taking into account that feeding is the source of energy for adipose tissue, the time of feeding, particularly for high-energy content meals, may be decisive, and changes in this timing could have metabolic consequences for the development of obesity and for weight loss.

Key words: Circadian clock, circadian rhythms, chronobiology food timing, obesity.

RECENT ADVANCES IN NUTRITIONAL SCIENCES: GENE THERAPY FOR DIABESITY AND THE GENETIC BASIS OF POSTPRANDIAL METABOLISM

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Background and objectives: Here we present two projects: Project A transferred genes involved in islet regeneration to the baboon's pancreas through ultrasound-targeted microbubble destruction (UTMD) therapy. Project B was designed to study whole genome expression analysis before and after a well-defined meal to characterize normal variation in postprandial metabolism.

Methods: Project A-We developed an innovative methodology for gene-based therapy delivered towards a specific tissue or organ, using UTMD technology. These microbubbles work as a noninvasive delivery system that can target specific anatomical sites. Project B-We obtained fasting and post-prandium biopsies of muscle and adipose tissue in the same subject two weeks apart. Each subject provided synchronous measures of gene expression in vivo in two tissues related to obesity and diabetes pathophysiology.

Results: Project A-We targeted plasmids encoding the cyclin D2/CDK4/GLP-1 genes to the baboon pancreas. We obtained in vivo β-cell regeneration and normalization of blood sugar, insulin, and C-peptide without administering viruses. Project B-We examined 17,128 gene transcripts detectable above background in every subject in at least one tissue type. 78.6% were detectably expressed in two tissues.

Conclusions: Project A-Gene therapy is frequently highlighted as one of the most promising technologies of the 21st century. Results related to enhancing the regenerative capacity of the pancreas acquired from this study are highly innovative and have the potential to be translated to humans. Project B-We have standardized a family-based study for collecting postprandial phenotypes and biopsies. This expression profiling is expected to find genes contributing to the metabolic flexibility of individuals. The genetic response following the consumption of a defined meal at the level of the specific tissues involved (adipose tissue and muscle), will produce new insights into the genetic architecture of individual variation in metabolism of carbohydrates, lipids and proteins.

Key words: Gene therapy, whole genome profiling expression, UTMD, postprandial metabolism.

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T5 NUTRIENTS AND NUTRITIONAL ASSESSMENT

NPS1-5 Methods and outcomes of nutritional assessment and health monitoring

USING BIOMARKERS FOR THE VALIDATION OF NUTRIENT REFERENCE INTAKE VALUES AND TO VERIFY INTAKE DATA IN NUTRITION SURVEYS

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The determination of nutrient requirements and the derivation of reference intake values for different population groups have been a central area of interest in the nutritional sciences research and development. Over the decades, reference values have been issued for an increasing number of nutrients at the national, regional and international level. Nevertheless, uncertainties still remain about the adequate supply of certain nutrients. This is especially true for potential at-risk population groups such as infants, children, elderly, and pregnant and lactating women. The situation is further complicated by recent discoveries of additional health-promoting functions of certain nutrients beyond mere nutrition. Generally, reference intake values should be based upon the intake of healthy individuals corroborated by status levels. This calls for valid, i.e. specific and sensitive biomarkers. The importance of biomarkers for the setting of reference intake values has been emphasized in the Austrian Nutrition Report 2012 where among others status of folate, vitamin D, and iron was better, that of vitamin B6, B12, and zinc was lower than would have been expected from the intake levels compared to recommended amounts. Functional biomarkers such as enzyme activities often allow an earlier detection of inadequate status than plasma levels. More recently, immune functions are being discovered as sensitive tools as well. However, most nutrients have many functions in the body so that a single biomarker might not adequately reflect status. Another aspect to consider is that normal ranges (cut-offs) of many biomarkers in humans are still not exactly known (plasma levels of 25-OH vitamin D, essential fatty acids in structural lipids). Additionally, genetic and epigenetic influences on absorption, metabolism and storage of nutrients and levels/activities of functional biomarkers add to inter-individual variation. New biomarkers may open the way to a more personalised nutrition.

Key words: Nutritional assessment, nutritional status, biomarkers, reference intake levels.

IODINE STATUS

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Worldwide, iodine deficiency is one of the most important preventable causes of poor brain development. In some industrialized countries (e.g. The Netherlands) iodine deficiency has been eradicated mainly by the introduction of iodised-salt. However in the UK in the 1930s the iodine content of milk increased due to changes in the dairy-farming industry and iodine deficiency disappeared without the introduction of iodised-salt. By the 1960s the UK was thought to be iodine sufficient and the iodine status of the population has not been monitored since then. In the last few years some UK studies have found mild-to-moderate iodine deficiency in a sample of pregnant women and in teenage school-girls and this has started to raise concerns.

The period of great vulnerability to iodine deficiency is at the time of fast brain development, in utero. Severe deficiency of iodine during pregnancy is well-known to result in cretinism and mental retardation but little is known about the effect of mild-to-moderate deficiency. Urinary iodine concentration, measured in a spot urine sample, is a reasonably good population biomarker of iodine status.

The concurrent measurement of creatinine levels to correct for dilution of urine can overcome some of the limitations of this method, especially in studies of subjects of similar age and sex. Food frequency questionnaires can be used to assess diet at a population level but must be designed to capture the intake of the nutrient concerned and to cover likely food sources in the population under study. Results from a UK cohort study of pregnant women and the neurodevelopment of their offspring at age 7-9 years will be discussed. This will be used to illustrate the importance of ongoing monitoring of the diet and health of the population even after a problem has been thought to be eradicated.

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Key words: Iodine deficiency, nutritional assessment, health monitoring.

PLASMA LEVELS OF FATTY ACID-BINDING PROTEIN (FABP) ASSOCIATED WITH THE ANTIOXIDANT STATUS AND INFLAMMATORY MARKER IN KOREAN CHILDREN

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Background and objectives: Adipocyte fatty acid-binding protein (A-FABP) has been reported to be increased in obese and to be related to metabolic syndrome. The purpose of this study was to investigate the relationship between plasma level of A-FABP and lipid profiles, insulin resistance, antioxidant, and inflammatory parameter in Korean children aged 9-10 years.

Methods: One hundred seventeen healthy children (66 boys, 51 girls) were evaluated with respect to anthropometric measurement, lipid profiles, A-FABP, leptin, glucose, insulin, C-peptide, free fatty acid, lipid soluble vitamins, total antioxidant capacity, lipid peroxidation, antioxidant enzyme activities, and C-reactive protein. Insulin resistance was estimated by the homeostasis model assessment (HOMA).

Results: It is found that the A-FABP was positively correlated with BMI, waist circumference, plasma level of total-cholesterol, triglyceride, activity of alanine transaminase, C-peptide, leptin, and C-reactive protein, while it was negatively correlated with the plasma level of HDL cholesterol, alpha-tocopherol, lycopene, and beta-carotene. The overweight subjects (n = 15) had higher concentrations of A-FABP compared to the children with healthy weight (n = 79) or at risk of overweight (n = 23). Subjects within the highest tertiles of A-FABP levels had correspondingly poor metabolic risk profiles (BMI, waist circumference, systolic blood pressure, triglycerides, total cholesterol, LDL cholesterol, HDL cholesterol, fasting insulin, C-peptide, HOMA), higher level of leptin and C-reactive protein, and lower levels of alpha-tocopherol, lycopene, and beta-carotene compared with those in the mid or lowest A-FABP tertiles.

Conclusion: These results suggest that the plasma A-FABP level might be closely related with not only metabolic risk profiles, but deteriorated antioxidant and inflammatory markers in children.

Key words: Adipocyte fatty acid-binding protein, metabolic risk profile, antioxidant status, C-reactive protein, children.

EVALUATION OF THE STATUS OF WATER SOLUBLE VITAMINS IN AUSTRIAN PREGNANT WOMEN

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Background and objectives: Micronutrient requirements during pregnancy increase due to fetal growth and development as well as maternal changes. Several micronutrients play a critical role in development; other can influence inflammation, and oxidative stress. Therefore, the objective of this survey was to evaluate micronutrient status during pregnancy.

Methods: Blood samples of 113 Austrian pregnant women (3rd trimenon, 18-43 y) were analyzed. Plasma folate and vitamin B12 concentrations were examined by radioimmunoassay, plasma vitamin B6 and aspartate-aminotransferase in erythrocytes were detected by HPLC and photometrically.

Results: Mean plasma folate concentration was 26.68 [22.99; 30.37] nmol/l. 77.1% of pregnant women reached the reference value of >13.4 nmol/l, 2.9% had a bad supply (<6.8 nmol/l)1. Average folate intake was 253.72 [227.06; 280.38] µg/d. The satisfying blood levels result from multivitamin supplements, which include without limitations 0.75-0.80 mg folic acid. Because high doses of folic acid are suggested to mask anemia caused by vitamin B12, cobalamin concentrations were measured: mean plasma concentration was 152.09 [141.28; 162.91] pmol/l; 34.3 % showed slightly and 18.6% clearly decreased levels1. Although, average intake meets recommendations (4.47 [3.19; 5.75] µg/d) 46.2 % of pregnant women were undersupplied. In all women a marked deficiency of vitamin B6 was observed: mean plasma level was 6.82 [5.86; 7.78] nmol/l; average-EAST 1.88. Mean vitamin B6 intake (0.20 [0.18; 0.22] mg/MJ) was below recommendations.

Conclusions: Estimated folate requirement increases during pregnancy and can barely be reached through food consumption. Therefore, supplementation is recommended to prevent neural tube defect, as well as pathological changes in the placenta, and spontaneous abortion. As results show monitoring of vitamin B6 and B12 levels is also important to protect pregnant women from deficiency outcomes.

Reference: 1 SAUBERLICH, 1999

Key words: Pregnancy, vitamin B6, B12, folate.

REVISION OF CHINESE IODINE DRIS AND SOME ISSUES OF USI

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The iodine nutrition has greatly improved in China since the Universal Salt Iodization (USI) was introduced and officially launched in 1996. Based on the current iodine status in both China and the world, iodine excess has become an emerging issue which needs to be solved. Further studies are needed to develop specific and accurate iodine intake levels for different populations. During the 2nd revision of Chinese DRIs in 2013, the UL of iodine of adults was decreased from 1000 μg/day to 600 μg/day based on an RCT trial on 256 Chinese euthyroid adults in 2012. However, there is still a dearth of data. So, we reviewed the reports of iodine EAR and RNI from different countries by means of evidence-based nutrition, RNI for Chinese adult was revised based on these data with adjustment by weight. In addition, the iodine RNI for pregnant and lactation women was also revised. Because of the complicated geographical environment, most regions in China are iodine deficiency, whereas 11/30 provinces are high iodine where nearly 30 million people are exposed to iodine excess because high iodine content in drinking water. Many studies found that excessive iodine intake is harmful to health, suggested that the safe range of iodine may be relatively narrow. After the revision of DRIs, emerging issues of USI has drawn great attention. Although the median UIC in school-aged children is typically considered to represent the iodine status of most population, recent studies suggest median UIC may not be an appropriate proxy for iodine status among pregnant women. Pregnant women and their offspring are particularly vulnerable to iodine deficiency. It is of great importance to develop safe and suitable iodine intake level for the vulnerable populations. Therefore, iodine supplementation policy should be continually carried out to control iodine deficiency and avoiding excess as well.

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Key words: Iodine, DRIs, USI.

INDICATORS OF A HEALTHY AGING AND AGE RELATED FRAILTY

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Large scale epidemiological research might become a very valuable resource for studying aging. It is therefore the question which methods should been applied in such study populations to promote research into the elderly.

Indicators of a healthy aging can be divided into indicators describing mental or physical performance. For the estimate of mental performance respective cognitive decline, the Mini-Mental-State-Examination (MMSE) is widely been used. The test can be conducted in about 10 minutes. Physical status and its decline with aging are reflected in the concept of frailty. Frailty is a syndrome with decreased reserves and resistance to stressors. A high index of frailty is associated with increased disability, co-morbidity and risk of mortality. Frailty is composed of shrinking of muscle mass, weakness, poor endurance, slowness, and low physical activity. These aspects can be evaluated by a battery of tests and questions and the degree of frailty in each individual can be assessed by a score value.

There are several proposals for measuring each of the aspects: Shrinking of muscle mass by questions on weight change and applying multi-frequency bio impedance analysis, weakness by hand craft, endurance by Health Survey questions (SF), slowness by walking speed, and physical activity by accelerometry. Particularly useful for evaluation of frailty status in the future could be the new generation of actimeters measuring movements in 3 dimensions with high frequency. These devices might not only record physical activity in detail but the raw data can be used for pattern recognition analysis estimating walking speed under natural condition and gait characteristics including impairments. The application of specific measurement tools for aging and age related frailty in existing frameworks of longitudinal studies will facilitate research into healthy aging in the next future.

Key words: Cognition, nutritional assessment, health monitoring, Mini-Mental-State-Examination.

NUTRITIONAL STATUS ASSESSMENT, A CONTINUOUS CHALLENGE

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Optimal supply of essential nutrients is the basis for health and wellbeing. Although obesity prevalence is increasing alarmingly worldwide, malnutrition is common not only in low-income countries. In fact, insufficient intake of certain micronutrients and overconsumption of macronutrients often occurs in obese persons contributing to diseases associated with excessive bodyweight. In turn, undernutrition exists in many parts of the World, especially in vulnerable population groups. Good knowledge of the nutritional situation of the target population is essential for the development of effective solutions to malnutrition calling for reliable assessment methods. While biochemical analysis certainly provides the best picture of an individual's actual status, the necessary equipment, trained staff and expenses present a limiting factor especially in large field trials where dietary assessment is generally preferred despite its many weaknesses. Rapid turnover or tight control of nutrient concentrations in blood limits their sensitivity as biomarkers as in the case of many trace elements. The existence of different forms of a micronutrient in the body adds further complexity. Functional biomarkers such as enzyme activities mirror long-term status better, but are subject to confounding factors. Moreover, markers like hemoglobin and homocysteine levels are influenced by several micronutrients, i.e. not specific for only one, therefore using a combination of biomarkers is advisable. Considering the role of many nutrients for immune functions, there has been increasing interest in using these latter as nutritional biomarkers (e.g. for Cu or Zn). Another option comes in the form of molecular biomarkers such as mRNA transcripts e.g. for Se status. Finally, a question concerns the setting of reference values and cut-off points. Recent advances in genetic research have revealed the impact of genes on nutrient status and requirements resulting in a wide inter-ethnic and interindividual variance of certain biomarkers due to polymorphisms.

Key words: Nutritional assessment, nutritional status, biomarkers, micronutrients.

PS1-5 The SMILING Project: A South East Asian-European collaborative action to prevent micronutrient deficiencies in women and young children in South-East Asia

FOOD FORTIFICATION IN FIVE SOUTHEAT ASIAN COUNTRIES: THE SMILING PROJECT

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Background: Food fortification is one of nutrition interventions considered by all SEA SMILING countries.

Method: A 3d-workshop on Food fortification was organized to compile information related to food fortification, namely, target groups, food vehicles, fortificants and existence of specific policy and implementation; strengths and weaknesses of the policy and programs were identified. A 2d advocacy meeting resulted in recommendations on further actions to improve effectiveness of food fortification programs.

Results: Common to all countries is the mandatory iodization of salt, although it was stopped and being revived in Vietnam. Additional mandatory fortification exists in Indonesia and Thailand. Indonesia has iron& zinc fortification of wheat flour, multiple fortified complementary foods, and vitamin A fortification of cooking oil. Thailand has iodization of fish/soy sauce and vitamin A fortification of sweetened condensed milk. Four countries(except Laos) have voluntary fortification of condiments, staples and complementary foods as a public health strategy. All countries have implemented food-based strategies as one of the nutrition programs, such as food-based dietary guidelines, food security for nutrition, nutrition education communication. However, they are not necessarily specific to micronutrient deficiencies. The meeting recommended that food fortification will be an important intervention.There should be a national level food fortification committee which

may be a subcommittee of the national nutrition committee, or an independent one if the national nutrition committee does not exist. A functional and active secretariat to the national food fortification committee is essential to coordinate the multi-sectoral efforts as well as partnering with academic, non-government and international organizations. Food fortification should be advocated to the current ASEAN committee on food security to support the exchange of knowledge, expertise, resources in laboratory (crucial for quality assurance) and capacity building.

Conclusion: Food fortification is an important intervention to alleviate micronutrient deficiencies in children and women in SEA SMILNG countries. Key challenges in scaling up as a national program include establishing a functional national food fortification committee to formulate and oversee a comprehensive program,a monitoring system for quality assurance and capacity building. Harmonizing efforts in food fortification among ASEAN countries will benefit the countries within and beyond SEA SMILING countries.

THE SMILING PROJECT: A NORTH-SOUTH-SOUTH COLLABORATIVE ACTION TO PREVENT MICRONUTRIENT DEFICIENCIES IN WOMEN AND YOUNG CHILDREN IN SOUTH-EAST ASIA

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Background and objectives: Micronutrient deficiencies prevent a third of the world's children from reaching their intellectual and physical potential. Because of their enormous impact on health, and human and economic development, micronutrients interventions are recognized among the most urgently needed and the most cost-effective interventions. The objective of the SMILING project 'Sustainable Micronutrient Interventions to Control Deficiencies and Improve Nutritional status and General Health in Asia' is to support the transfer of state-of-the-art knowledge in nutrition to public and private stakeholders, and policy-makers. It aims at improving the micronutrient status of women of childbearing age and young children on a large scale.

Methods: SMILING is a transnational collaboration of eleven research institutions and implementation agencies in five South-East Asia (SEA) countries - Cambodia, Indonesia, Lao's PDR, Thailand and Vietnam, with five European research organizations. SMILING has been built around a strong project consortium that works on a constant and pro-active exchange of data and analyses between partners and allows for the differences in contexts and development stages of the countries, a strong North-South-South collaboration and co-learning. SMILING is applying innovative tools that support nutrition policy making and programming.

Results: The Major expected outcomes are (i) to identify appropriate, efficient, and sustainable interventions adapted to each target countries; (ii) to develop a road map for decision makers and donors for integration of these priorities interventions into the national policy plans; and (iii) to raise awareness on the magnitude of micronutrient deficiencies and advocate for their prevention among the civil society, communities, non-governmental and international organizations, public and private sectors.

Conclusion: Main results will be presented during the symposium Project funded by the European Commission in the 7th Framework Programme for Research and Technological Development (GA 2896 16). Web site: www.nutrition-smiling.eu

Key words: South-East-Asia, micronutrient deficiencies, large-scale strategies, policy.

SEA COUNTRY SITUATIONS FOR MICRONUTRIENTS: PRIORITY PROBLEMS AND NATIONAL/ SPECIFIC PROGRAMS

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Background and objectives: The success of interventions to control micronutrient deficiencies rely on a combination of the biological efficacy of enhancing nutrient intake and the effectiveness to reach target groups. The objective of the review was to compile information on nutritional status and micronutrient intervention efforts in the five 'SMILING' countries, and hereby identify priority problems to be targeted.

Methods: SMILING partners in Cambodia, Laos PDR, Indonesia, Thailand and Vietnam systematically compiled available national and sub-national information on nutritional status in children and women in reproductive age (WRA), along with information on national and sub-national interventions specifically targeting micronutrient deficiencies.

Results: Information on micronutrient status in the SMILING countries varied widely. Recent data are available in some countries while others are decade old or lacking. Information on growth (stunting, wasting) is more consistent available. Except Thailand, the SMILING countries implement vitamin A supplementation for under-five children, and all countries have programmes for supplements containing iron-folic acid (IFA) for pregnant women, with variable coverage. Multimicronutrient (MMN) interventions to children or WRA have not been adopted nationally by any countries, but are implemented in selected pilot sites in a few. Micronutrient interventions specifically reaching WRA before pregnancy are recognized as beneficial but national programmes are lacking. Food fortification programmes are rapidly developing, and it may be implemented either mandatory or voluntarily. There is a growing attention that sustainable solutions rely on improving diets eg through agriculture production.

Conclusion: Stunting and micronutrient deficiencies existed in all SMILING-countries, with varying severity. Programmes to address these problems have been implemented, but impact may not be carefully evaluated. National surveys should be carried out to more consistently contribute to evaluate performance of national priority programmes. Food-based strategies may include scaling-up food fortification, along with incorporating nutrition objective in agriculture.

Key words: Micronutrient deficiency, children, women, Asia.

STATE-OF-THE-ART OF INTERVENTIONS TO CONTROL MICRONUTRIENT DEFICIENCIES IN CHILDREN AND WOMEN

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Background and objectives: The objective of the review of the State-of-the-art of interventions to control micronutrient deficiencies was to support the understanding of micronutrient status in the light of national efforts to control micronutrient deficiencies in the five 'SMILING'countries. The present knowledge about the efficacy and effectiveness of interventions targeting children and women in reproductive age (WRA) was reviewed.

Methods: For children under five, a systematic review of published systematic reviews and meta-analysis of the efficacy and effectiveness of interventions was conducted through a search strategy in PubMed. For WRA, an expert review was compiled assessing potential interventions to improve micronutrient status in WRA, and when possible, impact was quantified.

Results: The review on children found vitamin A supplementation reduced vitamin A deficiencies and MMN supplementation increased serum vitamin A. Iron supplementation as well as MMN supplementation/food fortification were protective against anemia. Zinc and MMN tented to show protective associations with faltered linear growth, while no systematic reviews supported a protective association between vitamin

A or iron on child growth. For WRA, evidence shows that supplementation programs need to be started before 12 weeks of pregnancy to be effective. It is unclear whether MMN render more benefits than Iron-Folic-Acid (IFA) only. Interventions enhancing intake before conception are more effective than targeting pregnant women, and when suitable food vehicles are available, fortification is more effective than supplementation.

Conclusion: The systematic reviews found inconclusive results regarding the effectiveness of single nutrient supplementation on micronutrient status and child growth, while positive impact of multimicronutrient (MMN) supplementation or fortification on growth were more consistent. Increasing micronutrient intake of women before conception, either through supplementation or fortification, could be an effective tool to reduce severe anemia in pregnancy and improve birth outcomes, but research on effective interventions is needed

Key words: Micronutrients, children, women.

PS2-13 Harmonization of human zinc requirements and country experiences in assessing population zinc status

HARMONIZATION OF ESTIMATES OF HUMAN ZINC REQUIREMENTS, INCLUDING SAFE UPPER INTAKE LEVELS

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Several expert committees and international advisory groups have published estimates of human zinc requirements, but these estimates lack consistency because they are based on different conceptual frameworks and/or statistical techniques and they rely on diverse sources of empirical information. This lack of uniformity in estimated requirements undermines their usefulness for developing dietary recommendations and assessing dietary adequacy. The US Institute of Medicine (IOM) and the International Zinc Nutrition Consultative Group (IZiNCG) employed a similar factorial method to estimate zinc requirements; but their respective estimates of adult (and derived child) physiological and dietary requirements differ because they did not use the same data sources, they contained several minor errors in transcribing or interpreting published data, they employed different statistical modeling procedures and assumptions concerning adult body weight, and the IOM did not consider zinc bioavailablity in the estimates of dietary requirements. A meeting convened to resolve these discrepancies has resulted in newly harmonized estimates of adult physiological requirements that are intermediate to those previously published by IOM and IZiNCG. Consensus was also achieved on the importance of including estimates of zinc bioavailability in the derivation of dietary requirements. In addition, new information on adverse effects of zinc supplementation on indicators of copper status among children suggests that the current IOM and IZiNCG estimates of safe upper intake levels may be lower than necessary for this age group. These collective sets of results argue for the need to review, update and harmonize current global estimates of human zinc requirements.

Key words: Zinc, requirements, dietary intake.

RECOMMENDATIONS FOR ASSESSING ZINC STATUS AND POPULATION RISK OF ZINC DEFICIENCY

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While the consequences of zinc deficiency have been quantified with respect to the global burden of disease, information on the prevalence of zinc deficiency in at-risk countries using direct indicators of zinc status is still limited. One reason may be the lack of clear global consensus on recommended zinc status indicators. Methods to assess zinc status have been reviewed extensively in recent years by the United Nations and other international organizations or initiatives. Collectively, conclusions drawn thus far have been consistent. The distribution of serum or plasma zinc concentration is currently the best available indicator for assessing zinc status in populations. Serum zinc is responsive to zinc intakes, declining with zinc restriction and increasing in response to supplemental sources of zinc; reference data for interpreting serum zinc are also available. The limitations of serum zinc are not unique to zinc, and include lack of specificity for reflecting zinc status under some conditions (e.g. inflammation), and lack of response with mildly low or high zinc intakes due to homeostatic control. Nonetheless, additional indicators that are both sensitive and specific to zinc status should still be identified. Until greater consensus and advocacy for the use of existing or new indicators is achieved, indirect indicators have been proposed to estimate the relative risk of zinc deficiency at national level. The prevalence of inadequate zinc intake based on national food supplies and population weighted theoretical zinc requirements, combined with the prevalence of stunting among children <5 years of age, has been proposed, and widely utilized. Following recent updates and methodological improvements, a 'best-estimate' model suggests that 17% of the global population is at risk of inadequate zinc intakes, while the composite index identified 32 countries as being at high risk. Assessment of population zinc status in those high-risk countries using direct indicators is recommended.

Key words: Zinc deficiency,indicators, requirements, status, supplements.

NATIONAL EXPERIENCE IN ASSESSING THE RISK OF ZINC DEFICIENCY: CAMEROON

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Prior to initiating a mass fortification program including zinc, this study aimed to assess zinc status and risk of zinc deficiency among Cameroonian preschool children and women of reproductive age. This was a nationally-representative, multistage cluster survey. We randomly selected 30 clusters in each of 3 zones (North, South, and Cities) and 10 households (HH) per cluster, each with a child 12-59 mo and a woman 15-49 y (n = 1002 HH). IZiNCG recommendations for blood collection and processing procedures for zinc measurement were followed. Plasma zinc concentration (PZC) was measured by ICP-AES, and plasma C-reactive protein (CRP) and α1-acid-glycoprotein (AGP) were measured by ELISA. PZC was adjusted mathematically for the presence of elevated acute phase proteins (CRP > 5 mg/L and/or AGP > 1 g/L). Adjusted mean PZC was 54.7 μg/dL among children (95% CI: 53.6 – 55.8 μg/dL, n = 812) and 53.4 μg/dL among women (95% CI: 52.1 – 54.7 μg/dL, n = 853). Low PZC was present in 69.1% of children (adjusted plasma zinc < 65 μg/dL in AM samples and < 57 μg/dL in PM samples) and 76.9% of women (adjusted plasma zinc < 70 μg/dL for AM fasting samples, < 66 μg/dL for other AM samples, < 59 μg/dL for PM samples, and < 50 μg/dL for pregnant women). Mean PZC was lower in the North than in the South and the Cities and was positively related to SES among both children and women. Stunted children (n = 240) had lower adjusted PZC than did non-stunted children (n = 507) (52.6 vs. 56.1 μg/dL, p < 0.001). The prevalence of low PZC and risk of zinc deficiency are high among both women and children in Cameroon. Programs to improve zinc nutrition, including food fortification, are needed.

Key words: Zinc, deficiency, Africa.

PREVALENCE OF ZINC DEFICIENCY IN MEXICAN CHILDREN AND WOMEN OF CHILDBEARING AGE

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Background and objectives: Describe the prevalence of zinc deficiency (ZD) among Mexican children and childbearing age women from the National Health and Nutrition Survey2006 (ENSANUT-2006).

Methods: Serum Zn concentrations were determined in 3,964 children 1-11 y, and 2,421 women 12-49 y from ENSANUT-2006. ICP atomic emission spectroscopy was used for determinations. The IZiNCG cut of was used to define ZD. Analyses were adjusted for survey design.

Results: Prevalences of ZD were: 26.3% in 1-4 y, 26.9% in 5-11 y and 33.8% in women 12-49 y. No significant differences were observed in prevalences by sex, geographic region and ethnicity in all ages. Higher prevalences of ZD were observed in children 1-11y from rural areas (28.1 vs 25.9%), those belonging to the lower socioeconomic (SES) tertile (28.2 vs 23.6%), non beneficiaries of a Federal fortified (including zinc) milk distribution program (Liconsa) (29 vs 19%; p=0.05) and preschoolers non beneficiaries of Oportunidades (26.9 vs 23.3%). A higher prevalence was found in urban women (35.8 vs 29.2%) and those belonging to the lowest SES tertile (36.5 vs 31.7%). Results from the 2012 national survey, currently in the process of determination, will be presented.

Conclusions: The prevalence of ZD in Mexican children and women is a public health problem. There is a need to extend the distribution of micronutrient containing foods or preparations in children <5y and from the poorest areas. This is supported by two efficacy studies of fortified food which demonstrated a reduction of ZD prevalence.

Key words: Zinc deficiency, children, women, nutrition surveys.

PS2-21 Assesment of body composition from birth to 2 years

BODY COMPOSITION MEASUREMENT TECHNIQUES IN INFANTS

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A number of techniques have been developed for body composition assessment in adults. Some of these methods can be extended to the measurement of infants. An overview of these methods will be presented, along with their limitations and advantages. Measurements of changes in body water, protein, bone mineral, and fat will be presented from birth to two years of age. The impact of pre-term birth, along with catch up growth, will be compared will reference curves developed for full-term healthy infants.

Key words: Body composition, infancy, growth, pre-term, full-term.

STANDARDIZATION OF BODY COMPOSITION ASSESSMENT FROM BIRTH TO TWO YEARS OF AGE – AN INTERNATIONAL INITIATIVE

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There is now strong evidence that growth from conception to 2 years of age represents a critical "window of opportunity" in terms of later risk of ill health and is central to the concept of the developmental origins of adult disease (DOHaD). However, the assessment of growth during this crucial period of early vulnerability is largely based on anthropometric measurements such as body weight, with insufficient attention to the "quality of growth" and the relative partitioning of nutrients to fat free mass or fat mass although infants of similar weight, height or even weight for height can vary substantially in body composition. In order to better understand the associations between growth during early life and later health status, there is an urgent need to better capture the dynamic nature of growth during early life. However, the reliable measurement of body composition during early life represents a technically challenging area.

The International Atomic Energy Agency (IAEA) initiated a review of body composition assessment techniques recently as the basis for efforts toward the standardization of body composition assessment from birth to 2 years of age. A document was developed by an international group of experts to provide practical information on the assessment of body composition from birth up to 2 years of age, using techniques with the highest potential for standardization globally; stable isotope dilution for total body water (TBW) assessment, dual energy X ray absorptiometry (DXA) and air displacement plethysmography (ADP). In addition, the importance of standardization of anthropometric measurements is highlighted in this book as basic measurements of body weight and length are crucial for accurate body composition assessment. The document will be available 2013.

Key words: Body composition, TBW, DXA, ADP.

PS3-29 Vitamin A supplementation for children 6-59 months of age: Revisiting program strategies and priorities

DELIVERING VITAMIN A SUPPLEMENTATION AT 6-MONTHS OF AGE: AN OPPORTUNITY TO IMPROVE CHILD SURVIVAL

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Vitamin A deficiency (VAD) is a major contributor to child mortality, and high-dose vitamin A supplementation (VAS) of children aged 6-59 months reduces child mortality by 11-24%. Globally, an estimated 66% of children living in areas with VAD receive the recommended two annual VAS dosages, most often through twice-yearly supplementation events. However, these events were not designed to reach children at exactly 6 months of age and as a result, they only reach an estimated 8.3% of children during their sixth month. The remainder is not reached through a supplementation event until later infancy, or during a measles vaccination visit at 9 months. We estimate that the systematic introduction of a 6-month VAS contact, optimally within the routine immunization schedule, could reduce infant mortality by an additional 2.3% as compared to twice-yearly VAS events. Modeling exercises using maximum hepatic vitamin A levels demonstrate that VAS at 6 months is safe even in the presence of a second VAS dose one month later and food fortification programs delivering vitamin A. In addition to the mortality benefits, VAS at 6-months could also serve as a platform to strengthen routine immunization programs and other nutrition interventions, such as promotion of high-quality and safe complementary foods. Revisions of vaccination cards could be linked to revisions related to the introduction of pentavalent vaccines and therefore increase feasibility. We therefore conclude that a 6-month VAS visit in the routine immunization schedule is an effective, safe, and feasible approach to reduce infant mortality rates.

Key words: Children,Vitamin A deficiency, supplementation.

VITAMIN A SUPPLEMENTATION FOR CHILDREN 6-59 MONTHS OF AGE: REVISITING PROGRAM STRATEGIES AND PRIORITIES

S. Baker[1], N. Kakrania[2], J. Blankenship[1], R. Kupta[2], T. Mkumbwa[1], A. Greig[3], L. Neufeld[3]

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The objectives of this symposium are to:

• Review the current global prevalence of vitamin A deficiency (VAD)

• Describe efforts to strengthen vitamin A supplementation (VAS) program implementation in contexts where VAD remains a significant public health problem

• Introduce recent efforts to support governments in the phase out of supplementation programs when VAD is no longer a public health problem. Moderator: Shawn Baker, Regional Director for Africa, Helen Keller International (HKI) Panel: Nita Kakrania, Nutrition Specialist, UNICEF Roland Kupka, Nutritionist, West and Central Africa Regional Office, UNICEF Jessica Blankenship, Regional Micronutrient Advisor, HKI East and Southern Africa Temina Mkumbwa, Nutrition Program Officer, HKI Tanzania Alison Greig, Senior Technical Advisor, Child Survival, Micronutrient Initiative Lynnette Neufeld, Director Technical Services, Micronutrient Initiative Topics for Presentations

1) Introduction: Shawn Baker (10 min) Continuing relevance of VAS and contributions to reducing U5M

2) Vitamin A Supplementation Programs – Revisiting the Strategy: Nita Kakrania) Current priorities of global VAS strategies including building national ownership.

3) Program Implementation examples:

o Monitoring for equity: Use of monitoring data and post event assessments to inform programme strategy and ensure equity: Jessica Blankenship

o Delivering vitamin A supplementation at 6-months of age: An opportunity to improve child survival: Roland Kupka)

o Mobilizing religious leadership to increase coverage of VAS in Tanzania: Temina Mkumbwa

o Integration of VAS into the Health System: Alison Greig

4) Evidence base to inform countries when phase-out of VAS may be appropriate: Lynnette Neufeld

Key words: Children, vitamin A supplementation, vitamin A deficiency.

PS3-37 Findings from 5 birth cohorts from developing countries: The COHORTS collaboration

HISTORY OF THE COHORTS COLLABORATION AND METHODOLOGICAL CONSIDERATIONS

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The COHORTS collaboration (Consortium of Health-Orientated Research in Transitioning Societies) was formed in 2005 and brings together five population-based prospective birth cohorts from low- and middle income countries (LMICs). These include the 1982 Pelotas Birth Cohort Study (Brazil), the Institute of Nutrition of Central America and Panama Nutrition Trial Cohort (INTC, Guatemala), the New Delhi Birth Cohort Study (India), the Cebu Longitudinal Health and Nutrition Survey cohort (CLHNS, Philippines) and the Birth-to-Twenty cohort (Bt20, Soweto-Johannesburg, South Africa). All studies recruited mothers before/during pregnancy, recorded birth weight and serial weight and height data in the children, and have followed the children up into adult life.

COHORTS combines data from approximately 11,000 individuals from populations with a high prevalence of maternal and child under-nutrition, in order to produce high-quality scientific evidence on the early-life determinants ('programming') of adult health. Analyses examine associations of early-life exposures (birth size, linear growth and weight gain during childhood, infant feeding and childhood social environment) with adult outcomes relating to human capital (height, attained education, income, next-generation birth weight) and chronic disease risk (body composition, blood pressure, plasma glucose and lipids). Conditional growth modelling is used to identify critical periods in childhood when growth predicts adult outcomes. 'Trade-offs' between different outcomes is examined. The large sample size enhances statistical power and has led to high-impact findings with strong public health relevance for LMICs. The different patterns of confounding in COHORTS data, compared with high-income countries, enable conclusions concerning early-life programming of relevance to all populations. In the development of analysis strategies to overcome the difficulties of combining data collected at different ages and using different methods, COHORTS has been a unique platform for capacity-building in epidemiology among the study teams. The collaboration's work is funded by the Wellcome Trust and the Bill and Melinda Gates Foundation.

Key words: COHORTS, children, chronic disease, risk, growth, mothers.

GROWTH FROM BIRTH TO ADULTHOOD IN FIVE LOW- AND MIDDLE-INCOME COUNTRIES – COHORTS

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Background and objectives: Growth failure remains a persistent challenge in many countries, and understanding the of patterns of growth failure is critical to the development of appropriate interventions. Most studies have been cross-sectional or have focused on children through age 5 y. We therefore characterized patterns of linear growth in the COHORTS study participants.

Methods: We analyzed data on lengths (or heights, as appropriate) at birth (not available for the cohorts from Brazil or South Africa), 12 mo, 24 mo, mid childhood (48 mo except 102 mo in Philippines) and adulthood for 5292 individuals. Lengths and heights were converted to Z-scores (HAZ).

Results: Mean HAZ were <0 at birth in the three cohorts with data and decreased sharply through age 24 mo in all cohorts. Mean HAZ at 24 mo ranged from -0.64 (Brazil) to -2.89 (Guatemala). Between 24 mo and mid-childhood HAZ increased by 0.45 – 0.49 SD in Guatemala, Philippines and South Africa and was unchanged in Brazil and India. Between mid-childhood and adulthood, mean HAZ increased further (range 0.07 SD (South Africa) – 0.86 SD (India)) but remained <0 (mean adult HAZ range -0.34 (Brazil) to -1.82 (Philippines)). Stunting (HAZ<-2.0) prevalence followed the same pattern, increasing through 24 mo (range 13.3% (Brazil) to 81.2% (Guatemala)) and decreasing between 24 mo and adulthood (range 3.2% (Brazil) to 41.1% (Philippines)). The proportion of children stunted at 24 mo who were no longer stunted as adults ranged from 21.4% (South Africa) to 82.0% (Brazil).

Conclusions: Patterns of growth failure and recovery vary across countries. The period from birth through 24 mo is critical. There is some growth recovery after this period among children who are stunted at 24 mo. Identifying the determinants of this recovery might provide opportunities to mitigate stunting among children for whom early preventive interventions were ineffective.

Key words: Adults, COHORTS, children, growth, low-middle income countries.

INTEREGENERATIONAL EFFECTS ON GROWTH

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We examine intergenerational relationships between size and growth across generations. In one set of analyses, we explore how maternal height influences birthweight and growth of her children. This is followed by other analyses that examine how birthweight and growth of the mother as a child influences birthweight of her children. We were particularly interested the relative importance of the predictive variables. The COHORTS collaboration uses data from birth cohorts from Brazil, Guatemala, India, the Philippines and South Africa. The first analysis relates height of the mothers of these cohorts to birth weight and conditional height measures of the cohorts. Maternal height was related to birth weight and to conditional height at all periods examined: 0-2y, 2y –mid childhood and mid-childhood to adult. The strongest relationships however, were with conditional growth from 0-2y and with mid-childhood to adult height. Independent of confounding factors, short maternal stature was an important predictor of stunting at 2 y of age. The second analysis is novel. It uses conditional growth measures but it disentangles linear growth from weight gain. Birthweight of the mother is a strong predictor of birthweight of her offspring. Only her linear growth from birth to 2 y predicts birthweight of her children. Weight gain independent of linear growth is unrelated to birthweight until the last period we examined: mid childhood to adult. This may point out to the importance of intrauterine growth, linear growth during the first 2 years and gains in relative weight during adolescence and prior to conception.

Key words: Intergenerational influences, linear growth, birthweight.

LONG TERM EFFECTS OF LINEAR GROWTH VS. WEIGHT GAIN ON ADULT HUMAN CAPITAL AND HEALTH

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The debate around the long term risks of rapid early-life weight gain has not differentiated the relative importance of linear growth and relative weight gain. We explored how birth weight, linear growth, and weight gain disproportionate to linear growth related to adult height, body composition, blood pressure, plasma glucose, attained schooling; and assessed whether growth after age 2 years related differently to these adult outcomes among those who were stunted or not stunted at age 2.

The COHORTS collaboration analyzed pooled data from >8000 participants in birth cohorts from Brazil, Guatemala, India, the Philippines and South Africa. Linear growth and relative weight gain from 0-2yr, 2 yr to mid-childhood and mid-childhood to adulthood were represented by residuals derived from regressing current size on all prior size measures. These uncorrelated variables represent faster or slower than expected growth during each interval. Taller adult stature and more attained schooling were significantly related to higher birth weight and faster 0-2 year linear growth. Higher BMI, blood pressure, and fat and lean mass were related to faster relative weight gain: associations were weak from 0-2 years and strengthened with age. Faster mid-childhood relative weight gain predicted larger increases in adult BP, fat mass, % body fat, and risk of hypertension and overweight among non-stunted individuals, but to significantly elevated odds of impaired fasting glucose or diabetes and to less attained schooling only in those were stunted at age 2.

Faster mid-childhood linear growth was more strongly related to adult height in those who were previously stunted. Results reinforce the benefits of linear growth in the first 2 years for human capital, and the risks excess relative weight gain after age 2 for obesity and related chronic disease risks.

Key words: Developmental origins of adult health, linear growth, weight gain, human capital, chronic diseases.

LESSONS LEARNED FROM COHORTS AND THE POST 2015 GLOBAL AGENDA

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Recent findings from analyses of the long-term consequences of early growth patterns in low and middle-income countries, which were presented earlier in this session, have important consequences for policy, practice and research. In terms of policy, nutritional recommendations in many countries are based on promoting rapid weight gain for children with low weight for age, regardless of how old they are, while research findings suggest that rapid increases in weight (above and beyond the rate of linear growth) do not contribute to human capital and also increase the risk of non-communicable diseases later in life. Growth monitoring and feeding programs (including school feeding) should be reexamined critically to ensure that these are not contributing to the child obesity epidemic. The practical implications of these findings include the need to incorporate measurement of child length/height in routine screening and growth monitoring activities; this will raise a series of challenges regarding availability of equipment and training health workers, but our recent results show that assessing anthropometric status based on weight only is insufficient and may lead to incorrect conclusions. Finally, further research is needed to understand how health and nutrition interventions can promote optimal linear growth without increasing BMI above what would be desirable.

Key words: Developmental origins of adult hHealth and disease, linear growth, weight gain, growth monitoring, optimal growth.

PS4-45 Iron and Malaria (FeMal) Project Results

OVERVIEW OF THE IRON AND MALARIA PROJECT

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Background and objectives: Historical concerns have been reinforced by recent studies suggesting that iron supplementation during early childhood increases the risk of severe morbidity and mortality from malaria and other infections. As many of these effects have been reported in individual who were not iron deficient prior to supplementation, questions have been raised about not only safety but also assessment of iron status and the utility of "universal" supplementation programs particularly in the context of malaria and other infections. To address these concerns a project was launched by the NICHD in collaboration with the Bill and Melinda Gates Foundation in November 2007.

Methods: The project was designed to address three core elements: 1) mechanisms to explain adverse effects of iron, 2) biomarkers and 3) an evaluation of existing interventions. As a first step, a Technical Working Group (TWG) was formed to evaluate available evidence and identify an initial research agenda. Subsequently, a Research Review Committee (RRC) was constituted to provide additional scientific oversight including evaluation of a grant portfolio, and identification of new research opportunities.

Results: A Technical Report drafted by the TWG was completed in 2009 and an Executive Summary published in 2011. Ten new grants have been funded to addressing aspects of the three core focal points. Based on suggestions by the RRC three additional projects were initiated: 1) Biomarkers Reflecting Inflammation and Nutrition Determinants of Anemia (BRINDA) Project; 2) Harmonization of soluble transferrin receptor (sTfR) assay; and 3) Inflammation and Nutritional Science for Programs/Policies and Interpretation of Research Evidence (INSPIRE) project.

Conclusion: The Iron and Malaria project has established a model for how to 1) translate existing knowledge to support

program/policy, and 2) actualize a research agenda to address high priority knowledge gaps. The results of these efforts will be presented in this session.

Acknowledgements: BMGF; NIH (NICHD, ODS, DNRC)

Key words: Biomarkers, iron, malaria.

SOLUBLE TRANSFERRIN RECEPTOR (STFR) COMMUTABILITY STUDY

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A 2004 Joint WHO/CDC Technical Consultation recommended the use of serum ferritin and sTfR as the best approach to assess the iron status of populations. This requires laboratory measurements of sTfR to be accurate over time and across studies, otherwise iron status and changes in status cannot be determined reliably. Currently, different tests for sTfR performed on the same sample give highly variable results. One step to overcome this problem is to use a common calibrator or material to verify measurement accuracy. In 2009, WHO/NIBSC (National Institute for Biological Standards and Control) released a new Reference Reagent for sTfR (07/202), recombinant rsTfR, intended to standardise immunoassays for sTfR.

Clinical sTfR tests are optimized for measuring patient samples. The WHO/NIBSC material differs from patient samples in its overall composition. Studies involving other analytes of interest have shown that laboratory tests are often accurate when testing patient samples but show a measurement bias with materials that are modified like the rsTfR. Materials that show such effects are considered "non-commutable" and cannot be used as a common calibrator or to assess the accuracy of an assay (trueness control). The goal of this commutability study is to assess the suitability of the WHO/NIBSC material for use as calibrator or trueness control with routine clinical tests.

The study design follows protocols established by the Clinical and Laboratory Standards Institute. Six participants were enrolled, including major assay manufacturers. The WHO/NIBSC material and 20 single-donor patient samples are analyzed by each participant. Commutability is assessed by comparing data from patient samples with data from the WHO/NIBSC material. The patient samples cover an approximate sTfR concentration range of 1.65-5.40 mg/L. Results from this study will be presented.

Key words: Soluble transferring receptor, reference material, commutability.

BIOMARKERS REFLECTING INFLAMMATION AND NUTRITION DETERMINANTS OF ANEMIA (BRINDA): PROJECT OVERVIEW

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Background and objectives: Identification of the relative contribution of nutritional and other risk factors for anemia is needed to develop programs that address the multi-factorial etiology of anemia. Furthermore, in countries with high anemia burden, the relationship between inflammation, infection and nutrient biomarkers, as well as potential methods for adjusting biomarker data to account for this association need to be explored. This necessitates a better understanding of the determinants of anemia and the effects of inflammation on nutrition biomarkers among high risk groups in different settings.

Methods: The Centers for Disease Control and Prevention (CDC), Global Alliance for Improved Nutrition (GAIN), and Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) formed a collaborative research group called Biomarkers Reflecting Inflammation and Nutrition Determinants of Anemia (BRINDA). We identified data from nationally and regionally representative surveys that included preschool children (PSC, 6-59 mo), school-age children (SAC, 5-14 yr) and women of reproductive age (WRA, 15-49 yr) that at minimum measured hemoglobin, inflammation (C-reactive protein and/or alpha1-acid glycoprotein), and iron status.

Results: Of 22 datasets identified, 3 did not meet the inclusion criteria, and currently permission has been received for 15, which include all 6 WHO geographic regions. Datasets represent 27,925 PSC, 7,906 SAC, and 25,384 WRA. Research topics to be addressed include: 1) impact of inflammation on anemia, iron and vitamin A biomarkers, as well as approaches to adjust for the effects of inflammation; and 2) risk factors and their relative contribution to anemia. Individual country and aggregated analyses will be performed.

Conclusions: BRINDA results will inform guidelines on the measurement and interpretation of anemia and other micronutrients in populations with high levels of inflammation.

Findings will also guide the development of a research agenda for future longitudinal studies.

Acknowledgements: Supported by NICHD, CDC, GAIN and the BMGF.

Key words: Biomarkers, inflammation, micronutrients.

THE IRON AND MALARIA PROJECT: PROGRESS REPORT ON FUNDED GRANTS

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Background and objectives: The project was initiated to address concerns about the safety and effectiveness of iron interventions particularly in areas of endemic malaria, included two solicitations published by NICHD that resulted in 10 funded grants to address three core areas: 1) mechanisms to explain adverse effects of iron; 2) biomarkers to assess iron particularly in the context of infection; and 3) an evaluation of currently available interventions.

Methods: Four of the studies were primarily lab-based mechanistic studies covering such issues as the impact of interactions between malaria and iron on iron regulatory proteins (e.g. hepcidin), impact of iron on stages of the malaria life cycle (e.g. erythrocyte versus hepatic stages), and comparative impact of iron on malaria versus co-infections. Five clinical studies have explored issues including the impact of iron interventions on such outcomes as placental malaria, malaria incidence, cognition and birth outcomes. Several studies focused on mechanistic aspects in clinical populations including impact of iron on gut microflora, impact of timing of interventions on response to treatment and the role of non-transferrin bound iron in malaria pathophysiology.

Results: Presentation will report on the completed results on: 1) role of hepcidin and macrophage function in malaria infection; 2) relationship between host iron levels and growth and development of erythrocytic stage of the malaria parasite (P falciparum) in vitro; and 3) a trial in Ghana to assess malaria incidence in children receiving powdered encapsulated Fe added to complementary foods.

Conclusion: Safety of iron interventions remains an open question under defined conditions of use. Iron homeostasis is impacted by the malaria parasite but functional implications remain unclear. Young erythrocytes are more susceptible to plasmodial infection so iron designed to reconstitute erythroid mass should be given with malaria prophylaxis.

Acknowledgements: Supported by the BMGF, NICHD and ODS.

Key words: Iron biomarkers, ironinterventions, malaria.

PS4-53 Strengthening micronutrient nutrition surveillance: WHO and CDC tools and methods

THE UPGRADE AND EXPANSION OF THE VITAMIN AND MINERAL NUTRITION INFORMATION SYSTEM (VMNIS)

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Since its establishment in 1991 by the World Health Organization, the Vitamin and Mineral Nutrition Information System (VMNIS) remains the primary surveillance system for monitoring anaemia, vitamin A and iodine status in populations and is used to develop global and regional estimates of deficiency. In 2009, an external evaluation of the epidemiological aspects of this surveillance system and the public health informatics features of the database guided a VMNIS upgrade and expansion. It now includes a flexible data entry platform that captures more survey characteristics and methodologies on multiple biomarkers, and features an interactive dissemination website. Better quality assurance procedures for data entry and survey search were also established.

The VMNIS now provides tools and resources to support efforts by Member States and their partners for assessing the vitamin and mineral nutritional status of populations. A section on "indicators" includes compilations of current WHO recommendations on cut-offs for defining vitamin and mineral status in populations as well as their severity. These cut-offs are essential for identifying populations at risk of deficiency and in need of interventions. The "Global laboratory directory for micronutrients assessment" identifies laboratories with capacity to analyze biomarkers of micronutrients for large surveys. This directory is not exhaustive and is not intended to prescribe, qualify or endorse any of the included laboratories. A section on "monitoring and evaluation" includes resources that can be useful for conducting surveillance related to vitamin and mineral nutrition. Examples of these tools are the eCatalogue of indicators for micronutrient programmes and manuals for micronutrient surveillance. The VMNIS is now available in the six WHO languages.

Key words: Surveillance, micronutrient, information system.

NUTRITION SURVEY TOOLKIT AND 2ND EDITION OF THE MICRONUTRIENT SURVEY MANUAL TO IMPROVE THE DESIGN AND QUALITY OF MICRONUTRIENT SURVEYS

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Key words: Survey, micronutrients, toolkit, manual Periodic cross-sectional surveys of the vitamin and mineral status and coverage of interventions within the population are an important component of micronutrient programs. Carrying out such surveys can be enhanced by the availability of tools and materials for planning, organizing, training, implementing, and reporting of results. The U.S. Centers for Disease Control and Prevention (CDC) developed a nutrition survey toolkit, containing resources that can be used in micronutrient surveys. This toolkit is available online and for download at www.micronutrient.org/nutritiontoolkit. It was developed to provide a publicly accessible compilation of qualitative and quantitative survey tools such as sample size calculators, lists of equipment and supplies, budget templates, step by step specimen collection procedures, training materials, templates of various data collection forms, survey report outlines. A search function enables the user to easily identify the tools needed for a specific task. This toolkit serves as a companion to a manual for designing and implementing micronutrient surveys. The manual "Indicators and Methods for Cross-Sectional Surveys of Vitamin and Mineral Status of Populations", was developed by the CDC, Micronutrient Initiative, World Health Organization and UNICEF. The manual provides practical information on how to plan and execute a cross-sectional survey and comprehensive help on all steps of survey implementation, including working with stakeholders, survey planning, calculating sample sizes, selecting indicators, and analysing survey data. The 2nd edition has been revised and expanded and includes new sections on the assessment of zinc and folate status. The toolkit and manual are based on field experience, expert group discussions, documents from various organizations, and journal articles relevant to the assessment of vitamin and mineral status in populations. Together, they can help survey managers improve the validity and efficiency of cross-sectional surveys of vitamin and mineral deficiency.

Key words: Nutrition surveys, micronutrients, minerals, vitamins.

CONTINUOUS HOUSEHOLD SURVEYS TO PRODUCE HIGH QUALITY, LOW COST, AND TIMELY NUTRITION SURVEILLANCE DATA

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Monitoring and evaluation systems are needed to effectively implement programs. Some countries collect nationally representative, high quality data on priority nutrition indicators through large-scale periodic surveys, such as Demographic and Health Surveys (DHS) or Multiple Indicator Cluster Surveys (MICS). These surveys are important for the breadth and quality of the information produced, but are expensive and do not provide timely information related to program processes and outcomes. Ministry of Health management information systems are an important source of information, but generally are unable to provide the extent of information found in household surveys, and may have limitations related to data quality or representativeness.

Continuous household surveys as a surveillance system method can provide representative, high quality, and timely process and impact data for nutrition programs. The design of the system includes continuous cross-sectional household surveys used to develop annual nationally representative estimates. Depending on the needs of the country, the data can be representative of other geographic areas or include non-nutrition components. Ideally the system is institutionalized within the government agency, which may lower costs. Data collection is carried out by a small and highly trained team that works part-time every month collecting data in the field.

A government laboratory manages the biological data, as needed, and the epidemiology or statistical unit carries out data management, analysis and report publication. These roles are built into the work plans of government staff and result in a continual and stable level of work for these employees.

With annually representative data, the system provides timely access to key nutrition indicators. CDC and partners have supported the development of these types of nutrition surveillance systems in Nicaragua, Guatemala, and Uganda, and the presentation will describe these experiences and lessons learned.

Key words: Surveillance, continuous household surveys, indicators.

PS5-61 Micronutrient Fortification. Science and Strategies for Public Health Improvement in Asia

MICRONUTRIENTS AND FOOD FORTIFICATION – STRATEGIC AND PRACTICAL ISSUES

G. Smith

ILSI Southeast Asia Region

We have just celebrated the 100th anniversary of the "discovery" of vitamins (Funk, 1912) and tremendous progress has been made in understanding the consequences of vitamin and mineral deficiencies and in addressing the issues. Fortification of food with micronutrients has proved a useful approach to reduce inadequate intakes over large populations. Nevertheless, implementation has often been slow and issues remain. The iodization of salt to prevent iodine deficiency has been a good example. As recently as 1990, only a few countries in Europe, plus Australia, Canada and the USA were completely iodine sufficient. A global program to iodize salt has resulted in a dramatic reduction in iodine deficiency. However, some countries in Asia are still not iodizing salt.

Although fortification is simple in principle, several practical and strategic issues often receive insufficient attention to achieve effective results. Actual levels of deficiency are often not well established for a given country. Intake data of foods to be fortified may not be adequate to assess the risk of excess nutrient consumption or sufficiency of the nutrients for each age group. There must be effective interaction between the public health, academic and industry sectors to address the various concerns. Fortification needs to be placed within the framework of all strategies to address micronutrient deficiencies, including dietary diversification, biofortification, supplementation and education. Careful implementation and continuous monitoring of results are important aspects. Additional complications include variation of intake and requirements, dietary inhibitors of bioavailability, increased requirements in pregnancy, special requirements for children and cost considerations.

Both mandatory and voluntary fortification policies are in effect globally, together covering most countries in the world. The advantages and disadvantages of these approaches will be reviewed and contrasted. Risk-benefit concepts may need to be incorporated in strategic plans.

Key words: Biofortification, food fortification, micronutrients.

GAIN's GLOBAL STRATEGY ON FOOD FORTIFICATION TO IMPROVE PUBLIC HEALTH - ASIA HIGHLIGHTS

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Despite the economic growth and the reduction of certain micronutrient deficiencies (Iron, vitamin A) in the region, some micronutrients such as zinc, vitamin D and folate for example are still a concern. In addition, significant parts of the population are at the borderline of developing micronutrient deficiencies (for example in Vietnam, over 25% of children and women had a ferritin concentration <30µg/l that indicates low iron stores, and more than half of children had a marginal or deficient vitamin A status); therefore preventive strategies need to be implemented. This is even more important since during moments of economic crisis, populations with lower purchasing power consume, as widely documented, mainly staple foods, and hence, these foods need to provide a critical amount of micronutrients to prevent large population segments from developing or worsening their micronutrient status. In Indonesia, a recent study showed that in TTS only 25% of households could afford meeting nutrient requirements. The potential contribution of large-scale fortification of staple foods and condiments toward filling the micronutrient intake gap cannot be ignored.

The benefits of fortifying staple foods and certain condiments are based on the fact that those foods are commonly and widely eaten by most of the population. A recent consumption data from Vietnam showed that rice, flavoring powders, fish/soya sauces and vegetable oil were consumed daily in significant amounts by over 65% of the women and 40% of the young children (6-59 months), making those foods suitable vehicles for fortification. For example, fortifying vegetable oil on a large-scale in Malaysia and Indonesia can reach millions of people globally (as they are the global leaders in vegetable oil export). Knowing that the UL cannot be approached, vegetable oil fortification with vitamin A and D has the potential to become a global public health intervention strategy. In addition, to ensure adequate fortification, it is essential to develop tools which evaluate micronutrient concentrations. GAIN has assessed with its partner's rapid test kits for different food vehicles and they offer a viable solution for field monitoring.

In summary, the Global Alliance for Improved Nutrition (GAIN), is implementing several food fortification programs in the Asia region that are attempted to be rolled out at large scale and nation-wide but also pilot studies towards fortification of rice. Through our GAIN premix facility we were able to reduce the cost of fortification without jeopardizing the quality of the micronutrient. In Indonesia, this consolidated procurement approach has allowed a 14% decrease of the unit price of vitamin A.

Key words: Fortification, rice, vitamin A, vitamin D.

IRON-FORTIFIED SOY SAUCE IN CHINA – AN ASSESSMENT OF 10 YEARS OF POLICY AND BUSINESS DEVELOPMENT

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Iron deficiency (ID) and ID anemia (IDA) remains to be one of the major malnutrition issues in China. Iron-fortified soy sauce was identified as one of the key measures in controlling ID and IDA in China, because soy sauce is widely used in China. NaFeEDTA was selected as the fortificant, because of its high biaoavailability (more than twice as ferrous sulphate in humans) and stability, and also no effects on the organoleptic characteristics of soy sauce. Therapeutic studies in anemic school children showed full recovery of blood hemoglobin to normal level after 3-month intervention used 5 mg Fe (as NaFeEDTA) in 5 ml of soy sauce per day. In a 18- month population-based double blind controlled intervention trial, iron-fortified soy sauce group (2-4 mg additional Fe per day) showed significant reduction of IDA prevalence than the control group in all age and gender groups. Based on the research achievements and regulatory approval, two phases of GAIN projects on the voluntary application of NaFeEDTA fortified soy sauce in the control of IDA in China were carried out. In the first phase, more than 20 soy sauce companies joined the project as designated iron fortified soy sauce producers. The application was launched in 7 provinces in a government supported "two wheels turning at same time" model, i.e. local public health professionals as one wheel and soy sauce producers as another wheel. All types of health education activities were conducted in collaboration with mass Within 3 years, 50 millions of residents regularly use iron fortified soy sauce and an average of 30% reduction of anemia rate were seen at the sentinel sites. The second phase started in 2010 is aiming at developing effective scaling up business model in selected provinces. The project is challenged by how to convince consumers to use fortified soy sauce regularly through proper public health education.

Key words: Iron fortification, soy sauce, iron deficiency, anemia.

IRON-FORTIFIED FISH SAUCE: EVALUATING AND ADOPTING A SUCCESSFUL MODEL IN VIETNAM

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Iron deficiency and iron deficiency anemia remains one of the biggest problems in Vietnam. Iron-fortified fish sauce (IFFS) was identified as one of the strategiesin controlling ID and IDA, because fish sauce is a condiment and widely used by more than 80 percent of the population. NaFeEDTA was selected as the fortificant, because of its high bioavailability (more than twice as ferrous sulphate in humans), stability and also acceptability by consumers. The Efficacy study in anemic working women showed significant improvement of blood hemoglobin and serum feritin after a 6-month intervention using 10 mg Fe (as NaFeEDTA) in 10 ml of fish sauceserved with a meal based on noodles or rice every day and 6 d/wk. In an Effectiveness study, an 18- month population-based double blind controlled intervention trial, the iron-fortified fish sauce group (11 villages) showed significant reduction of IDA prevalence than the control group (10 villages) in women of reproductive age.

Based on the research achievements and support from GAIN, projects on the voluntary application of NaFeEDTA fortified fish sauce (4mg iron as NaFeEDTA per 10ml fish sauce) in the control of IDA in Vietnam were carried out. In this phase, more than 10 soy sauce companies joined the project as designated iron-fortified fish sauce producers. The application was launched in 16 provinces, with local public health professionals and fish sauce producers working together to provides the iron-fortified fish sauce to consumers in the provinces. All types of health education activities were conducted in collaboration with mass media. District and commune health officers play an important role in communication and education to change the behavior of consumers. Within 6 months, prevalence of residents regularly using iron-fortified fish sauce increased significantly as compared with the beginning and in women aged 20-49 years, with 60 percent coverage of IFFS, the prevalence of anemia significantly reduced on average by 30 percent at the sentinel sites. Improvement in hemoglobin and anemia rates was not significantly different between the 2 groups of women aged 20-35 years and 36-49 years, and between the two groups of workers and farmer women.This phase, started in 2008, was aiming at developing an effective business model in selected provinces. The project is very challenging because we should convince consumers to use iron-fortified fish sauce regularly through proper public health education.

Key words: NaFeEDTA, iron fortification,fish sauce, Vietnam.

CAMBODIA IRON-FORTIFIED FISH SAUCE: PROGRESS & DEVELOPMENT

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Reproductive and Child Health Alliance (RACHA), Cambodia

High prevalence of Iron Deficiency Anemia among children and women is a major public health issue in Cambodia. In response to this, the Reproductive and Child Health Alliance (RACHA) funded by USAID, in collaboration with GTZ and International Life Science Institute (ILSI) Japan has undertaken a four-year product incubation of iron fortification of fish sauce and soy sauce (IFFS/SS) including efficacy study and market trial in selected areas. Results showed that consumption of IFFS significantly reduced anemia and improved iron status among anemic people.

RACHA in collaboration with the National Sub-committee for Food Fortification implemented the IFFS/SS and Vitamin A Fortification of Vegetable Oil Project in Cambodia, supported by Global Alliance for Improved Nutrition (GAIN), ILSI and USAID. This project is now being scaled up nationwide both in rural and urban areas, aiming at reducing the prevalence of anemia and vitamin A deficiencies by 30 percent and fortifying at least 42,000 MT/year of FS and SS, and 32,000 MT/year of vegetable oil. RACHA had a long process of influencing government policy and regulation on iron fortification. In 2012, the Proclamation (Prakas) for the official label/logo to be used for iron-fortified fish sauce and soy sauce products nationwide, and the Prakas for production and consumption of IFFS/SS were approved by the Senior Minister of Planning and Chairman of the National Council for Nutrition (NCC).

The social marketing strategy and advocacy plan have been finalized and implemented; the IEC materials for local and national campaign were reviewed; and a TV Spot on advantages of IFFS/SS as part of the education campaign has been broadcasted. Recently, a National Workshop on this fortification project has been convened, as multi-sector collaboration is vital to the success of this new project in addressing anemia in the country.

Key words: Iron fortification, fish sauce, iron deficiency, anemia.

IRON FORTIFIED RICE - LESSONS LEARNT, OPPORTUNITIES AND CHALLENGES

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Background and objectives: With the persistent high rate of iron deficiency anemia (IDA), the Philippine government had passed the Food Fortification Law in 2000 which stipulates the mandatory fortification of staples like rice with iron. This presentation aims to share experiences on iron rice fortification, technology generation and product development, barriers, challenges encountered and opportunities for implementation.

Methods: A document review from previous FNRI publications and current government and private sector programs was done to gather inputs on iron-fortified rice. The effects of fortification both in efficacy and effectiveness trials were extracted from the reports and the documented challenges and barriers of implementation and identified opportunities on how the program could best be implemented were evaluated.

Results: Evidences showed that the iron premix rice (IPR) fortified with micronized dispersible ferric pyrophosphate (MDFP) using extrusion technology has a stable colour, moisture, and iron contents during the 10 months storage period. Efficacy trial among school-aged children revealed significant decline in anemia rate from 100% to 33%. Small-scale and large-scale market trial revealed also a significant decline in anemia rate among consumers. Acceptability test revealed that the iron fortified rice (IFR) was rated as "like moderately" to "like very much". A local ordinance to sell iron-fortified rice and intensive social marketing activities resulted to increased knowledge and improved practice encouraged families to buy iron-fortified rice. Reluctance of rice dealers to sell IFR and product adulteration were among the challenges.

Conclusion: Strong political support and intensive social marketing activities are crucial in commercializing IFR. Keeping the cost affordable and maintaining the commitments of partners from the government and private sectors were the key factors for providing a continuous supply of iron-fortified rice.

Key words: Iron, rice, fortification.

RICE FORTIFIED WITH VITAMINS AND MINERALS USING EXTRUSION TECHNOLOGIES IS HIGHLY ACCEPTABLE IN VIETNAM AND CAMBODIA

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Background and objectives: Rice fortified with micronutrients has the potential to improve the daily intake of micro-

nutrients in populations which are at a high risk for micronutrient deficiency. However, rice fortified with micronutrients has to be acceptable in terms of organoleptic qualities before introduction can be considered. Few data exist on the acceptability of fortified rice in SE Asia. This study aimed to assess the acceptability of 2 types of fortified rice (cold and hot extruded) in Vietnam and Cambodia, 2 large rice consuming countries in SE Asia.

Methods: Sensory testing in Vietnamese women of reproductive age (n=430) and in adults (n=200) and schoolchildren (n=600) in Cambodia. In addition, consumption patterns in Cambodian school children (n=1700) were followed for 1 month.

Results. Most adults (>70%) corrected identified the fortified rice on taste and smell out of a choice of 3 (P<0.01). Fortified rice was found to be highly acceptable in both countries. In Cambodia, school children consuming fortified rice had higher intake than when consuming normal rice (P<0.05).

Conclusion: This study shows that fortified rice is highly acceptable in SE Asia, and holds great promise to improve the micronutrient status of vulnerable groups.

Key words: Fortified rice, acceptability, organoleptic qualities.

PS5-69 Evaluation of food fortification and biofortification interventions in developing countries using stable isotopes

EFFICACY OF VITAMIN A IN FORTIFIED EXTRUDED RICE IN SCHOOL CHILDREN IN SOUTHERN THAILAND

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Rice is widely consumed in Asia and is a promising vehicle for food fortification to prevent vitamin A (VA) deficiency in at-risk populations. Artificial rice grains were triple fortified with VA, zinc and iron using hot extrusion technology and the product showed good vitamin A stability. The aim of the study was to evaluate the impact of this multi-fortified rice to improve vitamin A status in school children in Southern Thailand. VA pool size was determined by paired stable isotope dilution technique with labeled 13C2-retinyl acetate at the beginning and end of 2 month feeding period. Fifty school children with serum retinol concentration > 0.7 μmol/L were randomized to receive either triple fortified rice (n = 25) or natural rice (n = 25) for 2 months served as the daily school meal. The fortified rice (mixed with natural rice at a ratio of 1:50) provided an additional 890 μg VA/d for 5 d/wk. Total body reserves of vitamin A (TBR of VA) increased significantly (p<0.05) in the intervention group after 2 months feeding. The control group showed no change in the TBR of VA. In conclusion, VA fortification of rice using hot extrusion is efficacious to improve VA status in at-risk populations.

Key words: Vitamin A fortification, rice, vitamin A status, vitamin A liver stores, stable isotopes.

VITAMIN A INTAKE IN BREASTFED BABIES FROM MOTHERS CONSUMING DAILY VITAMIN A FORTIFIED OIL DURING SIX MONTHS

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Background and objectives: To evaluate the impact of daily consumption of vitamin A fortified oil on vitamin A status in milk and serum in lactating women during 6 months post-partum. Study design: it's a longitudinal randomized controlled and double blinded trial.

Methods: mother-infant pairs were recruited at 2-3 weeks post-partum, from a local hospital in Morocco. Baseline data were taken from the mothers and their babies. Women were split into two groups and were all supplemented with a capsule of vitamin A dose and received each week, a supply of vit A Fortified soya Oil for the test group (FO) and None Fortified soya Oil for the control group (NFO). Blood samples were taken at baseline, 3 months and 6 months while human milk samples were taken each month. Human milk retinol and retinol in serum concentrations were measured by HPLC. The quantity of human milk intake was also determined in a subgroup of 32 mothers using the deuterium technique dose to the mother.

Results: At 6 month, the mean of serum retinol rises in both groups and the difference was highly significant in the FO group (p<0, 0001). Between 4 and 6 months, there was a decline in mean human milk vitamin A concentrations under 1.05μmol/L in NFO group. However the increase observed in the FO group was maintained above 1.05 μmol/l, even at 6 months post-partum (p<0.0001). For the human milk intake assessed by the deuterium technique, the results show a decline in breastfeeding practices of babies from 33.3 % at 3 months to 13.3% at six months

Conclusion: Supplementation and fortification seems to be more effective for maintaining a significant level of vitamin A in human milk; 2-For successful programs, the promotion of breastfeeding practices is necessary.

Key words: Lactating women, vitamin A supplementation, fortified oil, breastfeeding, deuterium technique.

USE OF DEUTERATED RETINOL DILUTION TECHNIQUE TO ASSESS TOTAL BODY VITAMIN A STORES IN MEXICAN PRESCHOOLERS CONSUMING VITAMIN A FORTIFIED MILK

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In Mexico, as in many other developing countries Vitamin A deficiency (VAD) continues to be a major nutritional problem. Among Mexican preschoolers, milk is a well-accepted vehicle and thus can be used for the administration of micronutrients (vitamin A [VA]). The aim of the study was to investigate the efficacy of daily intake of 250 mL of VA-fortified milk (0.68 μmol/d) for 3 months on total body-VA stores, in marginally VA deficient preschool children (serum retinol concentration >0.35 and <1.05 μmol/L), who did not receive food assistance. The study design was a randomized clinical controlled trial. Twenty-seven marginally VAD preschoolers, were randomly assigned based on screening outcome variables to either the intervention (n=14) or control group (n=13). The study protocol was completed by all children in the control group and 11 preschoolers from the intervention group (79%). Deuterated retinol dilution (DRD) technique was used to estimate total body VA (TBVA) pool size before and after the intervention. After 3 months of fortified milk intake, median changes in serum retinol concentration for the intervention and control group were 0.13 nmol/L vs. -0.21 nmol/L, respectively (P=0.009); median changes in TBVA stores were 0.06 mmol vs. 0.01 mmol, respectively (P=0.006) and estimated median changes in liver VA concentration were 0.09 nmol/g vs. 0.01 nmol/g (P=0.002), respectively. The daily intake of vitamin A-fortified milk significantly increased total body VA stores, liver VA stores and serum retinol concentration, additionally milk was well accepted among preschoolers, indicating that it may be an effective means to fight VAD in young Mexican children. Special thanks to Liconsa for providing the micronutrient fortified powdered milk for this study and the International Atomic Energy Agency for the funding provided (contract no. 15198). Full study information available at: J Nutr 2013;143:221-6

Key words: Vitamin A, isotopes, milk.

MULTIPLE MEAL STUDIES TO EVALUATE HUMAN IRON ABSORPTION FROM TYPICAL RWANDAN MEALS BASED ON BEANS

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Phytic acid and polyphenol compounds inhibit iron absorption, hindering food-based prevention of iron-deficiency anemia. Multiple meal studies reflect long term iron bioavailability more closely than single meal studies. Three multiple meal iron absorption studies were carried out with extrinsically labeled common beans fed with rice and potatoes in Rwandese women (20 per study). Iron absorption was measured as erythrocyte incorporation of stable iron isotopes. Study 1 comparing iron absorption from high and low polyphenol beans, similar in phytic acid and iron, did not show any significant difference (p>0.05) in mean fractional iron absorption from high polyphenol beans (7.0%) and low polyphenol beans (7.4%). Study 2 compared iron absorption from high and regular iron beans (9.1 or 5.2 mg Fe/100 g bean) with similar polyphenol levels and phytic acid: iron molar ratio. Mean fractional iron absorption from the high iron beans (3.8%) was 40% lower (P<0.001) than from the regular iron beans (6.3%) resulting in equal amounts of iron absorbed (p>0.05). Study 3 investigated phytic acid influence. The mean fractional iron absorption from the control bean meal with native phytic acid concentration was significantly higher than from the biofortified bean meal with native phytic acid concentration (P< 0.001) leading to only a marginally higher amount of iron absorbed per test meal from the biofortified beans (66 μg (19%); P<0.05). Participants absorbed 37% more iron from the biofortified beans than from the control beans after partial dephytinization (P<0.005) and 51% more iron after dephytinization to low phytic acid (P<0.0001). In conclusion, in multiple meals phytic acid limited iron bioavailability from biofortified beans in marginally iron deficient female subjects. In the presence of high phytate, polyphenols did not exert any further inhibition.

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Key words: Beans, iron absorption, polyphenols, phytate.

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T6 FUNCTIONAL FOODS AND BIOACTIVE COMPOUNDS

NPS1-6 PREVIEW Project

THE ROLE OF DIET IN THE PREVENTION OF TYPE-2 DIABETES (STATE-OF-THE ART)

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Three well-designed long term studies (the Diabetes Prevention Program, the Finnish Diabetes Prevention Study and the Chinese Da Qing study) reached the same conclusion: a low fat, high fibrediet and exercise intervention is highly effective in delaying or preventing the transition from impaired glucose tolerance to diabetes. Thecriticalelementin each study was achievement of weight loss (5-7% of body weight) followed by prevention of weight re-gain. It cantherefore be argued that sustained weight loss and weight loss maintenance is the key to diabetes prevention, rather than a specific diet composition.In recent years, alternate dietary approaches, including high protein, low glycaemic index, and Mediterranean-style diets, have produced faster weight loss and better weight lossmaintenance than traditional low-fat, high-carbohydrate diets. Indeed, the Diogenes study found that official dietary recommendations (low fat, high fibre) were associated with greater weight re-gainwhile a combination of a high protein and low GI diet prevented weight re-gain over 26 weeks. These alternate dietsmay be effective because they are more filling but also because they reduce postprandial glycaemia and insulinaemia, and thus the burden on the beta-cell. Some food patterns and specific foods (rice, white bread, soft drinks) characterised by hyperglycaemia are alsoassociated with higher risk of adiposity and/or type 2 diabetes. The recent rise in gestational diabetes and type 2 diabetes in the young may be traced to food patterns that exaggerate postprandial glycaemia and insulinaemia superimposed on the physiological insulin resistance of pregnancy and puberty. It is likely that there are more efficient waysthan just a low fat, high fibre diet to prevent diabetes in predisposed individuals.

Key words: Diabetes, diet, carbohydrate, glycemic index, protein.

PHYSICAL ACTIVITY AND THE PREVENTION OF DIABETES: PREVIEWING THE EVIDENCE

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Regular physical activity has a range of psychological and physiological benefits. Whilst improvements in glucose control in diabetes and overweight are well reported, the relative benefits of different exercise training interventions on glucose control are less clear. In addition the effect of physical activity on the psychological health in has further uncertainties. It is possible that the degree of compliance to physical activity programmes interacts with intensity and duration. Therefore effective behavioural approaches to maintaining a sufficient level of physical activity are key to successful delivery of programmes. Consequently the construction and delivery of physical activity programmes and their effect on health are critical factors in the prevention of diabetes and the management of overweight. Thus the objective of this presentation will be to outline the current literature and guidance on the effects of physical activity programmes on the prevention of diabetes and maintenance of healthy weight.

Key words: Diabetes, physical activity, body weight.

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PREVIEW: PREVENTION OF DIABETES THROUGH LIFESTYLE INTERVENTION AND POPULATION STUDIES IN EUROPE AND AROUND THE WORLD

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Background and objectives: PREVIEW is a new 5-y EU project (2013-2017) under the FP7, KBBE programme. The primary goal is to identify the most efficient lifestyle pattern for the prevention of type-2 diabetes in a population of pre-diabetic overweight or obese individuals.

Methods: The project comprises two distinct lines of evidence, both embracing European and overseas countries:

1) A multicentre, clinical randomized intervention trial (3 years) with a total of 2,500 pre-diabetic participants, including children, adolescents, adults and elderly. The impact of a high-protein, low-glycemic index diet vs. the officially recommended diet in combination with moderate or high intensity physical activity on the incidence of type-2 diabetes will be investigated. The trial will be performed in 8 countries.

2) Large population studies using data from all age groups in European and overseas countries (estimated persons included = 170,000). Modelling strategies will be used. Focus in both lines of evidence will be on specific diet(protein vs. carbohydrates, glycaemic index) and intensity of physical activity, their interaction with the lifestyle factors: habitual stress and sleeping pattern as well as behavioural, environmental, cultural, and socioeconomic variables.

Partners: PREVIEW includes 12 European and 3 overseas partners.

From Europe: Raben, University of Copenhagen (DK), Project Coordinator; Fogelholm, University of Helsinki (FI); Feskens, Wageningen University (NL); Westerterp-Plantenga, Maastricht University (NL); Macdonald, University of Nottingham UK); Martinez, University of Navarra (ES); Handjiev, Medical University Sofia (BU); Stratton, Swansea University (UK); Schlicht, University of Stuttgart (DE); Meyers Madhus (DK); Lam, NetUnion (CH); Sundvall, National Institute for Health and Welfare (FI); From overseas countries: Brand-Miller, University of Sydney (AUS); Poppitt, University of Auckland (NZ); Tremblay, Laval University (CAN).

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Key words: Prevention, type-2 diabetes, diet, physical activity, lifestyle-intervention.

THE PREVIEW-INTERVENTION TRIAL: DESIGN AND METHODS

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The aim of the PREVIEW-intervention trial is to determine the preventative impact of a high-protein and low-GI diet in combination with moderate or high intensity physical activity

on the incidence of Type 2 diabetes (T2D) in pre-diabetic individuals. The trial will be performed in 6 EU countries (Bulgaria, Denmark, Finland, Spain, Netherlands, United Kingdom), Australia, and New Zealand. A total of 2,500 pre-diabetic overweight or obese participants (200 children and adolescents, aged 10—18 y, 800 younger adults, aged 25—45 y, and 1500 older adults, aged 55—70 y) are to be recruited. Adult participants are first treated by a low-calorie diet (LCD) for 8 weeks, with the aim of reaching >8% weight reduction. Children and adolescents are treated separately with a conventional weight-reduction diet, without a specific target for weight loss. If >8% weight reduction is achieved (adults only), participants are randomized into two diet intervention groups and two exercise intervention groups, for a total of 148 weeks. The two interventions diets are: Moderate-protein: protein intake 15% of total energy intake (E%), carbohydrates 55 E%, glycaemic index (GI) >56; High-protein: protein 25 E%, carbohydrates 45 E%, GI <50. Both diets are 30 E% fat, and will incorporate only healthy food items. The two exercise interventions are: Moderate intensity: 60—75% of maximal heart rate; High intensity: 76—90%. This life style intervention is based on behaviour change theories and techniques. Participants are supervised in groups with meeting frequency declining throughout the study.

The primary endpoint is the incidence of type-2 diabetes over 3 years according to diet (high-protein/low-GI versus moderate-protein/medium-GI), adjusted for physical activity. Stress, sleep, and different socio-ecological and behavioural factors will also be assessed. The research described here receives funding from the FP7/2007-2013 programme under grant agreement no. 312057.

Key words: Complex Intervention, physical activity, protein, GI, Type 2 diabete.

THE PREVIEW-POPULATION STUDIES: DESIGN AND METHODS

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The overall objective of PREVIEW population studies is to substantiate the findings in the intervention study with data from five longitudinal population studies from Europe, New Zealand and Canada, covering the entire lifespan. It will be evaluated whether protein intake, glycaemic index (GI), and physical activity, are predictive of diabetes and its cardiovascular consequences. This will add insight into the natural history of diabetes, by considering specific dietary and exercise factors. The following epidemiological studies will be analysed:

1. The Netherlands: LifeLines (2006-ongoing), a three-generation population-based study in 165,000 people 4-90+y and NQplus (2011-ongoing), a survey in n=1,750 people 20-70y, repeated 3 times.

2. Finland: Cardiovascular Risk in Young Finns Study (1980-2012), a survey in n=3,596 people 3-18y at baseline, repeated 8 times.

3. New Zealand: NZ Adult Nutrition Survey (2008/09), a cross-sectional survey in n=4,721 people> 15y.

4. Canada: Quebec Family Study (1978-2002), a 3-phase longitudinal study from ~500 families including ~200 families with one obese member. A common database of these five population studies will be generated. Main exposure variables will be dietary components and physical activity. The outcome will be diabetes prevalence or incidence, and blood glucose parameters. Data-analysis will be conducted with meta-analytical techniques, using a random-effects model to consider heterogeneity among cohorts. Population attributable risks will give an estimate on how much of diabetes risk could theoretically be prevented by modifying these factors. Additionally, given that GI, one of the key exposures, is not routinely available in all food tables, a dedicated questionnaire focusing on assessing GI will be developed. It will be applied to the NQPlus cohort to gain insight into the quality of the GI results. The research

described here receives funding from the EU Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 312057.

Key words: Population studies, diabetes, protein, glycaemic index, physical activity.

PS1-6 Diversity of physiological functions of amino acids and peptides

PHYSIOLOGICAL FUNCTION OF SOYBEAN PEPTIDES

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Soybean seed includes around 35% protein. The soybean protein isolate (SPI) is well known to be reduced blood cholesterol levels in animals and human. The hydrophobic peptides derived from SPI contributes the anti-atherogenic effects. Recently, we found that an internal peptide in soybean β-conglycinin stimulates release of cholecystokinin (CCK) and suppresses food intake in rats, and also suppresses hunger in healthy human. Cholecystokinin is a gut hormone released from an enteroendocrine I-cells located in the upper small intestinal epithelium, and stimulates exocrine pancreatic secretion, reduces gastric emptying rate and induces satiety via afferent vagal nerve. We showed that dietary proteins and peptides directly stimulate the enteroendocrine cells and release CCK through a G-protein coupled receptor (GPCR) with activating Gƒ¿q subunit. We tried to identify the responsible peptides for enhancement of CCK release in soybean protein, and have got a tridecapeptide in β-conglycinin β-subunit (β51-63). The amino acid sequence of this active peptide is VRIRLLQRFNKRS, that is, the CCK-releasing peptide includes four arginine residues. The soybean peptide strongly stimulates CCK release in rats after an injection into the duodenum, and suppresses food intake after overnight fast. The suppression of food intake completely depends on CCK action, which confirmed by a CCK a-receptor blocker, devazepide. By a double blind crossover study in healthy individuals, a peptide preparation of soybean β-conglycinin hydrolyzed by pineapple-origin protease dose-dependently (1.5-3.0 g) suppresses hunger sensation and induces transient satiety in post-absorptive state with statistical significances compared with a whole soybean peptide preparation. Finally, we have identified a receptor for β51-63, which is a GPCR, calcium-sensing receptor (CaSR) expressed on the enteroendocrine cell line STC-1, by using a specific antagonist of CaSR and transfection of CaSR in HEK293 cells.

Key words: Soybean protein, cholecystokinin, appetite suppression, calcium-sensing receptor.

AMINO ACID PROFILING AND DATABASE FOR CLINICAL DIAGNOSIS AND PERSONALISED NUTRITION

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Recent studies show new possibilities of using plasma amino acid profiles as biomarker discovery by generating diagnostic indices through multivariate analysis. Using a rapid and sensitive LC-MS technologies enabling high-throughput amino acid measurement, we have constructed large scale human database containing medical information of more than 20,000 Japanese in total concerning multiple diseases (e.g. cancers, metabolic syndrome, hepatic diseases etc.) and their metabolic profiles. By variable selection and regression analysis, we have developed multivariate diagnostic indices that enable the early detection of multiple cancers and also metabolic disorders from a single blood draw and analysis. In addition, we have analyzed datasets from large database of healthy subjects by correlating blood amino acid profiles and physiological states to expand application of amino acid profile toward health and nutritional management, and then obtained some meaningful relationships between alternation in amino acid profiles and physiological variables. Current our data therefore indicates a potential use of blood amino acid profile for developing multivariate index exclusively associated with a specific physiological state so that single measurement of an amino acid profile could be used as an initial stratification for a multitude of disease and nutritional states, and also subsequent personalization of nutrition and dietary interventions.

Key words: Amino acid, metabolic profile, personalized nutrition.

DIETARY SUPPLEMENTATION WITH SPECIFIC AMINO ACID MIXTURES PROMOTES MITOCHONDRIAL BIOGENESIS: PHYSIOLOGICAL AND PATHOPHYSIOLOGICAL RELEVANCE IN MAMMALS

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Nutrients are major regulators of biochemistry and physiology in living organisms, and subtle changes in nutrient composition result in genetic or epigenetic control of processes influencing healthspan and survival. Though contentious

yet, calorie restriction (the reduced intake of calories as foods without malnutrition) postpones several age-related diseases, hence extending healthspan and lifespan in many species. The molecular basis of this long known phenomenon are still elusive, albeit evidence seem to converge on the reduction of mitochondria-derived oxidants through the generation of new, more efficient organelles (mitochondrial biogenesis) (Nisoli et al., Science 310: 314-317, 2005). Branched-chain amino acids (BCAAs) display healthy effects both in animals and humans (Valerio et al., Aging 3: 464-478, 2011). Notably, we reported that unlike other amino acid mixtures, a BCAA-enriched mixture (BCAAem), promoted mitochondrial biogenesis in cultured cardiomyocytes and skeletal myocytes as well as in heart and skeletal muscles of sedentary and trained middle-aged mice. This was accompanied by muscle fiber rejuvenation, improved locomotor activity and coordination, and extension of average lifespan (D´Antona et al., Cell Metab 12: 362-372, 2010), suggesting that BCAAem acts as a CR mimetic. We then investigated the BCAAem effects on statin-induced muscle damage in mice. Though known to be rather safe, statin use is associated with an elevated risk of myopathy, ranging in severity from asymptomatic increases in creatine kinase to muscle weakness, aches and fatigue, up to the rare fatal rhabdomyolysis. We found that BCAAem prevented atorvastatin- and rosuvastatin-induced structural and functional deterioration of skeletal muscles in both wild-type and hypercolesterolemic mice (ApoE receptor knockout mice on a high-fat diet). Statin prescription is expected to grow alongside the aging of population. Dietary supplementation with specific amino acid mixtures may be an effective strategy to avoid common adverse effects limiting the adherence to statin therapy in human subjects.

Key words: Amino acids, branched chain amino acids, malnutrition, mithocondria, skeletal muscle.

RECENT ADVANCES IN ARGININE METABOLISM: ROLES AND REGULATION OF THE ARGINASES

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Arginine is a semi-essential or conditionally essential amino acid in humans and is a precursor for synthesis of urea, nitric oxide, polyamines, proline, glutamate, creatine, and agmatine. Regulation of its metabolism is quite complex and involves a variety of enzymes, including the arginases. It has become clear that the arginases, which are expressed as two isozymes in mammals, play important roles in regulating many aspects of arginine metabolism in health and disease, including vascular disease, pulmonary disease, infectious disease, immune cell function, and cancer. In some cases, aberrant expression or localization of the arginases may result in arginine insufficiency, as in sickle cell disease. Therefore, there is growing interest in use of arginine supplementation or arginase inhibitors to treat a variety of conditions. This presentation will highlight recent advances and questions regarding the roles and regulation of the arginases.

Key words: Arginase, nitric oxide, endothelial, macrophage.

PS2-14 Dietary reference values for DNA damage prevention

THE CONCEPT AND RELEVANCE OF DIETARY REFERENCE VALUES FOR DNA DAMAGE PREVENTION

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Damage to the genome is recognized as a fundamental cause of developmental and degenerative diseases. Several micronutrients play an important role in protecting against DNA damage events generated through endogenous and exogenous factors by acting as cofactors or substrates for enzymes that detoxify genotoxins as well as enzymes involved in DNA repair, methylation, and synthesis. In addition, it is evident that either micronutrient deficiency or micronutrient excess can modify genome stability and that these effects may also depend on nutrient-nutrient and nutrient-gene interaction, which is affected by genotype. These observations have led to the emerging science of genome health nutrigenomics, which is based on the principle that DNA damage is a fundamental cause of disease that can be diagnosed and nutritionally prevented on an individual, genetic subgroup, or population basis. The following topics will be discussed: 1) biomarkers used to study genome damage in humans and their validation, 2) evidence for the association of genome damage with developmental and degenerative disease, 3) current knowledge of micronutrients required for the maintenance of genome stability in humans, 4) the effect of nutrient-nutrient and nutrient-genotype interaction on DNA damage, and 5) strategies to determine dietary reference values of single micronutrients and micronutrient combinations (nutriomes) on the basis of DNA damage prevention. This presentation will also identify mportant knowledge gaps and future research directions required to shed light on these issues. The ultimate goal is to match the nutriome to the genome to optimize genome maintenance and to prevent pathologic levels of DNA damage.

Key words: Dietary reference values, DNA damage, prevention, micronutrients, nutriomes.

VITAMINS AND DNA DAMAGE PREVENTION

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The DNA is constantly exposed to noxious agents from endogenous and environmental sources and the resulting damage is a major cause of potentially harmful mutations, cell death, and cancer. Vitamins as antioxidants Insights into DNA oxidation and repair mechanisms have revealed important roles for vitamins. Indeed, many of these micronutrients are potent antioxidants in the organism. Some studies showed inverse correlations between status of alpha-tocopherol and vitamin C, the most important lipid- and water-soluble dietary antioxidants, respectively, with markers of DNA damage. Supplementation with these micronutrients has also shown some protective effects. Prooxidative properties However, by acting as scavengers of reactive molecules, antioxidant vitamins have prooxidant potential as well. Oxidative damage to nucleic acids by high-dose micronutrient supplements as evidenced by 8-oxo-deoxyguanosine formation was reported particularly for vitamin C that is commonly used as an over-the-counter supplement and also added to many foods as a fortificant or an antioxidant. As dietary vitamin C supply is generally adequate, the resulting high intake could be of concern. Vitamins in DNA maintenance and repair Folate and vitamin B12 are essential for the supply of 1-carbon units that are required for nucleic acid synthesis and hence, for DNA maintenance and repair as well as methylation reactions as part of epigenetic mechanisms. More recently, epigenetic regulation of DNA damage detection and repair is being unveiled. Methylation of histones determines the accessibility of the DNA to repair enzymes. Besides, activity of repair enzymes themselves is regulated through methylation. Finally, disturbance of the epigenome resulting in excessive smooth muscle cell proliferation also seems involved in the development of atherosclerotic lesions. Vitamins are protecting factors in the prevention of DNA damage but can at high doses also become potential promoters.

Key words: DNA damage, DNA repair, vitamins, antioxidants, prooxidants.

MINERALS AND DNA DAMAGE PREVENTION

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Three main types of dietary recommendations are currently produced by public health agencies: dietary allowances (DRVs), dietary goals, and dietary guidelines. These figures provide national targets for selected macronutrients and micronutrients, aimed at preventing long-term risks of chronic diseases including coronary heart disease, type II diabetes mellitis and cancer. Minerals identified as necessary in certain amounts for human health are: Calcium, Chromium, Copper, Fluoride, Iodine, Iron, Magnesium, Manganese, Molybdenum, Phosphorus, Potassium, Selenium, Sodium and Zinc. However, recommendations in the national guidelines are aimed at the population, rather than the individual level. The example of our own studies on Selenium has emphasized how individuals with certain genotypes and certain disease states require higher than normal intakes of this mineral, in order to protect against DNA damage. The optimal Selenium intake level is also impacted by lifestyle factors, especially smoking. Similar are found for other minerals, including calcium, magnesium and zinc. There is a strong case for optimizing nutrient requirements at an individual level, as the amount required to optimize DNA repair and reduce DNA damage.

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Key words: DNA damage, genomic stability, mutagenesis, selennium.

PHYTONUTRIENTS AND DNA DAMAGE PREVENTION

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The evidence for protective effects of phytochemicals against DNA damage in humans is strong, and comes from several directions. Cross-sectional studies have shown negative correlations between the plasma concentration of phytochemicals (e.g. carotenoids) and DNA base oxidation in peripheral blood mononuclear (PBMN) cells. Supplementation of the diet with fruits or vegetables, or with individual phytochemicals, enhances antioxidant status, as indicated by the resistance of PBMN cell DNA to ex vivo oxidation by H2O2 – an effect seen after a single dose as well as after sustained supplementation. Endogenous DNA base oxidation can show a significant decrease,

especially after long term intervention. The antioxidant efficacy of phytochemicals is confirmed in experiments with cells in culture. On the other hand, large-scale, long-term human intervention trials with clinical outcomes (disease incidence or mortality) have shown, overall, no effect of antioxidant supplements, or even a harmful effect. There are also theoretical reasons to doubt the usefulness of antioxidant supplements; reactive oxygen species play an essential role in the inflammatory response and in cell signalling pathways, and suppressing them too far may be counter-productive. Intrinsic antioxidant defences have evolved, that – at least in healthy subjects – keep oxidants in the body within tolerable limits. Phytochemicals, however, have many other potentially important and beneficial roles, such as moderating phase I and I metabolism, and, as has recently been shown, influencing DNA repair capacity.

Key words: Phytochemicals, antioxidants, DNA oxidation, DNA repair.

PS2-22 The role of nutrition in healthy ageing: Insight from the CHANCES Project

NUTRITION AND OSTEOPOROTIC FRACTURES IN THE ELDERLY: INSIGHT FROM THE CHANCES PROJECT

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Bone fractures constitute important causes of morbidity and mortality among the elderly, especially in the developed countries. Furthermore, they represent important causes of long-standing pain and functional impairment, disability and diminished quality of life. A large proportion of bone fractures in the elderly are related to osteoporosis. Hip fractures, although represent less than 20% of all osteoporotic fractures, account for the majority of fracture-related health care expenditure and mortality in men and women over the age of fifty. Osteoporosis and osteoporosis-related fractures result from the interaction between genes and the environment. Nutrition plays an important role during childhood and adolescence for achieving peak bone mass and preventing osteoporosis in later life. However, the contribution of nutritional factors in the prevention of osteoporotic fractures among the elderly is still, largely, unknown. There is limited evidence that specific food groups (e.g fruits and vegetables), macro- and micronutrients (e.g protein, certain B vitamins) and dietary patterns (e.g adherence to Mediterranean diet) can have a beneficial or detrimental contribution in the incidence of osteoporotic fractures.

The Consortium on Health and Ageing:Network of Cohorts in Europe and the United States (CHANCES) provides an important opportunity to investigate the role of individual dietary factors, as well as, diet as a whole, in relation to hip fracture incidence using harmonized data from a population of elderly individuals from Europe and USA. The final goal of the consortium is to generate the scientific knowledge required for the development of evidence-based recommendations and the implementation of public health interventions for the well-being of the elderly.

Key words: Nutrition, fractures, osteoporosis, elderly, hip fractures.

BIOMARKERS AND NUTRITION

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CHANCES (Consortium on Health and Ageing: Network of Cohorts in Europe and the United States) is a collaborative large-scale integrating project funded by the European Commission (FP7) which aims to produce evidence on ageing-related health characteristics and determinants in Europe. The CHANCES project focuses on four groups of chronic diseases and conditions which are major contributors to the burden of disease in the elderly: cancer, cardiovascular diseases and diabetes, osteoporosis and fractures, cognitive function and psychiatric disorders. In an integrating work-package on Biomarkers (WP9) a set of biomarkers will be identified that can act as a general predictor of health in the elderly, and which correlates with absence or presence of various age-related chronic diseases. In this WP9 an inventory has been made of the biomarkers that have already been measured in the various cohorts. For further analysis we will focus on biomarkers that are thought to be involved in more than one age-related chronic disease. It was decided to focus the measurements on one cohort from Heidelberg (DKFZ) and four cohorts from the HAPIEE study, Prague, Kaunas, Krakow and Novosibirsk. In these cohorts the following biomarkers will be measured in serum samples: the oxidative stress parameters ROM (hydroperoxides), BAP (antioxidant status) and TTP (total thiols); the vitamins 25hydroxyvitamin D, folate and vitamin B12; the electrolytes Na, K, Cl, Ca and Mg and in addition creatinine, uric acid, gamma-glutamyl transferase and high-sensitive C-reactive protein. In total about 13,000 samples will be measured using two (immuno) auto analyzers. In the present study data will be given on the measurements of the mentioned biomarkers and the quality control data. Focus will be put on oxidative stress biomarkers and vitamins. The relation of these biomarkers with aging, nutrition and chronic diseases will be discussed.

Key words: Biomarkers, aging, nutrition, chronic diseases.

25-HYDROXYVITAMIN D LEVELS AND MORTALITY

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Background and objectives: Serum 25-hydroxyvitamin D levels (25(OH)D) have been linked to mortality in several studies but comparisons across European countries are lacking. Objective: It was aimed for an analysis on the association of serum 25-hydroxyvitamin D levels with all-cause, cardiovascular and cancer mortality in cohorts of the Consortium on Health and Ageing (CHANCES).

Methods: 25(OH)D was measured in overall around 25,000 subjects aged 50 and over in 8 population-based cohorts: ESTHER (Germany): n=8,938; TromsØ (Norway): n=4,401; MONICA/KORA-Augsburg (Germany): n=1,267; SENECA (across Europe): n=824; HAPIEE: n=10,000 (n=2,500 in each the four centers in Czech Republic, Russia, Poland and Lithuania). Adjusted Cox regression models were used to estimate hazard ratios (HR) in each cohort and random-effects meta-analyses to pool results.

Results: As analyses in all cohorts except the ESTHER cohort are ongoing, only results from the ESTHER cohort can be shown now. During 9.5 years of follow-up, 974 study participants died, among whom 228 died of cardiovascular diseases and 338 died of cancer. Comparing bottom and top quintile of 25(OH)D concentrations resulted in HRs for the outcomes all-cause, cardiovascular and cancer mortality of 1.65 (95%CI: 1.34-2.03), 1.70 (95%CI: 1.09-2.64) and 1.12 (95%CI: 0.78-1.62), respectively).

Conclusions: Results from the ESTHER cohort showed a strong association between low 25(OH)D levels and all-cause as well as cardiovascular mortality but no association with cancer mortality. It is now up to analyses in the other CHANCES cohorts to verify these findings and compare results from different European countries.

Acknowledgements: This study was conducted in the context of the German Cancer Aid project number 108250 and 108426 and the CHANCES project funded in the FP7 framework programme of DG-RESEARCH in the European Commission (Grant no. 242244).

Key words: Vitamin D; all-cause mortality, cardiovascular mortality, cancer mortality, cohort studies.

PS3-30 Fibres and the gut immune system(FIBEBIOTICS Project)

FIBRES AND THE GUT IMMUNE SYSTEM (EU FIBEBIOTICS PROJECT)

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The human gut and immune system is of utmost importance to maintain health. Polysaccharides/fibers are amongst the best studied compounds in relation to support of the gut & immune system. However, for demonstrable health claims, conclusive scientific evidence is needed. The EU FibeBiotics project studies the effect on gut and immune health of non-digestible polysaccharides (NPS) in detail. NPS represent a class of food fibres composed of polymers of carbohydrates (Dp > 10) that is not digested by the upper gastrointestinal tract. NPS can have a complex composition of different types of sugars with variable linkages, resulting in polysaccharides with different length and different degrees of branching. It can be expected that different NPS will have different bioactivity and that source, genetic background, processing and food formulation will have an effect on this bioactivity. Goals of the project are to set up methods and design strategies for efficient characterisation of NPS and improving the understanding on bioactivity using in vitro models based on human cells or blood derived cells, ex vivo analysis based on intestinal biopsies and on in vivo analysis. As one of the possible bioactivities is selective growth promotion of microbiota species or the production of short chain fatty acids (SCFA), also these are studied in vitro and in vivo. This winter season a double blind placebo controlled 6 arms pilot trial was performed, with 40 subjects in each arm. Currently biomarkers are analysed so no results are available yet. The presentation will give an overview on previous studies with NPS, strategies for bioactivity analysis in vitro and in vivo and technologies developed within the consortium that can be of benefit for other groups interested to study the gut and immune effects of food compounds and products.

Key words: Fibre, food formulation, microbiota, short chain fatty acids, intestine.

DETERMINATION OF BETA-GLUCANS IN FOOD AND SAMPLES FROM IN VITRO SYSTEMS

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Linear 1,3-1,4 or branched 1,3/1,6- linked beta-glucans can all be classified as dietary fibre but are attributed to di-

fferent effects such as immunological modulation and glucose and cholesterol metabolism. The different beta-glucans might be quantified by their unique monosaccharides or oligosaccharides motives. For analysis some spectroscopic approaches (NMR, IR) require purification and isolation of the polysaccharides due to overlapping spectra with other polysaccharides. Specific enzymes are being used to degrade the polysaccharides into oligosaccharides and glucose that can be quantified by colorimetry (Megazyme or GEM assays). In combinations with chromatography these analysis can give sequential information on building blocks. The interaction between cereal beta-glucans and calcofluor can be used with HPLC and fluorescence detection for determination of molecular weight. This approach can be used to analyze complex mixtures such as extracts from bread and fermentation cultures, without the needs of isolation and purification. In a batch mode minute amounts of cereal beta glucans can be quantified in complex samples (Rieder et al., 2012). On the other hand precise selection of enzymes, HPLC-systems and proper correction for the occurrence of free glucose and starch different types of beta glucans in biological material can be determined. We will present some new approaches for the quantification of different types of beta-glucans in fibre ingredients, food and fermentation fluids with fluorescence spectroscopy upon interaction with certain dyes (calcofluor and aniline blue) or HPLC analysis (Rieder et al., 2013) of released oligosaccharides. Rieder, A., Grimmer, S., L. Aachmann, F., Westereng, B., Kolset, S.O., and Knutsen, S.H. (2013). Generic tools to assess genuine carbohydrate specific effects on in vitro immune modulation exemplified by β-glucans. Carbohydrate Polymers 92, 2075-2083. Rieder, A., Knutsen, S.H., Ballance, S., Grimmer, S., and Airado-Rodr¨aguez, D. (2012). Cereal β-glucan quantification with calcofluor-application to cell culture supernatants. Carbohydrate Polymers 90, 1564-1572.

Key words: β-glucans, bread, HPLC analysis, dietary fibre, food analysis.

DEVELOPMENT OF INTEGRATED IN VITRO GUT MODEL PLATFORMS TO STUDY FIBER FERMENTATION AND GUT IMMUNE EFFECTS

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The role of foods on human health (e.g. immune function) is becoming more and more apparent. Into a large extent, such effects are mediated through intestinal processes. This is especially the case for dietary fibers, which may have direct immune effects, but for which most effects will result from specific fermentation by the gut bacteria. Given the difficulty of studying such intestinal processes inside the human body, well-designed in vitro simulation technologies offer an essential tool to assess metabolism and bioavailability of actives or modulation of the intestinal microbiome. ProDigest is specialized in the development of in vitro simulation technologies, among which the validated SHIME® (Simulator of the Human Intestinal Microbial Ecosystem) technology, an internationally accepted, representative simulation of the gastrointestinal tract (GIT). However, altough the predictive value of this model has been long validated, it does not evaluate the ultimate effects of food ingredients, such as fibers, on the intestinal epithelium and immune system, as it lacks a host biological compartment. Therefore, ProDigest has developed a novel toolbox which allows to evaluate the biological effect of microbiota and metabolites on gut wall functioning and the host immune system. The toolbox consists of the direct coupling of its SHIME technology with human cell culture models, including co-cultures of epithelial cells and immune cells and its so-called Host-Microbiota-Interaction module. This patented technology can be coupled with the SHIME and therefore allows to evaluate the metabolic fate of active ingredients in the intestine, their effect on the complete intestinal environment (e.g. microbiota changes) and the resulting modulation of gut epithelial and immune functioning; and this all in one integrated platform. Being part of the FibeBiotics project, the technology will be described in this presentation, based on proof-of-concept fiber fermentation and immune modulation studies.

Key words: Gastrointestinal tract, SHIME, gut bacteria, prebiotics, immunity.

PS3-38 HEALTHGRAIN Forum Symposium - Cereal foods and health - New results and science based nutrition guidelines

CEREAL FOODS AND COMPONENTS IN OUR DAILY DIETS AND THEIR IMPORTANCE FOR HEALTH

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Background and objectives: Cereal foods are the most important component of the human diet; they are major contributors of dietary carbohydrates and, therefore, play an important role in energy and substrate metabolism. The relevant literature has been reviewed to better understand the relationship between cereal food intake and major chronic non communicable diseases (NCD), trying to elucidate potential mechanisms linked to food constituents.

Methods: A PubMed search has been undertaken utilizing as key-words cereals (refined and wholegrain) plus other terms

identifying NCD and associated relevant body functions; both epidemiological and human intervention studies have been included.

Results: Relationships between cereal food consumption and health outcomes have heterogeneous patterns, depending on the type of cereal, on whether cereals are consumed as wholegrain or in refined form, on the amount of fibre, food structure, glycemic index, polyphenol content, micronutrients, etc. Recent research indicates as relevant for health not only the rate of starch accessibility and digestion in the small intestine, but also carbohydrate fermentation in the gut. Prebiotic compounds present in cereal products may influence the composition of intestinal microbiota and promote production of short chain fatty acids in the colon; this may represent one of the relevant mechanisms of the beneficial impact of many cereal foods on energy, glucose and lipid metabolism and intestinal cell proliferation (linked to the risk of cancer).

Conclusions: Epidemiological surveys consistently show an association between cereal consumption (mostly wholegrain) and prevention of several NCD; however, there is a gap between the health benefits shown in observational studies and the elucidation of the mechanisms involved. More research (particularly human intervention studies) is needed to fill this gap and provide solid grounds for more specific guidelines for cereal food consumption at the population level.

Key words: Cereal foods, health benefits, blood glucose regulation, energy metabolism, plasma lipids.

WHOLE-GRAIN AND FIBER INTAKE AND COLORECTAL CANCER; NEW RESULTS FROM THE HELGA AND EPIC COHORTS

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Background and objectives: Recently, World Cancer Research Fund stated that intake of dietary fiber is convincingly related to lower risk of colorectal cancer. When looking into sources of dietary fiber, cereals emerged to be the food group showing the strongest association. The content of dietary fiber constitutes one of the main differences between refined grains and whole grains. The association seen with cereal fiber may consequently partly be assigned as evidence for whole grains. None of the published cohort studies on wholegrain intake and colorectal cancer have been able to evaluate the potential different effects of the main cereals: wheat, rye and oats. Undetailed baseline information about whole-grain intake makes studies of associations to disease a challenge in most existing cohorts, using a biomarker to estimate whole-grain intake can overcome this problem.

Methods: In this presentation associations between dietary fiber and whole-grain intake and incidence of colorectal cancer, by use of detailed questionnaire information in a Nordic cohort (HELGA) and by use of the biomarker alkylresorcinols in a European cohort (EPIC) will be shown.

Results: In the HELGA cohort intake of dietary fiber, especially from cereal sources, and whole grains was found associated with lower colorectal cancer incidence. The strongest association was seen for whole grain wheat, with non-significant associations for oats or rye. In the EPIC cohort, whole-grain intake was measured by plasma levels of the phenolic lipids alkylresorcinols that is a validated biomarker for whole-grain wheat and rye intake. Plasma levels of alkylresorcinols were not found related to overall colorectal cancer, but lower incidence of distal colon cancer was seen among those with highest levels.

Conclusions: These studies confirm that whole grains may play a role in colorectal cancer prevention. The results are, however, preliminary and must be interpreted as such.

Key words: Whole grains, dietary fiber, alkylresorcinols, colorectal cancer, epidemiology.

HEALTH BENEFITS OF WHOLE GRAIN WHEAT: INTERVENTION STUDY CLARIFYING UNDERLYING MECHANISMS AND THE ROLE OF POLYPHENOLS BOUND TO DIETARY FIBRE

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Background and objectives: Epidemiological studies associate whole grain (WG) consumption to reduced CVD risk, body weight and abdominal circumference. Data obtained by intervention studies were not conclusive. Evidence from animal and few human studies indicated that prebiotic dietary fibre ameliorates metabolic syndrome. Whole grain, especially wheat and rye, present a large amount of polyphenols (mainly ferulic acid) bound to dietary fibre. This study aims to assess the role of dietary fiber polyphenols on health benefits of WG.

Methods: A commercial WG product, was selected. Eighty healthy overweight subjects were enrolled. Forty volunteers replaced equicaloric portions of specific foods with 68 g WG/day for 8 weeks; the other half did not change their diets. At baseline, and after 4 and 8 weeks, body weight, waist and hip circumferences, bioimpedance analysis and blood, urine and feces collection was measured. Markers linked to bioavailability of ferulic acid and several polyphenols (by HPLC/MS/MS), to inflammatory status (several cytokines by multiplexed immunometric assay), to lipid and glucose metabolism as well as

to the overall nutritional status and appetite, were measured. Metagenomic analysis of feces was run to evaluate the influence of intestinal microflora composition on the health benefit of a WG-enriched diet.

Results: 63 subjects (34 treated with WG and 29 controls) completed the study. Preliminary results indicate different concentration trends for inflammatory cytokines and ferulic acid-related metabolites in blood collected from subjects who consumed WG compared to control subjects over the study period. Data analysis is still ongoing and all final results will be crossed with metagenomic data to ascertain the role of individual microflora on bioavailability of polyphenols bound to WG dietary fiber as well as on health effect.

Conclusions: Consumption of wheat whole grain might improve inflammatory status in overweigh subjects:

Key words: Whole grain, ferulic acid, prebiotic, inflammation.

WHOLE GRAIN WHEAT INTAKE – IMPACT ON WEIGHT LOSS, BODY COMPOSITION AND CARDIOMETABOLIC FACTORS – RESULTS FROM INTERVENTION STUDIES

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Background and objectives: Cardiometabolic syndrome (CMS) is characterized by three of the following criteria, increased visceral adiposity, hypertension, hyperglycemia, hypertriglyceridemia, and low HDL-cholesterol. Weight loss is standard treatment for CMS.

Methods: A literature review was conducted to evaluate whole grain (WG) wheat intake, weight loss and CMS risk factors.

Results: Epidemiologic evidence demonstrates a decreased risk of CMS and type 2 diabetes with WG > 2 servings/day). A systematic review of 21 prospective studies demonstrated that consuming 3-5 sv/d of WG (48-80 g/day) versus consumption rarely lowered risk of type 2 diabetes 21%, and decreased weight gain over ~10 years (1.27 vs. 1.64 kg, P=0.0001). The Health Professionals Study reported that every 40-g/d increment of WG consumption was associated with a reduction of 0.49 kg in body weight over 8 years. In three prospective cohort studies with 120,877 subjects, weight gain was inversely associated with WG intake (-0.37 lb). Intervention studies have not shown consistently that WG enhance weight loss or improve insulin sensitivity; there is some evidence that replacing refined with WG may benefit individuals with insulin resistance/prediabetes. Also, WG decrease body fat % more than refined grains in response to weight loss (-3% vs -2.1%; P = 0.04). Results from 20 RCTs reported that WG reduced fasting glucose (-0.93 mmol/L), total cholesterol (-0.83 mmol/L) and LDL-C (-0.72 mmol/L). Many studies also have reported a hypotensive effect of WG mediated by improvements in body weight, dyslipidemia, and insulin resistance.

Conclusions: Epidemiologic studies show benefits of WG on CMS, including body weight. Mixed results from clinical studies on body weight might be explained by different methodologies, including type and amount of WG consumed.

Key words: Whole wheat grain intake, risk of cardiometabolic syndrome, weight loss, body composition.

GLOBAL DIETARY WHOLE GRAIN RECOMMENDTIONS: A HARMONISED OR MULTIFARIOUS MESSAGE?

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Background and objectives: Dietary recommendations for whole grain intake exist in a number of countries worldwide, however, the nature and wording of these recommendations have not been characterized to date.

Methods: Using a combination of literature searches and direct enquiry, this research reviewed current whole grain recommendations around the globe to assess presence/absence, rationale and diversity in emphasis and wording.

Results: The level of emphasis placed on dietary whole grain intake is hugely variable globally. For some countries, clearly defined dietary recommendations for whole grain intake exist which are supported by policy and health promotion campaigns. In these instances, quantitative recommendations may co-exist whereby a numerical value is ascribed providing a benchmark or 'target' for population intakes. However, this value can vary between countries and is sometimes related to a gram intake (e.g. 48g/d) or number of servings per day (e.g. 3 x 16 servings). In other countries, whole grain-specific dietary recommendations may be deemed as secondary, whereby they usually form part of broader guidelines on carbohydrate and/or fibre intakes or even general healthy eating guidelines. Where this occurs, the recommendations are typically less prescriptive and may be more difficult to disentangle from the primary recommendation. This can make the impact of any public health campaigns difficult to assess. Finally, in some regions, dietary recommendations for whole grain intake do not exist at all.

Conclusions: This review critiques the evidence regarding dietary recommendations for whole grain intake worldwide. The results indicate that there is a lack of a harmonized message which may result in potential confusion for the consumer, lessen the impact of public health messages and pose barriers to trade for the food industry.

Key words: Diet, whole grain, recommendations.

PS4-46 Functional roles of human milk and other selected oligosaccharides

ISOLATION, CHARACTERIZATION AND FUNCTIONAL ROLES OF HUMAN MILK OLIGOSACCHARIDES

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Since the discovery of human milk oligosaccharides (HMO) more than 60 years ago, research has faced major challenges including (i) the development of methods to identify and characterize these components, (ii) the need to use HMO fractions for functional studies since single HMO were not available, and thus (iii) the low availability of large quantities of single HMO for animal and human studies. In the last 10 years, there has been a tremendous progress in all these areas. Based upon in vitro experiments, animal studies and a few association studies in humans, many functions of HMO have been proposed. Recent animal studies support HMO functions shown in vitro. Concomitantly with these observations, progress in biotechnology today allows the production of at least some of the major HMO to be potentially added to infant formula. To be able to decide which compound should be used in which concentrations or combinations, studies are needed regarding absorption, metabolism and physiological functions in infants. Strikingly, the pattern of oligosaccharides in human milk depends on the mothers Lewis blood group specificity and secretor/non-secretor status. HMO are mainly characterized by type 1 structures (Galα1-3GlcNAc-linkages). Milk of other species including apes and monkeys either contains only or mainly type 2 oligosaccharides (Galα1-4GlcNAc-linkages). It seems likely that type I HMO exert specific effects in breast-fed infants. Here, we will focus on the potential of HMO to influence the microbial composition in the gastrointestinal tract, the adhesion of pathogens to the epithelium, and inflammatory processes after intestinal absorption. In addition, an increasing number of publications indicate a link between the blood group and secretor status of an individual and the risk for diseases, such as inflammatory gastrointestinal diseases. Thus, not only the HMO content but also the their pattern may be relevant for the infants´ health.

Key words: Gastrointestinal tract, human milk, infant formula, oligosaccharides.

BASIC ASPECTS OF HUMAN MILK OLIGOSACCHARIDES; NEW PRECLINICAL AND EX-VIVO OBSERVATIONS

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We have previously demonstrated that a soluble human milk glycan (SMG) can be produced in kilogram scale and conducted preclinical, toxicological and clinical studies to demonstrate its safety of use and probe for biological effects. We decided to focus our research on interactions of the most abundant soluble milk glycans with different cellular and tissue systems to identify biological activities that may be consistent with health benefits. We determined concentrations of SMGs in mother´s milk, and plasma and urine of breast-fed infants to evaluate the possibility of systemic effects. We also exposed respiratory epithelia and peripheral blood mononuclear cells to SMGs before challenging them with respiratory viruses. We then measured viral load and cytokine profiles to ascertain the ability of these SMGs to protect from infection and modulate immune responses . We also explored topical effects in the gastrointestinal system by assessing the effect of SMGs on cell lines representing different stages of maturation of human intestinal tissue. Furthermore, we measured the effect of fucosylated glycans on ex vivo rodent intestine and measured the ability of these carbohydrates to modulate peristaltic movement . We found that the plasma and urine concentration of the most abundant free soluble glycan of human milk, 2´fucosyllactose, in breast-fed infants correlates with the concentration of this carbohydrate in milk of the corresponding mother. We also found that different SMG decrease the viral load of specific respiratory viruses and impact cytokine responses with a marked modulation of IP-10, which is a recognized biomarker of respiratory disease susceptibility and inflammation. In addition, specific SMG emulate differentiation of intestinal cell lines and modulate neurally dependent colon contractions in rodent intestinal explants. These novel findings indicate SMG have the potential to deliver local and systemic health benefits.

Key words: Cytokine, glycans, human milk, oligosaccharides.

THE ROLE OF HUMAN MILK OLIGOSACCHARIDES IN INTESTINAL COLONIZATION

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Human breast milk contains numerous functional components which facilitate the newborn's adjustment to the extrauterine environment. of major importance to the newborn is an appropriate initial colonization of the intestine. Such colonization assures the development of intestinal mucosal and systemic immune function leading to immune homeostasis and preventing the expression of allergic and immune-mediated diseases in later life. Breast milk contains several factors that help to establish a symbiotic relationship between the colonizing bacteria and the host. A major component of breast milk is oligosaccharides which comprise eight percent of the total nutrients and represents a diverse array of oligosaccharides. The oligosaccharides, also known as probiotics, bypass small intestinal digestion and enter the colon where they are fermented into short chain fatty acids (ascetic, butyric, proprionic, etc.) producing and acidic intrauterine environment. This collective environment favors the proliferation of specific probiotic bacteria, e.g., Bifidobacteria, Bacteroides, and Lactobacillus, which colonize the intestine in large quantities early in postpartum existence and preferentially stimulate appropriate innate and adaptive immune responses. In addition, the breast milk environment stimulates these probiotic bacteria, particularly Bifidobacteria, to activate their specific genes which favor protection from pathogens including specific anti-inflammatory responses. The composition and quantity of oligosaccharides (prebiotics) in breast milk is dynamic with more diverse and larger quantities present in colostrum and breast milk from mothers who delivery preterm infants. Accordingly, breast milk comprehensively contributes to the initial colonization of infant's gut and indirectly helps protect the newborn from insult in the extrauterine environment.

Key words: Human milk, intestine, oligosaccharides, immune system, prebiotics, probiotics.

NONABSORBABLE OLIGOSACCHARIDES: JUST PREBIOTICS?

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Prebiotic effects of non absorbable glucids (NAGs) have been widely studied and depend mainly on the fermentation by the colonic microbiota. Nevertheless, before reaching the colon, NAGs go through the small intestine and are in contact with the intestinal epithelium and, in intestinal pathologies, they can even reach other layers of the intestine. On the other hand there is some evidence indicating that prebiotics could be transported by the intestinal epithelium. Little is known about non prebiotic effects of NAGs but it is widely known that carbohydrates interact with different cell types, and NAGs have been reported to bind to specific receptors on cells of the immune system, suggesting that microbiota-independent, immune-modulatory effects play a role as well. In fact, recent research with different cell lines and primary cultures indicate that NAGs interact with different receptors in intestinal epithelial cells, macrophages and lymphocytes regulating signal transduction pathways and the subsequent expression various cytokines. NAG also may exert modulatory actions in germ free mice, supporting that direct effects occur in vivo. Differences among several milk oligosaccharides including oligofructose, inulin, goat's, cow's and human milk have been described. Non-prebiotic effects of NAGs have been related to their beneficial effects on allergy and to a possible role in the intestinal defense. The relevance of these findings will be discussed.

Key words: Prebiotics, intestinal epithelial cells, immune cells, signal transduction pathways, non absorbable glucids.

PS4-54 Functional roles of prebiotic inulin-type fructans

PREBIOTIC MODULATION OF THE HUMAN GUT MICROBIOTA: IS THIS A HEALTH BENEFIT?

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It is recognised that the complex microbial ecosystem in the human colon has a profound impact on health. This has led to approaches to improve health via the nutritional manipulation of this ecosystem.

Functional food ingredients have the potential to modulate the colonic microbiota and its metabolic profile to promote health. Traditionally, this has been by the administration of live bacterial supplements, or probiotics. Whilst specific, carefully selected bacterial strains can have health benefits, it is not possible to bring about large changes in the colonic microbiota this way. In 1995 the concept of prebiotics was introduced and several definitions have followed with the most recent one published in 2010. Essentially prebiotics are food ingredients, supplements or components that escape digestion in the small intestine and reach the colon largely intact. They are then selectively fermented by health-positive members of the colonic microbiota. All recognised prebiotics are carbohydrates such as fructo-oligosaccharides, inulin and galacto-oligosaccharides. Many more are being investigated.

Much of the early work on prebiotics focused on increasing the relative populations of bifidobacteria and lactobacilli. These are non-pathogenic species with a range of recognised health-positive attributes including inhibition of intrinsic and extrinsic pathogens, modulation of immunity and vitamin synthesis. The health attributes of these organisms are still being explored in laboratory and human volunteer trials and data are accumulating to support their use in a range of chronic and acute gut disorders. Recent thinking, however, has focussed increasingly on the metabolites produced by the colonic microbiota and the impact of these metabolites on health is being studied. This widening of emphasis is stimulating debate over the definition of prebiotics.

This talk will examine the evolving view of what is meant by a prebiotic, and critically examine how they might act to increase health.

Keywords: Gut microbiota; prebiotics; gut health.

GUT MICROBIOTA IMPACT ON METABOLIC DISORDERS ASSOCIATED WITH OBESITY

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Experimental data in animals, but also observational studies patients, suggest that the composition of the gut microbiota differs in obese versus lean individuals, in diabetic versus non diabetic patients, or patients presenting other diseases associated with obesity or nutritional dysbalance, such as non alcoholic steatohepatitis. Several observation studies in humans allow to point out interesting bacterial targets, such as Bifidobacterium spp., which abundance is inversely correlated to obesity and diabetes; Faecalibacterium praustnizii, that could be involved in the control of diabetes-related inflammation, or Akkermansia muciniphila, involved in mucus layer regulation, which has been shown to be inversely correlated with obesity. We have recently confirmed, in an intervention study with fructan prebiotics versus placebo in obese women, that, even if the increase in Bifidobacteria remains the major and common signature of the prebiotic approach, a complex modulation of the gut microbial ecology – that can be studied through both bacterial genomic analysis and host fluids metabolomics- occurs upon prebiotic treatment in obese individuals. Some bacterial changes are clearly related to a decrease in inflammation, others the improvement of fat mass and of metabolic alterations. The mechanistic studies suggest that the changes in the gut microbiota occurring upon prebiotics, can be related to an improvement of gut bacterial functions implicated in the regulation of host energy homeostasis. The promotion of gut hormones release, changes in the gut barrier integrity, and/or the release of bacterial-derived metabolites could all participate in the improvement of host health in the particular context of overfeeding and obesity.

Key words: Gut microbiota, obesity, prebiotics, inflammation, gut peptides.

PREBIOTICS IN INFANT NUTRITION

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Before birth, the gastrointestinal tract is sterile; it occurs immediately after birth that the gastrointestinal tract become colonised by bacteria from the mother and the birthing environment. The developing microbiota and its composition is

thereby influenced by a number of factors such as the type of delivery (caesarean section showing lower numbers of Bifidobacteriumfragilis and higher counts of Clostridium difficile in comparition to vaginally birth), the stage of maturity, antibiotic therapy and feeding practices. Breastfed infants, for instance, have different flora that is mainly composed of Bifidobacteriaand Lactobacillus in comparison with formula-fed infants, displaying a more complex flora with a predominance of Clostridia, Bacteroides and Streptococci. Moreover, it has been observed that breast-fed infants grow and developed differently with reduced incidences of late-onset neonatal infection, necrotizing enterocolitis, infections, allergy and childhood obesity. There is also evidence that infant feeding can influence the risk of metabolic syndrome later in life.

Whereas human milk contains about 8% of total carbohydrates in the form of prebiotic oligosaccharides that selectively favour the growth and residence of lactic acid bacteria in the infant gut, infant milk formulas do not contain such prebiotics unless they are enriched. Meanwhile several studies have examined the impact of prebiotic supplementation with inulin, ologofructose and Orafti®Synergy1 to infant formula in paediatric populations, feeding improvement in gut flora composition, increased stool frequency and promoting softer stools.

Further benefits of prebiotic supplementation show preventive protection against the development of atopic dermatitis or infections.

One of this studies published recently by Veereman-Wauter and co-workers assesses the effects of an infant formula supplemented with 0.8g/dL Orafti®Synergy1 in newborns in a randomized controlled trial of 4 weeks. Orafti®Synergy1 supplemented formula showed similar efficacy as a "GOS:FOS (90:10) supplemented formula in promoting a stool consistency and microflora closer to the breastfed pattern.

This work led to the development of the Bambinol study which addresses tolerance, safety, and efficacy of an Orafti®Synergy1 supplemented infant formula during the first four months of life.

The Bambinol study was set up in double-blind, randomized, placebo-controlled design with two groups of neonates receiving and infant formula supplemented with 0.8g/dL Orafti®Synergy1 or an infant formula without prebiotics as control (n=252) for four months. An additional reference group of breast-fed infants (129) was monitored in parallel. Results showed similar growth, milk intake, and fluid balance and biochemical values in the intervention and control groups, demonstrating the safety of Orafti®Synergy1 supplementation. Additionally, Orafti®Synergy1 promote a deposition pattern closer to the mother milk with improved stool frequency and consistency versus de control formula. An important finding from this study is that the favourable softer stools were not associated with disturbed water balance. Moreover, a trend of increasing Bifidobacterium in faecal flora was seen with Orafti®Synergy1, without any side effects compared to the standard formula. In conclusion, the study demonstrates that the supplementation of 0.8g/dL Orafti®Synergy1 to formula milk during the first four month of life is safe and effective in terms of gut health.

Key words: Inulin, oligrofructose, prebiotics, infant formula.

ROLE OF PREBIOTICS IN REGULATING ENERGY INTAKE AND BODY WEIGHT

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The human food supply has changed drastically over the past 50-75 years, including reduced dietary fiber content, with an alarming increase in obesity following close behind. In response, there is a growing interest in value-added foods that will help curb the obesity epidemic. The effectiveness of dietary fiber, particularly prebiotic inulin-type fructans, to aid in weight management is supported by convincing data in animal studies and a growing body of evidence from human clinical studies. This presentation will highlight the mechanisms by which prebiotic fiber acts to regulate body weight with a special focus on gut satiety hormones. Furthermore, given the demonstration that the susceptibility to obesity can be programmed early in the course of development, the influence of prebiotic fiber on maternal health during pregnancy and offspring health will also be discussed. The overall goal of this presentation is to highlight the latest evidence for role of prebiotic fibers in body weight management across the lifespan.

Key words: Prebiotic, Energy Intake, Obesity.

PS5-70 Phytochemicals Responsible for the Food Function, from the chemistry to physiological relevance and human health

RED WINE POLYPHENOLS AND HUMAN HEALTH

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Background and objectives: Epidemiological studies have associated moderate consumption of red wine (RW) to a lower risk of coronary heart disease. The aim of this study was to evaluate RW polyphenols as biomarkers of intake and effect on human health using targeted and untargeted approaches by mass spectrometry (MS) and Nuclear Magnetic Resonance (NMR). The potential prebiotic effect of wine polyphenols on human feces microbiota was evaluated.

Methods: High cardiovascular risk subjects followed three interventions (28 days each) in a randomized crossover clinical trial: dealcoholized-RW (DRW)(272mL/day, polyphenols-control), RW (272mL/day) and Gin (100mL/day, alcohol-control). Urine samples (24h) were collected and analyzed by UPLC-MS/MS, HPLC-q-TOF-MS and 1H-NMR. Multivariate (Orthogonal Partial Least Square: OPLS) and univariate statistical analysis (ANOVA, Friendman and Wilcoxon's signed-rank tests) were used to compare treatments.

Results: Targeted analysis identified up to 21 resveratrol (RV) metabolites [phase II conjugates of RV and dihydroresveratrol (DHR) as microbial metabolites] after RW and DRW consumption. Besides others, glucuronide conjugates of dihydroxyphenylvalerolactone, RV and DHR identified by untargeted HPLC-q-TOF-MS were discriminant by OPLS analysis after both wines compared with gin intake. Endogenous 3-methyl-2-oxovalerate, a branched-chain aminoacid (BCAA) metabolite, was highly excreted after RW and DRW intakes.. Considering the microbial composition in feces, Fusobacterias, Enterococcus spp, Bifidobacteria, Blautia Coccoides and Eggertella lenta were significantly increased after DRW and RW comparing with baseline.

Conclusions: The use of multivariate statistical approaches can elucidate new biomarkers in high cardiovascular risk subjects after RW consumption. Presence of metabolites from BCAAs pathway could suggest an increase in the global energetic metabolism. This study showed that RW consumption can significantly modulate the growth of selected gut microbiota in humans, which suggests possible prebiotic benefits associated with the inclusion of RW polyphenols in the diet. This trial was registered at controlled-trials.com as ISRCTN88720134.

Key words: Wine, biomarker, metabolomic, metabolic profiling, LC/MS, NMR.

MULTI-FUNCTION OF GALLATE FOR HUMAN HEALTH

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Gallic acid (3,4,5-trihydroxybenzoic acid.) is one of phytochemicals and is found in many plants, such as gallnuts, tea leaves, and Toona sinensis leaves. Gallic acid (GA) and its derivatives (gallate) have been regarded to possess anti-oxidant, anti-obesity, anti-atherosclerotic, anti-diabetic, and anti-cancer effects in animal and human studies. GA is part of the structure of other polyphenols, and commonly used in laboratories as standard to measure the concentration of phenolics and polyphenols in plant extracts. GA has two functional groups hydroxyl and carboxylic acid groups. It can yield numerous esters and salts derivatives including digallic acid which is formed by the reaction of two gallic acids such as epigallocatechin gallate (EGCG). EGCG, the major and active compound in green tea, is a powerful antioxidant and has been shown to protect against heart diseases and cancer in numerous studies. Tannins, esters of digallic acids, have shown potential anti-viral, anti-bacterial and anti-parasitic effects. Recent studies indicated that GA, the major compound in the ethanolic extract of Toona sinensis leaves, decreased the hyperglycemia and insulin resistance in the type 2 diabetic mice, and reduced the lipid accumulation in the adipocytes and oleic acid treated hepatocytes, which is beneficial for body fat control and fatty liver. Molecular mechanism underlying was through peroxisome proliferator activated receptor alpha (PPARγ) due to the increased expressions of PPARγ and its downstream genes responsible for glucose and lipid metabolism by GA. Protein analysis indicated that GA reduced the expression of proteins responsible for gluconeogenesis and lipogenesis, leading to the reduced hepatic glucose production and lipid accumulation in liver of diabetic mice.

Thus, GA and its derivatives with a variety of biological activities protect human from metabolic disorders, suggesting to be developed into new adjunctive agents for human health.

Key words: Human health, phytochemicals, gallate, oxidative damage, viral infection, metabolic disorder.

GARLIC-DERIVED COMPOUNDS FOR THE PREVENTION OF LIFESTYLE-RELATED DISEASES

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Garlic (Allium sativum L.) has long history as food with characteristic flavor and some medicinal properties. Modern scientific research revealed that wide variety of dietary and medicinal functions of garlic such as antimicrobial, antiobesity, antihypertensive, antithrombotic, and anticancer effects. These potent activities are mostly attributed to sulfur compound derived from garlic. Actually, garlic contains great amount of sulfur in comparison with other edible vegetables. The sulfur is usually stored as amino acid including S-allyl-L-cysteine sulfoxide, S-methyl-L-cysteine sulfoxide in the garlic. Characteristic flavor is generated by the reaction of CS-lyase and S-allyl-L-cysteine sulfoxide or S-methyl-L-cysteine sulfoxide, when the cellular structure of garlic is disrupted. Diallyl thiosulfinate (allicin) and allyl methyl thiosulfinate are generated by the enzymatic reaction, and several kinds of sulfides are further generated by the following spontaneous reactions with sulfinates produced by CS-lyase. The sulfides including diallyl trisulfide, diallyl disulfide, allyl methyl trisulfide, diallyl sulfide are more stable than the sulfinates. In the crushed garlic, more than 20 kinds of sulfide compounds could be detected; however, their functions are different from one another; e.g., allicin, allyl methyl trisulfide, and diallyl trisulfide have potent antimicrobial, antithrombotic, and anticancer activity, respectively. Food function of garlic against lifestyle-related diseases including antiobesity, antithrombotic and antileukemic properties of these sulfides, and some of their molecular basis will also be discussed in this paper.

Key words: Cancer, garlic, obesity, thrombosis.

PHYSIOLOGICAL FUNCTIONS OF A FLAVOR COMPONENT FROM SHIITAKE MUSHROOMS

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Background and objectives: Shiitake mushrooms (Lentinula edodes) are appreciated for their specific flavor and often used in Japanese cuisine. The flavor compounds from shiitake mushrooms are cyclic sulfuric compounds, which are formed from lentinic acid by enzymes when they are cut or crushed. Lenthionine is the major component among them characterizing the shiitake flavor. This study presents the physiological functions of lenthionine especially focusing on the inhibitory activity against platelet aggregation and suppressive activity against hepatic injury.

Methods: Lenthionine was orally administered to rats, and its inhibitory effect against platelet aggregation was evaluated ex vivo. In order to examine the mechanism of action, platelets were activated by various agonists in vitro and the inhibition percent of lenthionine against aggregation was measured. Phosphorylation of proteins, morphological change and activation of platelets were also compared with and without the presence of lenthionine.

The preventive effect of lenthionine against acute hepatic injury was evaluated by using carbon tetrachloride. After the oral administration of lenthionine to mice, hepatic injury was induced by carbon tetrachloride. Then, markers of hepatic injury and activities of detoxification enzymes were determined.

Results:] Platelet aggregation was inhibited by the oral administration of lenthionine and by the addition of lenthionine to the blood samples prior to the induction of aggregation by various agonists. Phosphorylation of β-actinin and polymerization of actin were suppressed by the addition of lenthionine to platelets, which led to the prevention of their morphological change and integrin GP IIb/IIIa activation. Orally-administered lenthionine prevented the progress of hepatic injury inducing phase II detoxification enzymes and suppressing oxidative stress.

Conclusions: These results indicate that lenthionine excerts physiological functions in vivo even when it is orally administered, and the mechanism of action of lenthionine is different from that of sulfides from garlic.

Key words: Shiitake flavor, lenthionine,,platelet aggregation, hepatic injury.

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T7 FOOD CULTURE AND NUTRITIONAL EDUCATION

NPS1-7 The role of nutraceuticals in health along with basic nutrition

GLOBAL NUTRIENT SECURITY AND NUTRIENT BIOAVAILABILITY

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A billion people suffer from hunger, but even if people receive their energy supply, they often do not receive enough essential nutrients. In many cases these nutrients are in the food, but not bioavailable, thus, attention should be paid to making nutrients accessible to the organism. Preservation technologies are being used to obtain safe and stable food, in addition, feasibility of using these technologies to enhance the bioavailability of certain nutrients present in food products is under study. Depending on the food matrix, the presence of antagonistic agents may substantially compromise nutrient bioavailability.

Thereby, an update on the state of the art of processing technologies regarding the effects on nutrient bioavailability on different foods will be presented through the discussion of some of the key aspects that rule the enhancement or decrease of nutrient bioavailability in preserved food. As fruits and vegetables are rich sources of nutrients and other health-related compounds, case studies on various plant foods will be presented to illustrate the ability of thermal and nonthermal food preservation technologies for increasing nutrient accessibility to the organism. Although an improvement of nutrient bioavailability is important for population in general, this is a critical concern for people who do not have a guaranteed food security.

Key words: Food security, nutrient bioavailability, processing technologies.

ANCIENT WISDOM AND NUTRACEUTICALS - INTERNATIONAL PERSPECTIVE

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The role of diet in health maintenance and disease prevention has been known for centuries based on experience and epidemiological data. We have explored functionality of green tea and various other botanical by various scientific studies to confirm the health benefits. Many studies on various nutraceuticals based on ancient secrets will be discussed. The relationship between food and health is complex and continuously evolving with recent increased consumer awareness of nutrients and nutraceuticals and their delivery system that has begun to appear in a tremendous increase in the market size

Key words: Botanicals, disease prevention, nutraceuticals.

DRUG-INDUCED NUTRIENT DEPLETION: UNMET CLINICAL NEED OR LABEL WARNING?

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The depletion of nutrients by drug treatments and iatrogenic nutritional deficiencies is a long-standing problem in the current health care. Although the disease itself is the primary factor in the progression of symptoms, scientific literature with varied level of evidence indicate the role of nutrient depletion in the progression of disease. Furthermore, drug-induced nutrient depletion seems to be understated in the current drug review and approval process as an adverse drug reaction among the cluster of adverse reactions and side-effects on patient safety information sheets. Drug-Induced Nutrient Depletion is complex and appropriate system of comprehensive disease management program is yet to be evolved. This session is inclined to raise debate and call for action on Drug-Induced Nutrient Depletion issues rather than reviewing the published literature. Various options for debate including, nutrition panel review as a component of drug approval are proposed. Furthermore, repurposing of nutraceuticals and the co-existence and integration of nutraceuticals and pharmaceuticals is proposed as a prospective product solution.

Key words: Drugs, health care, nutrient depletion.

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MAPPING FRUIT, VEGETABLE AND PHYTONUTRIENT CONSUMPTION GLOBALLY

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Fruits and vegetables are important sources of key nutrients, such as potassium, dietary fiber, folic acid, vitamins A, C and E with recommended intakes. Additionally, they contain naturally occurring phytochemicals, which may have health benefits beyond basic nutrition, despite having no recommended intakes at this time. By utilizing the World Health Survey (WHS) Data and Global Environment Monitoring System (GEMS) Data which maps clusters, new global research will reveal, by global cluster as defined by the World Health Organization, the number of servings of fruit and vegetables consumed, the top fruits and vegetables consumed based on volume intake, and indicate the most concentrated phytonutrient sources among the fruits and vegetables being consumed. These findings will provide the foundation for further research documenting any global phytonutrient shortfalls. The research design mirrors an earlier protocol, which quantified the "phytonutrient gap" or intake shortfalls of nine phytonutrients found predominantly in fruits and vegetables among the US population (published February 2012 in the paper entitled "Phytonutrient Intake by Adults in the United States in Relation to Fruit and Vegetable Consumption" in the Journal of the Academy of Nutrition and Dietetics.

Key words: Fruit, vegetable, phytonutrient consumption

COLLABORATIVE FUNCTIONAL FOOD AND NUTRACEUTICAL RESEARCH OPPORTUNITIES IN CANADA

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The research and development landscape in Canada is diverse and complex. There are numerous world-class resources to aid discovery, scale-up, and commercialization of innovative food and health products, and Advanced Foods and Materials (AFM) Canada is the portal to engage with them. Our extensive network across Canada includes Universities, Government research labs, contract development centers, , business enterprises, producer groups, and private and public funding organizations. Evolving into an independent, self-sufficient, non-profit organization from AFMNet (a Network of Centres of Excellence in food research founded in 2003), AFM Canada gains awareness , and facilitates the translation, of laboratory breakthroughs into commercial success and has managed a portfolio of over $25 million in multidisciplinary and multisectoral R&D funding and has successfully raised an additional $13 million in leveraged financing from other sources, leading toward the generation of numerous start-up companies, patents, licenses, and the development of highly qualified personnel. AFM Canada is actively managing more than 25 innovative projects, including over $2.5 million in public and private project funding, producing technologies that will have a positive impact on the well-being of consumers around the world.

Key words: Collaboration, R&D, network, funding, university.

PS1-7Cultural differences in diet and nutrition across Europe. Impact on health

NUTRITION AND POLITIC – EASTERN COUNTRIES' EFFECT OF TRANSFORMATION

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The transformation from a communist into a capitalist system in East European countries had an influence on their population in many aspects. Among them were dietary habits, consumer preferences and food security. Since early twenty-first century, when several countries joined theEuropean Union, this influence started to increase. Several facts should be mentioned in connection with food nutritional value – the development of new food formulations, application of new technology in food industry, changes in agricultural (animal and plant) production, the introduction of new food packaging for extending the shelf life and increase in food imports, which had not been before. Changes occurred in dietary habits, structure of fat consumption in favour of poultry meat. However, several negative effects can be also observed, such as increased consumption of sugar, sweets, fat and salt, irregular meals, food intake higher that the energy demand. These phenomena are reflected in the increase of the incidence of civilization diseases.

Key words: Politic, food security, civilization diseases

DIET AND HEALTH IN THE MIDDLE OF EUROPE

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Eating habits in the middle of Europe are influenced by the local production of food. However, with the common European market, these local eating practices were more and more influenced by ideas of a healthy diet originating either from the South or recently from the North of Europe. The most prominent example is the Mediterranean diet index mainly characterized by olive oil, fish, raw vegetables, fruits and less meat and dairy products. Recently, a Nordic healthy diet index was proposed consisting of fish, cabbage, rye bread, oatmeal, apples, pears and root vegetables. Both types of indices have shown to be associated with reduced mortality and chronic disease risk in their regions, but also other populations.

The future diet in the middle of Europe have the change to combine the advantages of both types of indices since most components of the two indices also belong traditionally to the diet in middle Europe or have found acceptance during the last decades. Very interesting is the combination of the fiber component from the Northern diet with the vegetable component from the Southern diet. In the middle of Europe, the intake of fiber rich bread as well as the intake of raw vegetables is a widespread dietary practice, however, with some modification compared to the original indices. Compared to the North, fiber rich wheat products instead of rye products are often been eaten. Compared to the South, not only fruiting and leafy vegetables such as tomatoes and lettuce are eaten, but also root vegetables such as carrots. Despite these differences, inverse risk relation could be observed for particularly these two dietary components in cohort study analyses from Middle Europe.

In conclusion, the diet of the middle of Europe has the change to select the best preventive dietary components, identified either in Northern or Southern Europe, and to combine them in the daily dietary practice, since their consumption is already been introduced in principle for a long time.

Key words: Diet, European Union, Mediterranean diet

IS THE MEDITERRANEAN DIET THE BEST ONE IN EUROPE?

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Since the first data from the seven countries study, numerous surveys showed that adherence to a Mediterranean diet (MD) can significantly decrease the risk of mortality from cardiovascular diseases and cancer, as well as the incidence of age associated cognitive decline.

The MD was identified as the traditional dietary pattern from Crete, Greece and southern Italy in the early 1960s, characterized by high consumption of whole grains, legumes, nuts, fruits, vegetables and olive oil and moderate consumption of fish. For decades, researchers have been intrigued by the health benefits of its numerous components, but also by the role of the overall dietary pattern. The rationale is that food items and nutrients may have synergistic or antagonistic effects. Furthermore, the combination of healthy food choice with healthy weight, physical activity, a well ordered life, and a proper dose of sunlight may increase the beneficial effects.

There are other diets associated with a reduced risk of chronic diseases, such as the traditional Okinawan diet and the modern DASH diet (Dietary Approaches to Stop Hypertension), as well as dietary patterns identified by a statistical approach (e.g. factor or cluster analysis), such as the Prudent pattern.

In Europe, considerable differences in food habits exist among different countries, even if a sort of south-north gradient is present from Mediterranean to Western dietary patterns. However, southern countries are moving away from the Mediterranean model, as revealed also by a survey conducted in southern Italy (the Moli-sani project). On the other side, an interesting experience comes from the North Karelia Project, launched in Finland in the 1970s to help reducing the high coronary mortality. The results confirm how the Mediterranean "lesson" may be helpful in improving lifestyle and promoting health.

Key words: Mediterranean diet, dietary pattern, lifestyle

DOES LOCAL DIET LEAD TO MORE SUSTAINABLE DIET?

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Background and objectives: Growing interest for locally produced healthy foods is linked to actions needed because of climate change. Striving to avoid transporting food long distances is an example of such actions. The vision to go back from the all-a-like global food production to varying cultural foods supports this interest. More knowledge about food, nutrition and health has also led to increased interest in locally produced food. The objective of this paper is to explore whether a local diet leads to a more sustainable diet.

Methods: Sustainable diet can be defined as

-a diet that can be the diet of a population continued over a long time without damage to the environment i.e. based on sustainable use of resouces and without harmful pollution,

-a diet that promotes health of the population at all ages and conditions and takes the impact of diet in early life on health later into consideration, -a diet that preserves biodiversity.

Results from several studies on local foods for vulnerable groups (infants, children, adults with metabolic syndrome) will be discussed and evidence for recommending local diet as more sustainable diet.

Results: Investigations show a need for better adherence to the old Nordic recommendation on vitamin D intake. A minority of 7 year-old children (22.4%) were following the vitamin-D intake recommendations during autumn in Iceland. About 65% of the children had sub-optimal vitamin-D blood levels. In the SYSDIET randomized contolled study the dietary quality of a Nordic population with metabolic syndrome was found unsatisfactory. A change to a Healthy Diet including local foods (e.g. rye bread, barley, fish, vegetables, fruit and berries, rape seed oil) improved the nutritional quality of the intake significantly.

Conclusions: Studies on local diets in the Nordic countries indicate they are more sustainable and promote health in several vulnerable groups in the population.

Key words: Local dietes, Nordic diet, sustainability, Vitamin D.

PS1-7 B Professionalism and Capacity Building in Nutrition – a UK perspective

PROFESSIONALISM AND CAPACITY BUILDING IN NUTRITION – A UK PERSPECTIVE

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Professor Jackson and Leonie Milliner will update the conference on developments in the UK to regulate the practice of nutrition to build capacity and develop workforce competence in evidence-based nutrition. The lecture will outline the role of the Association for Nutrition (AfN), the Voluntary Regulator for Registered Nutritionists in the United Kingdom, and I the Association's work to restructure the register, define competency standards for entry to the nutrition profession, and develop a modern, responsive and internationally-focused course accreditation for higher-education providers. They will outline AfN's work, funded by the UK's Department of Health's Third Sector Investment Programme, and building on AfN's role as the Voluntary Regulator, to set standards, recognise and quality assure the skill and competence of the wider workforce across health and social care. AfN's view is that it is vital everyone who uses or provides nutrition information and advice has the skill, confidence and capacity to do so safely and effectively, supported by sound, evidence-based scientific practice. The lecture will give an overview of UK regulatory developments and provide an update on our work to develop AfN Certification to assess, maintain and enhance the nutrition competence of those who give nutrition advice to the public, including online assessment of nutrition skills leading to AfN Certificate of Nutrition Competence, and Course Certification, which recognises evidence-based and effective nutrition training. Finally, we will provide an overview of AfN's strategic objectives for the next five years; to provide leadership to the international community and share our skills and knowledge in capacity building in the workforce, at both the professional and lower levels, to the benefit of all.

The lecture will be of interest to those involved in capacity building and skill development, in the governance of professional, regulatory or statutory bodies in nutrition, to course leaders in higher and further education, to employers and commissioners of training programmes.

You can find out about AfN's work to support the wider workforce for the protection of the public, on www.associationfornutrition.org.

Key words: Capacity building, nutrition education, leaderships, training.

PS2-15Linking food security and nutrition education to improve infant and young child feeding

AGRICULTURE-NUTRITION LINKAGES: POTENTIALS AND LIMITATIONS FOR IMPROVING YOUNG CHILDREN´S DIETS THROUGH LOCAL FOODS

E. Muehlhoff

Food and Agriculture Organization of the United Nations

Growing attention is being given to the pathways through which agriculture and food systems can play a stronger role in improving nutrition. Aiming toward more nutrition-sensitive agriculture means recognizing the value of diversified food production systems, particularly for smallholders and adding nutritional value to production systems by translating increased income and food availability into more nutritious family diets. Nutrition sensitive agriculture also means recognizing the importance of adequate food and a nutritionally sound diet for women and young children, particularly during the 1000 day period between conception and the first two years of life. FAO has been promoting improved complementary feeding for children 6-23 months by empowering rural families to enrich young childrens´ diets using local foods. A multi-sectoral approach is encouraged to foster linkages between different sectors having an influence on food security, such as agriculture, fisheries, health, rural development and womens´ affairs. The approach supports a community based process which combines food security and nutrition education activities. Tools such as the Seasonal Food Availability Calendar and Gender

Based activity calendars are used to identify local food resources available throughout the year to better understand problems of food insecurity and malnutrition. Community based nutrition education and hygiene and cooking demonstrations are undertaken with families with young children in order to facilitate adoption of improved feeding and hygiene practices. Preliminary evidence from projects in Afghanistan, Cambodia, Laos, Malawi and Zambia has demonstrated: 1) families´ interest in using locally available foods by seasons to improve the nutritional content of young childrens´ diets 2) the relevance of introducing such skills and 3) the practical feasibility of using improved recipes in the family setting. The potentials and limitations of this approach are discussed and insights and lessons are offered on upscaling complementary feeding interventions.

Key words: Complementary feeding, food-based approach, nutrition-sensitive agriculture.

EXPERIENCE AND LESSONS FROM TRIALS OF IMPROVED PRACTICES: CONSULTATIVE RESEARCH WITH CAREGIVERS

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Food-based approaches to improve nutrition during the first two years of life are one of the essential strategies to prevent stunting and to contribute to people's health and well-being throughout life. FAO has used Trials of Improved Practices (TIPs) in Afghanistan, Cambodia, East Timor, Laos, Malawi and Zambia to design nutrition education programmes to improve infant and young child feeding in the context of food security projects. TIPs is a consultative process to test improved infant feeding and nutrition practices using locally available resources. During TIPs current infant and young child (children 6-23 months) feeding practices are assessed, improvements are negotiated with the family and subsequently tested in a real environment while information is gathered on their acceptability. In all countries, participants lived in rural agricultural economies with poor market integration, where seasonal variations in food availability are pronounced. TIPs teams were multisectoral and comprised of extension staff from the Ministries of Health, Agriculture, Education, Women's Affairs and Department of Community Development, depending on the country. The TIPs field work consisted of four home visits: during the first visit the family food security (FS) situation, feeding behaviours and dietary intake were evaluated. Subsequent home visits assessed families' ability to engage in selected improved feeding and hygiene practices, such as preparing thicker complementary foods, and/or increasing the quantity and diversity of food , increasing feeding frequency, practicing active feeding and hand washing. Recipe testing was carried out at community level, during participatory group cooking demonstrations. General lessons and experiences will drawn from the implementation of TIPs in diverse countries. Recent research findings from TIPs in Malawi (2011/2012) will be presented in detail and implications reviewed for the design and scaling up of recommendations.

Key words: Infant and young child feeding, complementary feeding, trials of improved practices (TIPs), developing countries.

SCALING UP FOOD SECURITY AND NUTRITION EDUCATION: OPPORTUNITIES AND CONSTRAINTS

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Food and Agriculture Organization of the United Nations

There is a global call for scaling-up integrated, community-based nutrition programmes that link agriculture, health, water and sanitation, social protection and other sectors in order to secure lasting nutritional improvements. Many current initiatives such as Scaling up Nutrition (SUN), REACH (Renewed Effort Against Child Hunger and Undernutrition) and the Zero Hunger Challenge are advocating an intensified and wide-spread effort to eliminate child hunger and undernutrition. Similarly there is an increasing dialogue taking place on how to make agriculture and food systems more nutrition sensitive. This presentation will describe FAO projects in Malawi and Cambodia which combine food security activities oriented toward increasing the production and availability of nutrient dense foods with nutrition education and behavior change interventions to improve complementary feeding practices. The projects use a community based approach aimed at improving the local production of nutrient dense crops such as small animal source foods, dark green leafy vegetables, nuts and beans and fruit. These food security interventions are combined with community-based nutrition education, provided by community nutrition facilitators who are supported by agriculture, health and women's affairs extension services. Despite the increase in advocacy and attention to the importance of nutrition, efforts to scale-up activities are often challenging. The presentation will highlight the challenges and opportunities for scaling up this type of program.

Key words: Complementary feeding, food security, Cambodia, Malawi.

CHALLENGES IN APPLIED NUTRITION RESEARCH

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According to Rossi and Whyte, important differences between basic and applied research are the research's motivation, the methods, financial sources, and the research arena. While basic research addresses questions focussed on details of processes and products, applied nutrition research orientates itself towards questions of immediate practical relevance for solving problems outside the laboratory. In the latter quantitative methods of epidemiology as well as qualitative methods (e.g. focus group discussions, mappings a.o.) are used. In the 1980's, Brownlee pointed out that - if applied research is to serve as a tool for solving delivery problems in developing countries - researchers and managers must work more closely together. A challenge might occur that primarily research is directed towards issues and problems of marginal interest to programme managers and the prime interests of the project managers do not coincide with the research questions. Still, applied research, its questions and methods are to be negotiated between researchers and implementers throughout the project. The risk of interfering with the project implementation through research on this process will be discussed. Today, systematic reviews and meta-analysis are considered as most promising in identifying the best problem solution for development. However, in a systematic review Masset and colleagues concluded after looking at the effectiveness of agricultural interventions aiming on improvements of the nutritional status of children in developing countries that most studies are statistically under powered to demonstrate any effects. The complexity of the pathway to a good nutritional status is long. Many causal and underlying factors impact on the outcome. A research approach acknowledging the disparity of humans and their livelihoods results in bigger sample sizes. Thus, applied research is often very costly and time consuming. Programmers and policy makers need to take this into account when asking for evidence.

Key words: Communication, nutrition research, impact assessment.

PS2-23A China's nutrition transition: Implications of rapid social and economic change for non-communicable disease risk

CHINA IN THE 1950-1982 PERIOD: A PERIOD OF SCARCITY, A VERY TRADITIONAL LIFESTYLE, AND EXTENSIVE UNDERNUTRITION

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Historically many have spoken of the Chinese diet as one of the great healthy diets of the world. However, little is understood about the actual diet Chinese consumed prior to the 1980¡¯s and the rapid transformation of its economy. After 110 years of poverty, civil wars, and the battle against the Japanese invasion, China in 1949 was like a wasteland: famine was common in many regions, mortality was high and life expectancy was low. The 1950-82 period represented a complex set of changes which ultimately created the basis for a revolution in food production. Initially food production and food supplies were inadequate and food rationing was utilized. Initial high levels of cereal consumption increased from 542 grams/day (80% coarse grains) in 1952 to 618 grams/day (predominantly refined rice and wheat) in 1982. Animal source food consumption was very low and slightly increased from 30 to 56 grams/day. Energy from fat increased slightly from 11% to 14% of energy over this 30-year period. Away from home eating was rare. Sugar-sweetened beverages were introduced by Coca-Cola importation in 1979. On the other hand, over 80% of the Chinese population had heavy work-related physical activities. Transportation shifted slowly from walking toward biking with limited public transportation. Few private cars and minimal television existed during this period. Consequently, malnutrition was prevalent, while overweight and obesity was rare. Till 1982, 17% of preschoolers, 20% of children and teens, and 13% of adults were underweight. Minimal overweight and obesity existed with the very highest estimates being a total of 6% of adults having BMI ≥ 25 kg/m2. Large cultural, economic and communication differences existed between urban areas and rural areas. Overall, the stage of famine was replaced by one of receding famine during this period.

Key words: Malnutrition, food insecurity, overweight, poverty, physical activity, China.

THE EVOLUTION OF THE CHINESE DIET: 1991-2011

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China has undergone in the past two decades a major transition not only in the types of foods consumed but in basic cooking and eating behaviors. The classic high complex carbohydrate and vegetable diet with minimal animal source food and fats is gone and is increasingly being replaced by an unhealthy western type of diet but using traditional recipes. On the one hand, the basic transition has entailed a shift away from rice, wheat and coarse cereal toward more fats and proteins. This has included large increases in vegetable oil intake and animal source foods. The major animal source foods have shifted from pork to include poultry, and egg products. On the other hand cooking and eating styles have changed remarkably. The proportion of calories that come from deep fried foods has increased markedly to the point where the majority of Chinese consume over 30% of their calories from deep fried foods, and more than 60% of Chinese population consumes a diet with over 30% of energy from fat. At the same time away-from-home eating has increased greatly as has snacking. Prior to the last decade essentially there was no snacking in China except for consumption of hot water or green tea. This has shifted and continues to represent a major growth factor. The proportion of calories and fat consumed away from home also has markedly increased. The latest trend is a rapid increase in sales of sugary beverages of all sorts. The younger cohort of Chinese, those who have grown up during this economic boom period, have shifted more markedly toward eating western foods as well as their traditional cuisine. Overall vegetable intake is down considerably and most dimensions of dietary change are moving far outside the classical diet and Chinese dietary guidelines.

Key words: Biomarkers, aging, nutrition, chronic diseases

THE PHYSICAL ACTIVITY TRANSITION IN CHINA: 1991- 2011

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Econometric and epidemiological analyses have linked each dimension of activity at work, home production, transportation and inactivity with weight change. We estimate the Metabolic Equivalent of Task (MET) hours expended per week for each individual in the domains of work, home production, travel/transit and active leisure, as well as sedentary leisure hours per week. We present the observed measures among adult (19-65y) men and women, and adolescent boys and girls (12-18y) and children (6-11y) and explore the determinants of these trends.

Major shifts have occurred among adults while children have remained relatively inactive the entire period. The greatest PA declines for both adult men and women have been at work, where the majority of physical activity is reported for most individuals. Women have also reduced their home production activities (cooking, laundry, cleaning, childcare) significantly. Urbanization, shifts from agriculture-based work to manufacturing and the service sector, and improved access to energy-saving technologies at work and at home help explain these trends. In addition, we found at in the early 1990s, adult Chinese women had higher energy expenditure at work compared to men due to greater involvement by men in businesses and factory-work, while women were more involved in farming until around 2000. We also see a large gender difference in home production time and METS. Adult, travel PA has also fallen with increase vehicle ownership and improved transportation infrastructures. Active leisure PA has started to rise gradually in the last decade but remains low. Meanwhile, sedentary leisure time rose significantly from an average of 15hrs/week to 22hrs/wk between 1991 and 2011. Similar analyses on children and adolescents will be presented; however, the PA variations are small due to minimal home production, extensive studying, television and sedentary time).

Key words: Physical Activity, movement, adults, children, China.

OBESITY DYNAMICS IN CHINESE CHILDREN AND ADULTS

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China presents a unique model for weight change as the country has experienced transition from a history of undernutrition followed by the most rapid worldwide increase in obesity. The China Health and Nutrition Survey (CHNS) longitudinally documents these changes using measured height and weight across 53,298 observations from 18,059 participants collected over a 19-year period from 1991 to 2009. The prevalence of overweight (BMI ≥ 25 kg/m2) in CHNS adults nearly tripled from 1991 (11.7%) to 2009 (29.2%), with age-related increases in BMI, a secular trend towards increasing BMI (stronger in males), and cohort effects underlying these dynamics. In youth during this same period, quanitle regression reveals changes across the entire BMI distribution. The increase in the population-specific mean BMI was biggest between 1991 and 2000 and between 2006 and 2009 and was comparatively larger in 10 year olds than 13 year olds. By 2009, approximately 12% of children and adolescents were overweight, with 3% of 7-11 year olds and 1% of 12-17 year olds were obese (IOTF BMI 25 & 30 kg/m2 equivalents). Using latent class trajectory modeling, we see substantial variation in patterns of weight gain that are masked in homogeneous classifications, with age and baseline BMI predicting patterns of weight gain. Although urbanization and income in rural and urban areas is highly predictive of increasing BMI in early years of the CHNS, in the last decade trends are more similar across all urbanicity and income levels. Yet among women in later years of CHNS, the greatest burden of overweight is in the lower educated women (the reverse is true for males ¨C overweight was higher in higher educated men). Our findings highlight the importance of preventive measures early in the lifecycle to reduce weight gain.

Key words: Overweight, cohort effects, urbanization, China, weight trajectories.

THE EMERGENCE OF CARDIOMETABOLIC DISEASE RISK IN CHINESE CHILDREN AND ADULTS: CONSEQUENCES OF CHANGING PATTERNS OF DIET, PHYSICAL ACTIVITY, AND OBESITY

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Concomitant with rapid social and economic changes, much of China's population has experienced major dietary changes and reductions in occupational physical activity, leading to an increased prevalence of obesity across all age groups. The China Health and Nutrition Survey (CHNS), an ongoing longitudinal, household-based survey of urban and rural residents of 9 provinces documents these changes, and measures the emergence of cardiometabolic (CM) disease risk. The 2009 survey measured blood pressure and collected fasting blood on >9000 individuals, ages 7-98 years and analyzed glucose; HbA1c; triglycerides (TG); total, HDL and LDL cholesterol; and CRP. We estimated prevalence of prediabetes/diabetes, dyslipidemia, inflammation, and hypertension using standard international definitions. The prevalence of CM risk factors increased with age and degree of urbanicity of residence. In 7-17 year old youth, 42% had at least one of these CM risk factors: nearly 10% had elevated TG and 9.4% had low HDL. In young adults (18-40 years), 70% of men and 60% of women had at least one risk factor, with 25% having high TG or low HDL. In young adults, for whom prevention is particularly important, abdominal obesity (waist circumference >90 cm in males, >80 cm in females) was already highly prevalent and strongly associated with all CM risk factors [e.g., odds ratios ranging from 1.5 (1.3-2.8) for high LDL to 3.2 (2.5-4.1) for hypertension]. Impaired HbA1c or diabetes (HbA1c>5.7%) occurred in nearly 9.5% of youth and 13.7% of young adults. Using reduced rank regression, a dietary pattern characterized by higher intake of wheat products and lower intake of legumes, poultry, eggs and fish was associated with HbA1c. The high levels of CM risk in youth and young adults foreshadow high morbidity and mortality from CVD unless major efforts are made to reduce obesity.

Key words: Diabetes, cardiometabolic risk, China, adolescents, adults.

SYNTHESIS AND IMPLICATIONS: CHINA'S NUTRITION TRANSITION IN CONTEXT OF THE CHANGES ACROSS ASIA, AFRICA, LATIN AMERICA, AND THE MIDDLE EAST

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The China Health and Nutrition Survey (CHNS) is important not only for its insights into current and future shifts in China but also for understanding underlying processes common across all Low and Middle Income Countries (LMIC) China has seen is a most rapid shift in urbanization of both urban and rural areas, major shifts in technology affecting all activity, vast shifts in dietary and activity patterns with resultant shifts first in obesity among adults and now the entire population. The resultant cardiometabolic burden is seen across the entire lifecycle, beginning in school age children. Current rapid shifts in the food system in China foretell even more rapid increases in cardiometabolic problems related to annual doubling of food sales from convenience stores and supermarkets, and large shifts in away-from-home eating with no increases in activity. Mass marketing, snacking and increased sugary beverage and processed foods will lead to new dynamics. Concurrently, the CHNS is unique as the only major longitudinal study of changes over the past two decades across LMIC in diet, activity, body composition, and cardiometabolic change in all household members across a wide geographic area in the low and middle income countries. The CHNS allowed us to study shifts in urbanization, global changes, economic and social changes in a manner not allowed in other countries. But then using cruder data we found comparable global shifts and have been able to utilize the CHNS to uncover many critical dynamics of food systems, urbanization, and technology of work, home production, movement and leisure that are affecting the LMIC in general. While it would be ideal to have similar nutrition-related and underlying socioeconomic and contextual data from across the globe, the CHNS has allowed many hypotheses to be generated and tested globally.

Key words: Nutrition transition, overweight, diet, activity, globalization, urbanizatio.

PS2-23B A global partnership to improve nutrition medicine in Vietnam

A GLOBAL PARTNERSHIP TO IMPROVE NUTRITION MEDICINE IN VIETNAM

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Many countries in transition are experiencing the "double burden" of nutritional disease. While significant advances continue to be made in medicine, 30 to 50% of hospitalized patients remain at increased nutrition risk worldwide, which impact inpatients morbidity and mortality.

Community-based nutrition programs have primarily been the focus of public health and development projects in Vietnam but increasing attention is given to hospital-based nutrition. This novel project stems from a collaboration between academia, government, and foundation. This project uses a three-pronged approach based on a partnership of US academia with the Vietnamese government, hospitals, and academia. Vietnamese and US partners have expertise in global health, hospital nutrition, education, and research. The ultimate goal of the project is to improve nutrition care, and thus patients' nutritional status and hospital outcomes, by addressing policies, training and education, as well as research using a multidisciplinary and integrative approach.

Educational Aims: -Describe nutrition health characteristics in the hospital settings of Vietnam -Identify steps required to form a partnership between academia, government and foundation to address nutrition medicine in a country in transition -Identify interventions that may improve process and thus inpatients nutrition status and thus morbidity/mortality in the Vietnamese hospital setting -Compare and contrast models of education in nutrition medicine

Key words: Education, malnutrition, research, training, Vietnam.

HYPOVITAMINOSIS D AND MILD HYPOCALCAEMIA ARE HIGHLY PREVALENT AMONG YOUNG VIETNAMESE CHILDREN AND WOMEN AND RELATED TO LOW DIETARY INTAKE

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Background and objectives: In many developing countries including Vietnam, data are lacking on vitamin D and calcium deficiencies whereas those deficiencies can play an important role in the development of bone health and possibly non-communicable diseases.

Methods: A cross-sectional study conducted among 595 women of reproductive age and 532 children <5 years from 19 provinces of Vietnam to determine the overall prevalence of vitamin D and calcium deficiencies in women and young children. For each individual, data concerning daily diet, socioeconomic group, anthropometric status were obtained, and plasma concentrations of calcium and vitamin D were measured.

Results: The prevalence of hypovitaminosis D status was very high, with the prevalence of vitamin D deficiency (25(OH) D< 30 nmol/L) and insufficiency (25(OH)D between 30–49.9 nmol/L) being 17% and 40% in women and 21% and 37% in children, respectively. Using more liberal cut-off of 75 nmol/L, approximately 90% of the women and children were classified as having hypovitaminosis D. Overweight/obese women had a 2 times lower risk (OR=0.46, [0.24-0.90]) for vitamin D deficiency than non-overweight and non-obese women. No participant had severe calcium deficiency but moderate and mild hypocalcaemia (plasma calcium concentrations between 1.15-0.9 mmol/L for mild deficiency and between 0.9-0.8 mmol/L for moderate deficiency) affected respectively 14% and 83% of the women with 97% of the children having mild hypocalcaemia. Women and children consumed about 1% of the Institute of Medicine (IOM) recommended nutrient intake (RNI) for vitamin D and less than 43% of the RNI for calcium.

Conclusion: Our study suggests that calcium and vitamin D deficiencies represent a major public health concern in Vietnam. Thus, actions to improve the vitamin D and calcium status of the Vietnamese population should be considered.

Key words: Calcium, Vitamin D, daily intake, fortification, Vietnam.

PS3-31A Building research capacity in Latin America to address NCDs and obesity

THE CHALLENGE OF BUILDING NUTRITION RESEARCH CAPACITY IN IBERO-AMERICA: THE FINUT EXPERIENCE

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The Iberoamerican Nutrition Foundation (FINUT) is a non-profit organisation created in 2011 aiming to promote knowledge, research, development and innovation in the area of Nutrition and Food through international cooperation in the setting of Iberoamerica. The Board of Trustees is comprised by one IUNS, one SLAN and two SEN representatives leaded by a President. The FINUT is undertaking the following activities: a) Providing technical advice for and contributing to the implementation of comprehensive nutrition and food strategies at national or regional level in Iberoamerican countries. b) Providing incentives for communication and collaboration among Iberoamerican scientists in the fields of Nutrition, Food and other similar areas, in both the public and private sectors, and disseminating related information. c) Providing education and training to young Iberoamerican scientists in Nutrition

and Food. d) Developing leadership programmes in Nutrition and Food for young scientists in Iberoamerica. e) Organising conferences, symposia, workshops and expert groups, as well as promoting as many publications as are deemed of interest in the area of Nutrition and Food. f) Cooperating with public and private entities in carrying out activities and in disseminating knowledge. During the last two years the FINUT has developed a formation program for young scientists based on high quality workshops on food and nutrition hot topics. Two of them have been published as BJN supplements in 2012 and 21013- In addition, he has signed an agreement with the FAO to translate into Spanish and disseminate FAO/WHO Food and Nutrition reports. Moreover, the FINUT has organized a big exhibition on Healthy Food, Nutrition and Lifestyles in a Sustainable Environment that will last one year in Spain and later for the next four years in four cities of Latin America.

Key words: Capacity building, nutrition, food, research, formation.

BUILDING RESEARCH CAPACITY IN NUTRITION IN THE MIDDLE EAST AND NORTH AFRICA: THE CHALLENGE FOR MENANA

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The Middle East and North Africa Nutrition Association (MENANA) is established as a regional association of professional nutrition societies in countries of the Middle East and North Africa. The Association enjoys affiliation status with the International Union of Nutritional Sciences (IUNS). The overall objective of the Association is to promote the advancement of nutrition sciences and the interest of professional nutritionists in the Middle East and North Africa. Specific objectives of the Association are to encourage and promote closer contact and interaction between nutritional societies and nutritional centers within the region; support holding of conferences and workshops that will allow nutritionists to exchange experiences among peers and with professionals from other continents; encourage and support training programs and educational courses that will build the capacity and improve the quality of nutritional research, teaching and service delivery, in the Middle East and North Africa; encourage communication and collaboration among nutrition scientists in the region, and promote dissemination of information in nutritional sciences through modern information and communication technology (ICT). Other activities are commensurate with promoting nutrition among scientists in the Middle East and North Africa and explaining the role of nutritionists to society in general. The major goal of this session is to have an opportunity to enlighten international professionals about MENANA and create platform for joined research with similar associations to build the research capacity in nutrition in the Middle East and North Africa.

Key words: MENANA,research capacit,nutrition, Middle East, North Africa.

PS3-31B Traditional, Indigenous and cultural food and nutrition

TRADITIONAL MEDITERRANEAN DIET WITH NORTH AFRICAN PERSPECTIVE

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Mediterranean Diet (MD) is a dietary pattern of people living in the countries bordering the Mediterranean Sea. The traditional MD is characterized by abundant consumption of fruits, vegetables, and high vegetable fat content and olive oil. Because MD is rich in biodiversity and nutritionally healthy it is reported to protect against cardiovascular risk factors. However, the demographic, nutritional and epidemiological transition that accompanies development and urbanization have also increased the prevalence of overweight and obesity in low and medium income countries including North African population in the Mediterranean basin. Obesity and overweight have been associated to many diet-related chronic diseases (diabetes, CVD, hypertension, stroke, cancer). In these countries diet is based on a large consumption of cereals (mainly wheat that is replacing traditional grains), fruit and vegetables. The consumption of animal products including fish remains very limited. Also, ready to eat food and restaurants are in continuous development leading to consumption of foods rich in sugar and fat and, to a shift from MD to westernized diet. This nutritional situation raises the problem of the sustainability of MD. On the other hand, and despite the efforts undertaken in these countries, there is a growing extension of chronic diseases (obesity, diabetes, hypertension, and metabolic syndrome) while undernourishment is still prevalent (6.8% in Morocco, 5.6% in Algeria and 1% in Tunisia). Among the causes involved are globalization, industrial agriculture and urbanization that have changed food production and consumption. There is a need to promote and protect MD as it has a beneficial role in the development of sustainable agriculture. It could be an approach to redress malnutrition in the Mediterranean region in general and in North Africa in particular.

Key words: Mediterranean diet, nutrition transition, North Africa.

RESILIENCE TO THE COMPOUNDING EFFECTS OF CLIMATE CHANGE ON THE NUTRITION TRANSITIONS EXPERIENCE BY MEMBERS OF YELLOWKNIVES DENE FIRST NATION

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Climate change has been disturbing the traditional food systems of Canada's Arctic Indigenous Peoples. Climate change, coupled with the influence of globalization, has been contributing to the nutrition transitions experienced by Indigenous Peoples.

The purpose of this study was to develop an understanding of how the members of Yellowknives Dene First Nation (YKDFN) who harvest and use Traditional Foods (TF) manage their nutrition and health in a changing climate and global environment. An ethnographic constructivist grounded theory method was used to systematically obtain and analyze data. In-depth interviews with thirteen members of YKDFN who harvest and use TF in the Northwest Territories of Canada were conducted in 2010 and 2011.

Analytic codes and categories were constructed from the data and a constant comparative method was used for analysis.

A comparative look at the resilience among members of YKDFN for whom harvesting and using TF is 'who they are' and 'how they were raised' and among those for whom it is a 'chosen lifestyle' and 'conscious effort to learn' reveals the complementary value each member contributes to securing their ancestral legacy of harvesting for future generations. Experienced hunters are sharing their knowledge and transferring their skills to novice hunters and youth interested in harvesting and using TF.

Hunters are committed to funding and supporting programs that introduce Dene youth to harvesting and using TF through formal education and community based programs. Women and young girls are also encouraged and taught how to harvest, a trend that empowers women in a rapidly changing social and cultural environment. The activities and commitment of YKDFN are positioning youth and women to utilize and become stewards of their lands and waters and serve as proactive efforts in disease prevention, health promotion and adaption to climate change.

Key words: Climate change, Arctic Indigenous Peoples, resilience.

FROM MICRO TO MACRO POLICIES: WHY MICRO-LEVEL DIFFERENCES MATTER IN THE FIGHT TO PRESERVE ACCESS TO TRADITIONAL, INDIGENOUS FOODS

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Protecting indigenous peoples' food security in a globalized world presents many challenges and has been the subject of research attention from the perspectives of multiple disciplines for a number of decades. Each discipline brings its own perspectives, methods and theories to bear on the choice of research focus, the conduct of study and the conclusions that are drawn. It also has implications for recommendations that affect the design and implementation of policy. In this presentation we: (1) examine the fundamental challenge of reconciling local culture and local conditions for sustaining food security with government policy, and (2) present a case study from Alaska to illustrate a model for reconciling and adjusting policy to local needs. We draw on anthropological theory and ethnographic studies, publically available documents and key informant interviews to obtain data for deriving descriptions and analysis to structure our report. State regulatory policy regarding management of salmon populations in Alaska carries the potential to interfere with local communities' cultural-ecological adaptations to ensure their food security. However, the development and operation of the Kuskokwim River Management Working Group is an example of a model to address this issue. It "provides a forum for [the various parties involved] to come together and discuss issues relevant to management." Thus, it illustrates a strategy to address the need to balance macro-level policy with micro-level community, cultural conditions. The potential conflict between macro-level policies and the requirements for preserving community adaptive strategies can be mediated through organizational models that create opportunities for exchange and for modifications that help to preserve local cultural patterns directed to sustaining household food security. It is important to search for, develop, and support appropriate models for addressing this fundamental dynamic.

Key words: Food security, micro-ecological conditions, wildlife policy.

BIODIVERSITY, FOOD SYSTEMS AND NUTRITIONAL STATUS OF THE INDIGENOUS PEOPLE OF NORTHEAST INDIA

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Northeast India is one of India's two mega biodiversity hotspots inhabited by various ethnic groups who make use of the diverse plants available within their environment as food. The paper presents the case of the indigenous tribes of Northeast India,their food systems,and nutritional well-being. Neglected and underutilized plant foods constitute the bedrock of diversity in traditional food systems in Northeast India. Despite the onslaught of modernization a large proportion of traditional food systems is still underutilized food resources, including insects, indicating the importance of biodiversity in family diets. The tribal communities' traditional knowledge in regulating sustainable agriculture, natural resources management and biodiversity conservation are based on rich indigenous ecological knowledge gained over generations.

The diversity of diet in Northeast India is reflected in the better nutritional status of the population in general, lower rate of stunting, wasting and underweight among children as compared to the rest of India. The prevalence of mortality rates from cardiovascular diseases is also strikingly lower here. The indigenous populations in Northeast India are still holding on to their traditional culture and lifestyle but there is a gradual shift from dietary diversity to the adoption of simplified diets indirectly resulting in the loss of food biodiversity. Key government policies such as the Public Distribution System and the Green Revolution Technologies have contributed to the changes in the food systems. Hybrid rice is slowly replacing traditional land races and micronutrient rich staples such as millets. The consequence of the changing food systems in Northeast India can pose serious public health challenges. Therefore efforts should be made to capitalize the positive effects of traditional food systems and integrate them into contemporary food systems to be able to fully support the health and nutrition of the population.

Key words: Biodiversity, India, Indigenous Peoples, nutritional status.

TRADITIONAL CULTIVATION AND USE OF MAGUEY AND CACTUS PEAR IN THE UPPER MEZQUITAL VALLEY: RELEVANCE FOR SUSTAINABLE LIVELIHOODS

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Livelihood strategies in the Upper Mezquital Valley (Mexico) have for centuries been closely intertwined with the cultivation and integral use of maguey (Agave spp.) and cactus pear (Opuntia spp.) – natural resources that not only constitute an essential component of traditional diets but are also intrinsic aspects of the cultural identity of the Ñähñú indigenous population inhabiting the region. By applying the sustainable livelihoods approach, this study explores changes in traditional maguey and cactus pear use patterns in the Ñähñú community of San Andrés and community members' perceptions about these changes.

The gradual displacement of locally manufactured items by industrial products at the beginning of the 20th century set in motion a treadmill of disturbed patterns of traditional resource use, a rapidly deteriorating natural resource base, and mass migration across the northern Mexican border. Paradoxically, this development has recently been brought to an abrupt halt through the global financial crisis that has strongly limited employment opportunities in the United States. Seemingly obsolete and therefore neglected traditional practices have served as safety nets for large numbers of migrants enabling their return to their home land. At the same time, the reduced flow of remittances has impelled the search for possibilities of adding value to the only raw materials available in the region. These trends bear both opportunities and risks; overexploitation of maguey represents a major concern among the latter. The importance of preserving traditional practices (ranging from traditional concepts of welfare, traditional diets, traditional resource use knowledge and skills, to language transmission) is discussed, as is the promotion of agro-ecological practices as management strategy for a sustainable use of maguey and cactus pear as means of securing local livelihoods. (Acknowledgment: This work was financially supported by the Foundation fiat panis.)

Key words: Agave spp, Opuntia spp, indigenou, Mexico, sustainable livelihoods.

PS3-39AENLP -Nutrition during times of economic crisis, let's cook something up!

NUTRITION DURING TIMES OF ECONOMIC CRISIS, LET'S COOK SOMETHING UP!

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The economic crisis has hit all of us, in both developing and developed countries, while we are constantly confronted with both ends of the spectrum of malnutrition which is reflected in an increasing demand on availability of nutritious foods along with the growing world population. Urbanisation in developing regions (every day 20.000 people move from the countryside to the city) drives a demand for foods as people have less access to their own resources, while the economic crisis in the Western Countries brings people back to the kitchen and home cooking is a new trend. All these facts combined with the scarce financial resources, makes us realise that we have more challenges than ever in our daily life and work (in research, in education and in development and implementation of public health policy). So the main question is: What could be our role as nutritionists to ensure nutritious foods? Leadership, working in multi-disciplinary teams and – above all creativity are more than ever required in addressing the problems that we are confronted with. The participants will contribute to this session/workshop and harvest the best ideas to make a difference with the ultimate goal that our children have still a nutritious future in 2050.

This session is a combination of an ex cathedra lecture and workshop. A devoted keynote speaker will give examples of best practices on how to handle new challenges. In the workshop the creative thinking concept will be handled. The session will mix up juniors and seniors, which is a great opportunity for growth and networking. Creativity may be directed not only to find the best solution to the problem but also to see the emerging opportunities and thus give another dimension to our current approach.

Key words: Leadership, health, food, economics

A CHALLENGE FOR PUBLIC HEALTH NUTRITION IN A TIME OF AUSTERITY

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In a time of global financial austerity where the poor are more likely to go to be hungry what can public health nutrition do? Over one billion people will go to bed hungry tonight in both North and South.In America 60 million people, mainly women, will go without a meal today, in the EU this is 44 million with a further 80 million at severe risk. As food, fuel and housing costs rise, incomes remain stagnant thus placing great pressure on households to economise and food is one way that this can be done.

In the emerging and developing economies, individuals who go hungry and are overweight are the same groups. The new outward or visible demonstration of food poverty/insecurity is likely to be overweight or obese bodies. The fact of living in poverty introduces constraints on peoples' choices. When you are worried about hunger you may chose food which is energy dense, this represents better value per calories than fruit and vegetables.

Globally there are two strange things happening, and these are presented as tensions as opposed to being opposites. In some economies poverty is increasing but inequality is decreasing -good for health. In other economies, UK, US and Australia, poverty is increasing and inequality is also increasing -bad for health. So what are the implications for nutrition of these moves and what can we do?

The following options will be explored in the session and the workshop: - Business as usual -stick to health eating messages and not get involved in these wider debates! - Ameliorate existing conditions by giving people knowledge and skills? But not change much about their social and economic circumstances? - Focus on preventing future problems and become more concerned with social determinants that influence healthy eating?

Key words: Public health nutrition, economic crisis, poverty, inequality.

NUTRITION (HOW DO WE ENSURE NUTRITIOUS FOODS?) DURING THE ECONOMIC CRISIS

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Challenges created by our current way of thinking, require our current way of thinking to be challenged. If we are to connect the dots, we need to first understand that everyone's knowledge, insights and experiences ARE the dots. This session aims to connect our unique, yet isolated ways of thinking, in order to create the critical mass in thinking power needed to confront and solve 21st century problems. What's the recipe? Based on the challenge at hand, participants will experience a new and far more productive way to formulate, share and enrich ideas into collectively supported solutions. In three steps participants will:

- learn how to reframe the challenge in order to reframe their thinking about it;
- be able to give constructive feedback on ideas, regardless of their basic opinion about its quality or perceived validity;
- be challenged to voluntarily support and commit to their peer's ideas. Each of these steps are made possible by means of precise, tangible and reproducible instructions and/or tools.

Key words: Creative thinking, economic crisis, solutions, food.

PS3-39B Capacity development in innovative techniques in food and nutrition research

DIET QUALITY, DETERMINANTS AND METHODS OF ASSESSMENT

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A high quality diet is the best source of adequate nutrient supply contributing to health and wellbeing. In turn, the current abundance of highly processed energy-dense but low-nutrient foods promotes obesity and nutrition-related diseases. Food pattern and hence, diet quality is influenced by many factors such as age, gender and cultural background. Low socioeconomic status and educational level are strong predictors of less healthy eating patterns. Health effects of human diets arise from a wide variety of components and cannot be attributed to a single nutrient or food. Assessment of overall diet quality presents a better tool that, in accordance with dietary recommendations, can be based on nutrients or food components or a combination of both. Among food groups, vegetable and fruit consumption has been used as a central marker, but other components such as fatty acid pattern, intake of wholegrain, milk products and fish are also important. Food-based approaches may be easier to apply as they do not require knowledge about food composition. In turn, nutrient-based indices require the availability of adequate food composition databases and programs for calculation of the dietary intake. The classical way focusses on adequacy scores of essential micronutrients like iron, calcium and some vitamins. Other ratings are based on special health effects of food components with unfavorable components like sugars, salt, or saturated fatty acids serving as negative indicators. Regrouping several components – food groups, nutrients as well as other aspects (e.g. quantity/portion size, processing, diversity) – in indices or scores allows a more in-depth evaluation of diet quality. Comparison with biomarkers showed the validity of some of these food quality indices. Evaluation of diet quality provides the knowledge required for effective strategies for addressing nutrition problems of the general population and specific risk groups.

Key words: Diet quality, food groups, assessment, index

GUT MICROBIOTA, TOOLS FOR ANALYZING IMMUNE FUNCTIONS

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Intestinal bacteria promote the early development of the host immune system. Over the course of evolution, lactobacilli, other lactic acid bacteria and bifidobacteria have been abundant colonisers of the human small intestinal mucosa and coexist in mutualistic relationships with the host. Some members of these groups exert additional probiotic properties that provide health benefits to the host via the regulation of immune system functions. These interactions primarily involve gut-associated dendritic cells (DCs), which have the capability to respond to microbial signals through toll-like receptors (TLR) signalling. Here we review the current experimental tools that can be used to ascertain the mechanism through which intestinal microorganisms exert an action on the immune functions. Although human clinical trials are the definitive tool for establishing microorganisms functionality, the use of in vitro models is necessary to select the most promising strains for these trials. Ideally, cell models should resemble the in vivo conditions; however, in most in vitro experimental models, epithelial and DC cells are cultivated as monolayers in which the establishment of functional epithelial features is not achieved. To overcome this problem, co-culture experiments with bacteria,

DCs and intestinal epithelial cells and 3D models attempt to reconcile the complex and dynamic interactions that exist in vivo between the intestinal epithelium and bacteria. Additional models include tissue explants, bioreactors and organoids. Accumulating evidence demonstrates that commensal bacteria and probiotics communicate with the host by pattern recognition receptors, such as TLR and NOD-like receptors, which modulate key signalling pathways, such as NF-κB and MAPK, to enhance or suppress activation and influence downstream pathways. Gaining insight into the mechanisms of intestinal microorganisms action may contribute to foster the development of novel strategies for the treatment or prevention of gastrointestinal and autoimmune diseases.

Key words: Intestinal immunity, microbiota, probiotics, dendritic cells.

METROLOGY BASED MEASUREMENTS IN FOOD AND NUTRITION SCIENCES

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Metrology deals with the science of measurements and their applications. In its pivotal role, metrology provides a framework that is designed to generate the highest level of quality in a measurement outcome irrespective of the field of application. This is established by adopting metrological criteria such as metrological traceability (tracking established pathways to credibility), measurement uncertainty (credibility level) and metrological equivalence (metrological compatibility of data obtained by different analytical methods). Traceability facilitates a robust measurement system; uncertainty demonstrates method capability, and equivalence strengthens shared responsibility in collaborative measurements. When metrological criteria are met, the data quality level reaches near absolute accuracy for physical measurements (e.g. time), exceptional accuracy for certain chemical measurements (e.g. isotopic composition), and best attainable accuracy (practical and reliable) for biological measurements (e.g. body composition). Application of metrological concepts for assessment of food, dietary and related metabolic measurements is still in its infancy. Two reasons account for the lack of progress: (i) the concept of accuracy and precision is not fully understood by the food and nutrition (F&N) investigators (often, precision is over emphasized thus ignoring accuracy), (ii) excessive reliance on the experimental data generated for F&N investigations using a single analytical method (lacking method validation). Imparting metrological basis to the measurement process by analyzing natural matrix certified reference material is a vital requirement for establishing traceability. As a whole, F&N and related metabolic assays represent 3 categories of measurements, namely physical (e.g. quantity, density and size), chemical (composition and speciation) and biological (e.g. caloric energy metabolism, bioavailability and bone density). In conclusion, F&N related measurements, although biological in nature, share some similarities with physical and chemical measurements, and therefore, can benefit from following the metrological practices prevalent in physics and chemistry areas. Several examples will be presented.

Key words: Metrology, biological metrology, traceability, uncertainty.

ISOTOPE TECHNIQUE TOOLS FOR BETTER ACCURACY OF ANALYTICAL PROCEDURES

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Physiological outcomes in research investigations are often very variable. Metrology is the science of accurate measurements, and its application to the measurement of outcomes in nutritional intervention research in humans is of importance. Stable isotopes of elements are safe, typically already present in the environment. Advances in isotopic methods have made the measurement of stable isotopic dilutions in human experiments easier. This, along with the traceability of standards that allows for multiple study comparisons, has meant that these methods offer the ability to evaluate the variability of outcomes with interventions, while working in resource poor settings. These methods allow for the establishment of a quality control system that includes the use of traceable standards and the estimation of errors with multiple measurements. Examples relate to the measurement of body composition rather than body weight at different ages, the measurement of energy expenditure, lactation, amino acid fluxes and oxidation, and the bioavailability of nutrients, particularly iron.

Key words: Stable isotopes, metrology

PS4-47 Mediterranean diet and disease

MEDITERRANEAN DIET AND METABOLIC SYNDROME; AN UPDATED SYSTEMATIC REVIEW

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This is an updated systematic review of epidemiological, observational studies and clinical trials on the relationship between adherence to the Mediterranean diet and prevalence of

the metabolic syndrome. English language publications in the available databases PubMed, Embase, Scopus, until May 31, 2013, were included in this review. New evidence from prospective cohort studies, cross-sectional studies and clinical trials supports the beneficial role of adherence to the Mediterranean dietary pattern regarding metabolic syndrome presence and progression. Moreover, adherence to the Mediterranean diet seems to confer further protection to all individual components of the syndrome. In conclusion, efforts should be made in order to encourage adoption of this pattern, especially in the Mediterranean countries.

Key words: Mediterranean diet, metabolic syndrome, systematic review.

MEDITERRANEAN DIET, HEALTH BENEFITS AND THE ROLE OF TRADITIONAL FOODS

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Background and objectives: European Commission (EC) Regulation 1924/2006 provides the legal framework for the use of nutrition and health claims on foods in the European market, on the basis of scientific evidence. Although the Mediterranean diet has long been recognized for its nutritional quality and adequacy, individual Mediterranean traditional foods are commercially under-represented. Regulation 1924/2006 could endorse nutritionally rich foods, such as Mediterranean traditional foods and, thus, increase their availability in the European households.

Methods: One hundred and ninety four Greek traditional foods were selected from the Greek food composition tables, and their nutritional composition was evaluated on the basis of the thresholds for nutrition claims set by the EC. The following nutritional values, high or low as desired, were taken into account: energy, protein, total fat and fatty acids, sugars (mono + disaccharides), salt (sodium), dietary fibre, vitamins (B6, C, A, E, riboflavin, thiamin and â-carotene) and minerals (P, Mg, Fe, Zn, Ca, Cu and K).

Results: On the basis of the compositional data used, 1024 nutrition claims could apply to the 194 foods studied, with an average of about 5 nutrition claims per food. of those nutrition claims, 529 were related to vitamins and minerals.

Conclusions: The European regulation on nutrition claims on foods could highlight basic characteristics of the Greek traditional Mediterranean diet i.e. the ample use of olive oil and nutrient dense plant foods such as vegetables. The application of this legislation may benefit small business operators involved in the production or promotion of traditional foods. It could also promote the health of European citizens by underlining the nutritional quality of these traditional foods and eventually increase their share in the common market.

Key words: Traditional foods, nutrition claims, Mediterranean Diet.

PS4-55 PREDIMED study

THE PREDIMED STUDY: RATIONALE, DESIGN, METHODS AND INTERVENTIONS

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A recent meta-analysis of prospective studies showed that adherence to the Mediterranean diet (MeDiet) was associated with reductions in total mortality and coronary cardiovascular disease (CVD) mortality, as well as cancer mortality and incidence of neurodegenerative diseases. However, randomized clinical trials of the MeDiet with hard endpoints were lacking. We hypothesized that two traditional MeDiets, one enriched with extra-virgin olive oil (EVOO) and another enriched with nuts, both high in total fat and unsaturated fat, would be superior to the usually recommended low-fat diet for the primary prevention of CVD in a high-risk population. To test this hypothesis we designed the PREDIMED study as the first randomized trial assessing the efficacy of the MeDiet on the primary prevention of CVD. The primary aim of the trial was to assess the effects of the two MeDiets on a composite endpoint of cardiovascular death, myocardial infarction and stroke (primary endpoint) in comparison with a low-fat, control diet. Secondary endpoints are death of any cause and incidence of major chronic diseases. The study subjects are nearly 7500 individuals at high risk but free of CVD at enrolment. Participants were randomized to 3 dietary interventions: advice on MeDiet plus free provision of 1 L/week of EVOO; advice on the MeDiet plus free provision of mixed nuts (30 g/day); and advice to reduce all kinds of dietary fat (control diet). Throughout the duration of the study (mean 5 years), participants attended quarterly individual and group sessions run by dieticians, where they received written dietary instructions, seasonal shopping lists, menus and recipes adapted to group assignment. A 14-item screener was instrumental to assess MeDiet adherence and upgrade it at each visit in the MeDiet groups. All events were registered and definite ascertainment was done by the Clinical Events Committee whose members were blinded to the intervention.

Key words: Nutrition, mediterranean diet, cardiovascular disease, clinical trial, PREDIMED study.

INTERACTIONS BETWEEN MEDITERRANEAN DIET AND GENETIC VARIANTS, AND RISK OF DISEASE IN THE PREDIMED STUDY

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Despite the growing evidence supporting the protective role of the Mediterranean diet (MedDiet) in reducing cardiovascular diseases, diabetes or obesity, there is a lack of studies analyzing the genetic influence modulating the effects of the MedDiet in these diseases. Added to this is the fact that the majority of the studies undertaken to examine gene-diet interactions cardiovascular phenotypes such as dyslipemia, hypertension, type 2 diabetes, etc, have focused on the macronutrients of the diet, mainly on the intake of different types of fatty acids, and have not considered the overall pattern of the MedDiet. To investigate the relationship between genetics and the Mediterranean diet, both as a whole and analyzing the specific relationships of the main components in determining intermediate and final phenotypes (stroke, myocardial infarction, etc) of the most prevalent diseases. Therefore, the PREDIMED study offers an excellent opportunity to examine the interaction between the MedDiet and genetic variants in determining intermediate and disease phenotypes. We have undertaken several nutrigenetic analyses in the PREDIMED study and have analyzed the different types of interactions (biological and statistical) between the MedDiet (both at baseline and after dietary intervention) and its components and variations in key genes in lipid metabolism, inflammation, obesity, type 2 diabetes, and cardiovascular diseases (TCF7L2, MLXIPL, CETP, APOE, etc.). We have detected interesting gene-diet interactions in which a greater adherence to the MedDiet, or to some of its typical foods, is able to reverse the adverse effects that have the risk alleles in these genes on their specific phenotypes.

Key words: Mediterranean, genetics, gene-diet interactions, cardiovascular.

THE PREDIMED-PLUS TRIAL: OBJECTIVES AND IMPLEMENTATION

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The worldwide epidemic of obesity is alarmingly growing. The long-term consequences of this epidemic on vascular risk and other causes of disease and death represent a global crisis and a failure of public health.

Most observational studies have consistently shown that all-cause mortality progressively grows with increased adiposity. This higher risk is specially increased for cardiovascular mortality. However, a recent (and controversial) meta-analysis challenged this assertion (Flegal, et al. JAMA 2013). In addition, the only available long-term trial conducted among type-2 diabetics (Look AHEAD, N Engl J Med 2013) did not demonstrate that an intentional weight loss may produce a reduction in cardiovascular clinical events.

The PREDIMED-1 trial showed that a Mediterranean diet (without any caloric restriction) did reduce cardiovascular clinical events (Estruch et al, N Engl J Med 2013). The aim of our new trial (PREDIMED-PLUS) is to assess whether a calorie-restricted Mediterranean diet together with specific goals for weight loss and physical activity is able to reduce the risk of cardiovascular events beyond the results obtained in PREDIMED-1. Our hypothesis is that an intensive intervention on diet and lifestyle aimed to weight loss and based in the traditional Mediterranean dietary pattern is an effective and sustainable approach for weight los in adults with overweight/obesity and this intervention will exert a beneficial effect on cardiovascular events.

The research plan is to recruit 6,000 men (55-75 years) and women (60-75 years) with a body mass index between 27 and 40 kg/m2 and at least three criteria of the metabolic syndrome. The recruitment will take place during 2013-2015. The follow-up will average 6 years. We will randomise them in 1:1 ratio to two interventions: a) control: a Mediterranean diet without any caloric restriction or special program to foster physical activity (as we did in the PREDIMED-1 trial); b) intensive intervention: a Mediterranean diet with goals for weight loss (at least 8% of initial weight), caloric restriction (30%), physical activity (walking 45 min/d or equivalent), and behavioural therapy. For the intensive intervention group, 3 contacts/month will be scheduled during the first year and 2 contacts/month during the rest of follow-up. The primary end-point will be a composite of myocardial infarction stroke or cardiovascular death.

PS5-63A Regulaion Versus Innovation (IUFOST)

REGULATION AND INNOVATION IN FUNCTIONAL FOODS

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As consumers around the world are getting more informed and interested in promoting their own health and well-being, the functional food market continues to grow. Food companies are constantly searching for innovations in order to keep their niches in this dynamic, demanding and highly competitive

market. Developed countries are offering an array of bioactive ingredients (e.g., fiber, omega-3 fatty acids, isolated soy and milk proteins, probiotic, tomato concentrate, tea extracts, fruit extracts), bioactive-enriched foods (e.g., fiber enriched foods, dairy products with probiotic), as well as naturally functional foods (e.g. flax, nuts, cranberry, whole grains). Innovation, development and marketing of functional products in developing countries are limited by the prohibitive cost and needed resources for clinical trials to establish safety and substantiate health claims. Developing countries are focusing more on optimization of naturally functional traditional foods (e.g., quinoa, amaranth seeds, yerba mate) and processing native, often unexploited, plant species with high levels of bioactive components (e.g., tropical fruits). Regulating functional foods is a complicated issue as it goes beyond assuring safety; demonstration of efficacy in terms of the claimed health benefits is as critical. While it is undoubtedly important to guarantee that functional foods and beverages are safe and health claims are evidence-based, there is call for caution that regulation should not be unnecessarily restrictive so as to prevent sound innovations from getting into the market. The need for international standards and regulations is recognized, but global harmonization efforts have been beset with many complicating factors and have not been successful, although some regional harmonization has been achieved.

Key words: Functional foods, bioactive ingredients, safety, health claims, regulation.

FOOD REGULATION AND PROCESSING INNOVATION IN VIETNAM

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As the proverb say, Vietnam is a tropical country with three magic elements for the success: Heavenly opportunities, Favorable land, and Human consensus. These conditions lead to an abundant and diversified agriculture production. Many products of VietNam have been appreciated around the world such as rice, tea, coffe, cashew nut, exotic fruits, and aquatic products… On the other hand, recent advances in food sciences and technology allow food industry to diversify their products and to toward their production to a high value products. The appearance of many new Vietnamese food products in the market showed that there is an innovation in food production. Beside that, the consumers are increasingly interested in the health benefits of foods and have begun to look the potential disease prevention and health enhancing of foods. Regulating the industry is important to maintain the high standard of food safety and quality that the consummers expect, while allowing the industry to innovate and market new products, espesciallly in the context of integration with ASEAN and EU markets. Today, the foodstuff quality and safety must be ensured along the supply chain "from farm to fork". Thereby, the regulations must keep pace with the advances in technology and controle the innovation in food processing to ensure the relationship between quality of foodstuffs and concerned claims. Generally, the quality and health benefits of foodstuffs are often communicated to consumers through the product packaging, websites or advertising. Such quality and health-related statements or claims are made according to the applicable regulations and guidelines. In many cases, incorrect claims related to quality and health benefits are published by industry to promote their products. Therefore, the regulations need to clarify the quality criteria and functional component in foods and controle the exaggerated health claims made by manufacturers.

Key words: Food products, food regulation, processing innovation.

ADVANCING NOVEL PRESERVATION TECHNOLOGIES DEMANDS HARMONIZING INTERNATIONAL FOOD SAFETY LEGISLATION AND REGULATIONS

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Primary among the roles and responsibilities of most national governments are the protection and preservation of its citizen's health and the promotion of trade and commerce. Legislation, regulations and standards are frequently promulgated with that aim to both safeguard public health and advance economic growth. Food laws and regulations framed with a pretext of food safety are important for both, preserving public health and commerce. Owing to the great global disparity in food safety laws and regulations, however, often neither of these national priorities is achieved. The advancement and adoption, by government and industry, of novel preservation and processing technologies such as: High Pressure; Power Ultrasound; Atmospheric Cold Plasmas; and Pressure Assisted Thermal Sterilization are highly dependent on achieving consensus and harmonization on the scientific methods and the regulatory constructs used for validating novel food preservation techniques. Eliminating regulatory ambiguity in the approvals and validation processes will also stimulate innovation. Successfully resolving the incongruent regulatory issues, globally, will likewise assist in achieving public health and trade objectives. This presentation will provide an assessment of regulatory activities, globally, relating to the approval and uptake of novel and nonthermal preservation technologies.

Key words: Safety, regulations, technology, innovation, food.

HOW TO WORK WITH THE FOOD INDUSTRY TO IMPROVE THE NUTRITIONAL PROFILES OF PROCESSED FOODS

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At virtually every gathering of nutrition professionals, there is strong criticism of the food industry as one of the main contributors to obesity and other public health concerns. While aggressive marketing of foods with poor nutritional composition can certainly be criticised, insufficient cognizance is taken of the very real challenges faced by food companies in improving the nutritional characteristics of their products and practical factors such as technical feasibility, cost and palatability are often insufficiently understood by the nutrition profession. In particular a confrontational approach incorporating simplistic and impractical regulatory based solutions is unlikely to achieve their desired effect due largely to the behavior related nature of many of the causes of obesity. There are a number of ways in which nutritionists and dieticians can interact in a much more constructive manner with the food industry and these will be discussed. From a technical perspective, they include working with marketing and technical personnel to understand the practical constraints that exist in changing the nutritional characteristics of particular products and constructively challenging these. A further option is using nutrient profiling as a means of assessing the effect of potential compositional changes. From a commercial perspective, it is possible to incentivise companies to improve the nutritional quality of their products by linking staff remuneration and in particular performance bonus payments to the achievement of specific average compositional criteria for their product ranges. A suggested model for this process will be proposed which includes not only product composition but also the volumes of different products sold by the companies.

Key words: Food industry, nutritional profiles, processed foods.

PS5-63B Food systems for nutrition and health: Growing, shopping, cooking and eating

SUSTAINABLE AND AFFORDABLE HORTICULTURE FOR HEALTHY COMMUNITIES: AFRICAN AND ASIAN EXPERIENCES

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Healthy diets include diverse foods from the key food groups (starchy staples, legumes and nuts, animal products, fruit and vegetables) that are enjoyable to eat, fulfill daily nutrient requirements, and contain health-promoting substances such as fiber and antioxidants. Vegetables are highly diverse in terms of species and varieties as well as essential and bioactive phytonutrients. Many people consume monotonous, insufficiently nutritious diets because they lack access to or cannot afford a broader range of nutritious foods with limited awareness of healthy diet importance. AVRDC – The World Vegetable Center addresses constraints along the vegetable value chain through four research and development themes—Germplasm, Breeding, Production and Consumption—to contribute to enhanced productivity, profitability, availability of vegetables and the nutritional status of consumers in developing countries, particularly in Africa and Asia. The Center develops improved tropically-adapted vegetable cultivars with emphasis on high yield, heat tolerance, multiple disease resistance, and high quality and high nutrient content. Strong collaboration with the private seed sector ensures that AVRDC's improved breeding lines reach farmers throughout the tropics. The Center designs improved horticultural practices that conserve water and soil nutrients to improve vegetable crop production in suboptimal environmental conditions and integrated pest management practices to reduce farmer reliance on pesticides. Home garden designs promoted through partners enable rural households to access vegetables throughout the year. Postharvest research offers practical solutions to reduce losses and maintain produce quality as it passes along the supply chain. The Center is engaged in nutritional and functional analyses of vegetable crops, food method improvement, and dietary strategies to enhance local appeal and nutrient bioavailability of vegetables. Jointly with colleagues and partners in agricultural, social and health sectors, the Center develops nutrition-sensitive, community-based agricultural interventions and promotion strategies to enhance access to nutritious food and promote healthy diets.

Key words: Vegetables, diversity, nutrition-sensitive, malnutrition.

INTRODUCTION TO FOODSCAPE STUDIES – WHAT THEY CAN DO FOR PUBLIC HEALTH NUTRITION

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Since the settings approach was introduced by WHO nearly 3 decades ago much intervention research has been taken as a point of departure for the everyday life arenas where health is created and lived such as the kindergarten, school, institutions and workplaces. Since these places in many cases have also a responsibility to provide food, there is a considerable interest in understanding how such arenas most effectively can work to provide healthy nutrition- for instance, by promoting healthier eating and physical activity. A new type of study – the broad ca-

tegory of FoodScape Studies (FSS) can offer new opportunities for a deeper understanding of the socio-physical space in such arenas. The aim of this paper is to give a brief account of the origin of this new type of study and to look at some important implications for the public health nutrition agenda. The paper looks in particular at applications in public food environments – so called captive foodscapes. It introduces a typology of physical, social, mental, discursive and learning foodscapes. It concludes that the idea of foodscapes offers a suitable conceptual framework for the food, the different types of people and intermediaries and the space. Some of the important features of the notion of foodscapes are that it is able to capture the importance of place and time, contextual factors, meaning and the everyday life perspective of eating. The idea of foodscapes has important qualities to offer in terms of being able to understand the complex interactions taking place in spaces where public foods are offered. Such a typology can act as a guideline for the planning, development and the analysis of interventions in public settings where health is increasingly put on the agenda.

Key words: Foodscape, public health nutrition

COULD THE GREEK HOME GARDEN EXPLAIN THE REDUCED CARDIOVASCULAR MORTALITY IN ELDERLY GREEK MIGRANTS TO AUSTRALIA?

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The well-known cardioprotective benefits of the traditional Greek Mediterranean diet were first described in the Seven Countries Study in the 1960s (Keys et al, 1986) and then by de Lorgeril et. al. (1999) in France. Elderly Greek migrants to Australia consistently show lower rates of all-cause and CHD mortality compared with Australian-born people. Paradoxically, however, this is in spite of a higher prevalence of CHD risk factors (ABS, 2008). Greek migrants to Australia have resisted dietary acculturation and retained healthy aspects of their traditional diets which may partly explain their lower mortality rates (Itsiopoulos and Brazionis, 2011; Itsiopoulos, 2007; Kouris-Blazos, 2002). Compared with Australian-born people, Greek migrants were found to have higher plasma levels of carotenoids (lycopene, lutein/zeaxanthin), biomarkers for fruit and vegetable intake (Itsiopoulos, 2007). Kouris-Blazos (1994) compared elderly Greek migrants aged > 70 years in Melbourne (n=189) to elderly Greeks living in a semi-rural area near Athens (Spata) (n=104). Over 70% of the Greek migrants reported growing a variety of vegetables in home gardens such as tomatoes, leafy green vegetables, fresh herbs, legumes, and olives. Almost 40% of the Greek migrants compared with 4% of the Greeks in Spata reported relying solely on their home gardens for most of their vegetable intake. Consequently, Greek migrants reported higher vegetable intakes (1040g vs compared to 870g, data for men) as well as greater overall adherence to the traditional Mediterranean diet which correlated with significantly fewer deaths in a 5 year mortality follow up study (Wahlqvist et al., 2005).

Preliminary data from the Australian Mediterranean Islands Study show that Greek Islander migrants that grow tomatoes, onions and leafy greens in their gardens have a lower diastolic blood pressure (-30mmHg; P=0.049) and a trend towards lower BMI.

Key words: Traditional diets, home gardens, culinary herbs, olives, diabetes.

THE ROLE OF SHOPPING AND COOKING IN THE FOOD AND HEALTH SYSTEMS OF ELDERS

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Active ageing is a key to healthy ageing. Both shopping and cooking behaviors are important part of social life and economically relevant activities for the elderly. Considering the food and health systems together, we have investigated whether these two activities can contribute to survivorship in the elders independent of physical and cognitive function. We have linked data for some 1800 people aged 65 or over in a nationally representative free-living Taiwanese elderly cohort (NAHSIT, 1999-V2000) to the National Death Registry for decedents´ time of death. During the 10-year follow-up (1999-2008), 695 participants died. Highly frequent shopping compared to never or rarely predicted survival (hazard ratio (HR)=0.54; 95% confidence interval (CI), 0.43-0.67)) with adjustment covariates HR (95%CI) was 0.73 (0.56-0.93). Elderly who shopped every day have 27% less risk of death than the least frequent shoppers. Men benefited more from everyday shopping than women with decreased HR 28% versus 23% compared to the least. Those who cooked most frequently were younger, women, unmarried, less educated, non-drinkers of alcohol, non-smokers, without chewing difficulty, had spouse as dinner companion, normal cognition, who walked or shopped more than twice weekly, who ate less meat and more vegetables. Highly frequent cooking (>5 times/week, compared with never) predicted survival (HR=0.47; 95 %CI, 0.36-0.61); with adjustment for physical function, cognitive function, nutrition knowledge awareness and other covariates, HR (95%CI) was 0.59 (0.41-0.86). Women benefited more from cooking than did men, with decreased HR, 51% vs. 24%, when most was

compared with least. Both shopping and cooking behaviors favorably predict survival. Highly frequent shopping favors men, however, highly frequent cooking favors women. Shopping and cooking capture several dimensions of personal well-being, health and security as well as contributing to the community's cohesiveness and economy and may represent or actually confer increased longevity.

Key words: Healthy ageing, longevity, function

INTEGRATING FOOD AND HEALTH WITH ECOSYSTEMS FOR HUMAN DEVELOPMENT

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The most vulnerable are those who are disconnected from their culturally and biologically relevant ecosytem unless they or their ancestors have developed some form of resilience. If we are to make significant progress with sustainable human development, we need households and communities to have food and health security and for their inhabitants to have livelihoods. Although there may be short-to-medium term benefits for well-being, physical and mental function, for health and even mortality, these are relatively few compared with the PARs (population attributable risks) and benefits which may accrue through ecological approaches. These approaches embrace intergenerational, spiritual, sociocultural, biomedical, personal behavioural (especially throughout the food system, with regular physical activity, avoidance of substance abuse with tobacco and alcohol) and livelihood dimensions. They favour affordable solutions to lifes´ necessities of shelter, clothing, food, education and health. Nutritionally-related health disorders and diseases (NRHD) may reflect a spectrum of deficiencies, excesses and their combinations which manifest against a range of environmental and societal backgrounds. Their effective prevention and management requires strategies at the household and community level with foods whose progress through the system from production to consumption is known and understood. Such strategies are more implementable if people and systems involved and affected are digitally-connected. Well-rehearsed ecosytem measurement and monitoring tools are now available through the UN (http://www.un.org/apps/news/story.asp?NewsID=39344). When combined with national health system information about localities, they provide ways in which health, sustainability and economic problems can be defined, goals established and solutions found (http://www.wri.org/project/mainstreaming-ecosystem-services/about). Further Reading Wahlqvist ML and Specht RS. Food variety and biodiversity: econutrition Asia Pacific J Clin Nutr. 1998; 7:314-9. Wahlqvist ML, McKay J, Chang YC, Chiu YW. Rethinking the food security debate in Asia: some missing ecological and health dimensions and solutions. Food Security. 2012;4(4):657-70

Key words: Connectedness, econutrition, sustainability, NRHD (Nutritionally-related health disorders and disease).

PS5-71A The value of nutrition labelling: Has nutrition labelling reduced any chronic diseases? (IUFFoST)

NUTRITION LABELLING IN EUROPE: EFFECTIVE GUIDANCE TOWARDS MORE HEALTHFUL FOOD CHOICES?

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Background and objectives: Providing nutrition information on foods and menus is considered a relevant means to guide consumers towards more healthful food choices. Assessments of the actual effectiveness among consumers of the different systems devised vary in scope, methodology and outcome. A review of the current literature appears timely, hoping to provide the informational base for actions to be taken on a public health and policy level.

Methods: We searched the following databases: CAB Abstracts, CAB Heritage, Agricola, Medline, PubMed, EBSCO Business Source Elite, and EBSCO Business Source Premier (search terms: nutrition, nutrition label, food label, labelling, food choice, consumer understanding) and included all studies published after 2000 which measured behavioural effects. A special focus was put on nutrition labelling in obesity prevention, for which we considered literature referenced in PubMed and Social Science Research Network (SSRN) from 2007 onwards (search terms: nutrition labelling, obesity), when the last major review on the subject had been published.

Results: Currently, various formats of back-of-pack and front-of-pack nutrition labelling can be found across the EU, with varying levels of penetration and directiveness. Experimental studies show that consumers are reasonably able to understand and use the different systems to identify more healthful food products from given choice sets. However, they seem to be lacking the motivation to actually seek out nutrition labelling information when shopping for food. European studies assessing the impact of nutrition labelling on actual dietary intake are scarce, and no real-life evidence exists linking nutrition label use with measured changes in body weight.

Conclusions: Looking at the question of whether nutrition labelling so far has been effective in encouraging healthy eating, results of this review may be seen as a base for evaluating future achievements of the new EU regulation which makes nutrition labelling mandatory.

Key words: Nutrition labelling, Obesity prevention, Consumerbehaviour, Public policy, Information provision.

PS5-71B Urbanization and Food Security

ECOSYTEM APPROACHES TO NUTRITION AND HEALTH SECURITY: URBANISED COMMUNITIES

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Localities, whatever their whereabouts, may or may not support nutritionally secure communities. It is rare for their food supply to be self-sufficient, although local food production was the hall-mark of human settlement. Arable, especially horticultural land and its water supply, has given way to residential and commercial development. This is part of a wider ecosystem loss. In a facile way, we regard this as acceptable and even sustainable because of our ability to trade, although that has considerable infrastructural dependency. Ecosystems are vital for the integrity of food systems as a whole in serving sustainable food diversity, even if that means trade between ecosytem-competent communities. Wahlqvist has made a case for communities to be connected, especially digitally, to enable food-based strategies to serve health needs (1). We know that food diversity is a valuable indicator of household food security and food variety (FV) a predictor of more favourable health outcomes. Regrettably, but not inevitably, the costs of the fruit and vegetable contributors to FV often make it less affordable. It is now also clear that the notion of Homo sapiens as a species discrete from its ecosytems is flawed and that, at some point, ecosytem collapse will include the decline of Homo sapiens (2). Measuring and monitoring the ecosystem resource and food diversity are two important methodologies for nutritional security programs. They could facilitate the development of more sustainable and affordable food systems which would also provide livelihoods and erode the unemployment mentality.

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Key words: Food diversity, food systems, nutritional security.

INFLUENCE OF URBANIZATION ON CLIMATE CHANGE AND NUTRITION INSECURITY

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Urbanization brings along with it infrastructural changes, technological advancement, population upsurge from migration and improved standards of living. Expectedly, climatic changes go along with all these transformations. However, usually the processes of urbanization move at geometrical rate while considerations for the effects on climatic changes and nutrition security move in arithmetic order. Many nations witnessing rapid urbanization do fail to plan for the consequences of expansion on climatic changes and the attendant nutrition insecurity. Influx of high-tech machineries, automobiles, industrial chemicals/gases and human resources etc. has great impact on climatic changes, especially as these affect global warming and ozone layer depletion. All these impacted on food production, environmental hygiene/pollution, healthcare services, which are all strong variables that constitute nutrition security. Many developed worlds are highly urbanized but capable of maintaining safer climatic conditions and at the same time reduce the problem of food insecurity. It is therefore suggested that as many developing countries aspire to witness urbanization that is necessary for development, strong policy should be instituted to ensure that imported machineries and others are monitored and certified safe before they are shipped into the countries. Rural areas should be opened up for development to reduce concentration of people into the cities. Nutrition advocacy that will foster enabling environment for nutrition education should be promoted to create awareness on healthy eating, which is usually a neglected area in the process of urbanization. Urban agriculture should be supported as part of urbanization processes and a link should be created whereby some industrial wastes can be converted to organic manure to boost food production. Standard meteorological service should be instituted to serve as monitor of the environment and provide information on notable changes. Urbanization is needed for development but the effects on human survival should be of great priority to all stakeholders.

Key words: Urbanization, Climatic changes, Nutrition insecurity and National development.

CLIMATE CHANGE, URBANIZATION AND FOOD SECURITY: LINKING PRODUCTION AND CONSUMPTION

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Increasing food production is the main policy prescription to address food security. This neglects the crucial importance of access and affordability for low-income urban residents. With more than half the world's population living in urban centres, urban food insecurity is an emerging challenge that is exacerbated by climate change. While low and irregular incomes are its root cause, environmental hazards and inadequate housing and infrastructure contribute to higher levels of malnutrition in low-income settlements than in rural areas. Addressing urban food security requires attention to incomes, living conditions, access to formal and informal markets and the interconnections between rural and urban food security.

Key words: Climate change, food security, malnutrition, urbanization.

NUTRITION AND FOOD SECURITY: A CLIMATOLOGICAL PERSPECTIVE

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To climatologists nutritional security is dominated by the impacts of weather and climate on food systems. With growing urbanization, extreme weather events such as tropical cyclones impact directly on agriculture, but also on the logistical distribution of food. Drought affects human life and health as well as impacting dramatically on the sustainable development of society. It represents a pending danger for vulnerable agricultural systems that depend on the rainfall, water supply and reservoirs. Developed countries are affected, but the impact is disproportionate within the developing world. Drought, especially when it results in famine, can change the life and economic development of developing nations and stifle their development for decades. A holistic approach is required to understand the phenomena, to forecast catastrophic events and to predict their societal consequences.

The International Union of Geodesy and Geophysics (IUGG) is leading the WeatCliFS consortium of international scientific unions (including IUNS and IUFoST) to examine weather, climate and food security as well as to look at the interaction of food security and geophysical phenomena. The following fundamental question underpins WeatCliFS: What technologies and methodologies are required to assess the vulnerability of people and places to hazards [such as famine] – and how might these be used at a variety of spatial and temporal scales?

This talk will review the historical link between weather, climate, drought and food supplies; examine the Australian and international situation; summarise the response of the scientific community and point out the direction for future research.

Key words: Agriculture, climate, food security, urbanization.

USING SOUTH AFRICAN FOOD COMPANIES' NUTRITION STRATEGIES AND CONSUMER KNOWLEDGE, ATTITUDES AND PRACTICES PERTAINING TO NUTRITION INFORMATION TO DEVELOP GUIDELINES FOR THE PROMOTION OF THE PREVENTION OF CHRONIC DISEASES OF LIFESTYLE

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Background and objectives: The main objective of the study was to investigate the nutrition strategies that food companies in South Africa use to communicate with the consumers and to compare it with the knowledge, attitudes and practices of the consumers towards the nutrition information that they receive.

Methods: The study population consisted of a sample of 7 food companies operating in South Africa and a sample of 230 South African consumers. Data were collected through questionnaires aimed at each specific study population. The data were analysed statistically for each study population and the data between the two study populations were compared.

Results: Seventy-one percent of the food companies indicated that they address chronic diseases of lifestyle in their nutrition strategies. The medium most frequently used by food companies for consumer nutrition education, is the food label and this together with television is the preferred medium for the consumers. Both the majority of food companies and consumers agree that the food companies have a responsibility towards the nutritional education of the consumer.

Conclusions: Food companies should be actively involved with consumer education pertaining to healthy eating and healthy lifestyle habits as it is expected by the consumer. Communication with regard to evidence-based nutrition education is critical but should be consistent with an integrated approach involving all the role players including the food industry, Department of Health and Department of Education.

Key words: Food industry, healthy eating, healthy lifestyles, nutrition education.

EFFECTS OF CLIMATE CHANGE ON THE FOOD SUPPLY CHAIN AND THEIR IMPACT ON URBAN NUTRITION SECURITY

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In the FAO definition of Food Security (FAO, 1996) there is the requirement that all people at all times should have access to an adequate food supply of their preference, to maintain health, growth and continuing development (the italics are mine). However undeveloped a country may be, food supply chains exist and provide the means for the availability of enough safe food of the required quality for their population, under ideal conditions. With the rapid increase in the rate of urbanization (now > 50% of the world's population live in cities) the supply chain links within urban areas are becoming critical, if a balanced diet is to be available. Poorer communities within cities have increasing difficulty in accessing a diverse fresh food supply and hence an adequate diet. In contrast, their access to fast food outlets is very much better (London Food Programme, 2006). Developments in urban agriculture may alleviate these trends to some extent but face their own technical and supply chain difficulties.

Climate changes will impact on every stage and aspect of the food supply chain from primary production to final consumption. Loss or interruption of power supplies will reduce food safety (loss of temperature controls), transport failures will cause disruption to the 'just-in-time' retail sector and many urban citizens will be unable to travel to even local food outlets. Nutrition will suffer and starvation will become a real possibility.

To maintain and improve urban citizens' access to a sound, nutritional diet, an understanding of their food supply chain and its underpinning science and technology is required. The development of strategies to improve the adequacy, sufficiency and security of this supply chain, in the face of the potential disruptions resulting from climate change, is our ongoing challenge.

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T8 AGRICULTURE, FOOD SCIENCE AND SAFETY

Key words: Usual intake, assessment, fortification, inadequacy, DRI.

NPS1-8 IMAPP (Intake, Monitoring and Program Planning): Software nutrient intake data

INTAKE, MONITORING AND PLANNING PROGRAM (IMAPP) – WHAT ARE ITS CAPABILITIES?

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IMAPP was developed at Iowa State University in collaboration with University of Hawaii and USDA-ARS Western Human Nutrition Research Center with funding from WHO. IMAPP is freely available from http://www.side.stat.iastate.edu/. IMAPP can be used to assess and to plan nutrient intakes. For assessment, IMAPP implements the ISU Method (Nusser et al., 1996) to estimate usual nutrient intake distributions and the IOM recommendations (DRIs: Applications in Dietary Assessment) to compute prevalence of inadequate or of excessive intakes. For planning, IMAPP implements the recommendations by WHO/FAO in Guidelines for Food Fortification with Micronutrients (WHO 2006). IMAPP estimates usual intake distributions of nutrients for groups defined by age, gender and pregnancy/lactation using daily intake information. Ideally, two or more observations are available at least for a sub-sample of individuals. However, IMAPP permits adjustment of datasets with no replicates by using external intra-person variances supplied by the user or by IMAPP. The EARs and ULs of a long list of nutrients are built into IMAPP and the program "understands" which form of the nutrient (e.g., retinol or vitamin A) should be used to estimate inadequacy or excess. IMAPP also allows for different bioavailability of iron and zinc. Given a target prevalence of inadequacy of a nutrient in a population group and daily intake of potential vehicles, IMAPP will compute the amount of the nutrient to be added to each vehicle to meet the target prevalence in the group. It will also estimate the resulting prevalence of inadequacy and of excess in all other population sub-groups. Because of its many built-in functions, IMAPP can be used by practitioners with little statistical or computational background.

USING THE IMAPP SOFTWARE; INFORMATION REQUIRED FOR OPTIMAL APPLICATION

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The intake monitoring, assessment, and planning program (IMAPP) provides software to analyze nutrient inadequacies and potential excessive intakes within a population group. However, the power of the software can only be realized if accurate information is provided by the user. Before using IMAPP, it is necessary to collect daily dietary intake data (e.g., from 24 hour recalls or records) for each individual in a sample of the population. Intakes of the nutrients of interest must be provided for each person.

Thus, the user must have access to food composition data that can correctly convert food intakes into nutrient intakes.

To apply the appropriate nutrient standards, age, gender, and reproductive status should be indicated for each person. The nutrient standards that are used for the calculations are the average nutrient requirements and the safe upper levels of intake. These standards may be specified by the user or the default "harmonized" values in the program may be used. To adjust for day-to-day variation in intakes, multiple days of dietary data for at least a representative subsample of the population should be provided, although it is also possible to use default values from other populations for these variance estimates. Bioavailability factors may be specified for iron and zinc, or may be based on dietary patterns.

If IMAPP is being used to design fortification programs, daily intakes of potential food vehicles for fortification must also be provided. Intake for each vehicle should be calculated after disaggregating mixed dishes into their ingredients. IMAPP will then calculate new prevalences of nutrient inadequacies assuming specific levels of fortification of one or more food vehicles. Thus, IMAPP is an important tool for assessing intakes as well as planning intakes, but optimal application depends on high quality intake data provided by the user.

Key words: Intake assessment, intake planning, fortification.

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HARMONIZING MICRONUTRIENT RECOMMENDATIONS WORLD-WIDE

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Background and Objectives: Harmonization of nutrient intake recommendations is important because advice concerning nutrient intakes, formulation of complementary foods, levels for fortification and labeling is usually provided at the global or regional level. Actual requirements vary little across the world yet the process for creating and revising recommendations is costly and time-consuming especially for low income countries, and already includes some uncertainty. Current terms for recommended levels are inconsistent and WHO/FAO has no Estimated Average Requirements or Upper Levels. Our objective was to use a systematic approach to develop global recommendations.

Methods: Values were compared from the Institute of Medicine (IOM, US/Canada), WHO/FAO and the UK primarily. IOM was used if values differed <10%, otherwise scientific criteria were applied to choose best estimates.

Conclusion: New harmonized values were derived for use in IMAPP and elsewhere. A process for review and revision is needed.

Key words: Recommended nutrient intakes.

APPLICATION OF THE IMAPP FOR PLANNING, MONITORING AND EVALUATION OF FLOUR FORTIFICATION PROGRAMS

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Background and objectives: The planning, monitoring and evaluating of cereal-grain fortification programs require dietary intake data (or proxies thereof). These data are needed to determine which food vehicle(s) to fortify and in what amounts (planning); if a change in dietary patterns warrants a change in food vehicles or fortification levels (monitoring); and whether intended beneficiaries are consuming fortified foods in sufficient quantities and frequency to expect health improvements (evaluation). The objective of this analysis is to explore the use of Intake, Monitoring and Program Planning (IMAPP) software with dietary intake data for countries that are in the planning, monitoring or evaluation stages.

Methods: Dietary data from countries (e.g. Mongolia in the planning stage, South Africa in the monitoring stage, and Indonesia in the evaluation stage) will be analyzed using IMAPP. Results and conclusions: Recommendations for countries in the planning, monitoring and evaluation stage will be generated using IMAPP results. The pros and cons of IMAPP for such exercises in the context of fortification will be discussed.

Key words: Fortification, planning, monitoring, evaluation, IMAPP.

ESTABLISHING DESIRABLE FORTIFICANT LEVELS FOR MICRONUTRIENTS IN FOODS FOR INFANT AND YOUNG CHILD FEEDING: EXAMPLES FROM THREE ASIAN COUNTRIES

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Background and objectives: Concern has been raised whether micronutrient levels in manufactured cereal-based fortified foods for infant and young child feeding available in low income countries meet their high micronutrient needs. We used WHO recommended procedures to establish desirable fortificant levels for three problem micronutrients in Asian children's diets.

Methods: Dietary data collected earlier from Filipino (n=1374; 6-36 months), Mongolian (n=179; 12-36 months), and Cambodian (n=177; 12-36 months) children were used to assess prevalence of inadequate and excessive intakes of calcium and zinc (cut-point method) and iron (full probability approach) after adjusting usual intake distributions with PC-SIDE using internal or external within-person variances. Fortificant levels were determined by repositioning usual intake distributions so 2.5th percentile for each distribution and target population equalled the EAR (calcium, zinc) or so that full-probability prevalence of inadequate intakes of iron was no larger than 2.5%.

Results: Prevalence of inadequate intakes was 70% for calcium and iron, except Filipino infants (30% for calcium) and Cambodian toddlers (41% for iron); but <1% for zinc for toddlers in Mongolia and 20% in Cambodia. Prevalence of excessive intakes was <1% for zinc, calcium, and iron, except for Mongolian toddlers (11% for zinc). Desirable fortificant levels, although apparently negligible for zinc, were 530 to 783 mg for calcium, and 10.8 to 22.8 mg for iron (per 100 gram). Fortificant levels can be estimated from 24-hr recalls, preferably by applying internal within-person variances.

Conclusions: Fortification with calcium and iron was necessary, but seemingly not for zinc, despite a high prevalence of low serum zinc concentrations, suggesting the need for better defined cut-offs for risk of zinc deficiency in young children based on the prevalence of inadequate intakes of dietary zinc and/or serum zinc.

Acknowledgement: Supported by Univ. Otago Research Committee.

Key words: Micronutrient fortificants; PC-SIDE; within-person variation; Estimated Average Requirements.

PS1-8 Food-based approaches to improve multiple micro-nutrient deficiencies and protein quality

DIETARY APPROACHES TO DIET QUALITY IMPROVEMENT

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Although dietary supplements and fortified foods can contribute to meeting nutrient intake standards, they do not appear to have many of the health benefits of food sources of nutrients, especially in the prevention of chronic diseases. Furthermore, they are not typically as sustainable as foods that are available locally. In the Child Nutrition Project (CNP) in rural Kenya, school-based snacks were developed to supply six micro-nutrients of concern: iron, zinc, vitamin B12, vitamin A, calcium, and riboflavin. Two snacks incorporated animal-source foods to provide several of these nutrients: the milk snack supplied calcium, vitamin B12, and riboflavin while the meat snack supplied vitamin B12 and bioavailable iron and zinc. The milk snack provided an average of 48% of the recommendations for these six nutrients, and the meat snack provided 44%. By comparison, an equi-caloric vegetarian snack provided only 17.5%. Although it was not tested, a snack that provided both milk and meat would be likely to improve dietary quality even further. Studies like CNP contribute to the design of food guides which provide practical advice on how to choose a nutritionally adequate diet using foods that are readily available to a population. Food guides that have been derived to ensure nutrient adequacy virtually always include meat and dairy groups, as well as fruits, vegetables, and starchy staples. In the United States, MyPlate presents a simple graphic showing the proportions of a plate that should be filled with foods from each food group (see www.choosemyplate.gov). Adapting such food guides to local preferences and food availability may be an important step in improving dietary quality. For countries at any level of development, these guides can then serve as the basis for educational programs as well as the foundation of national nutrition policies that promote nutritionally adequate diets.

Key words: Diet quality,food guides, micronutrients.

COMPLEMENTARY FEEDING RECOMMENDATIONS FROM LOCALLY AVAILABLE FOODS

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Background and objectives: Adequate nutrition during the first 2y of life is essential to ensure optimal health, growth, and development. In their Global Strategy for Infant and Young Child Feeding, WHO and UNICEF have provided guidance on appropriate complementary feeding, with emphasis on use of suitable locally available foods. Affordable, locally contextual complementary feeding recommendations (CFR) are more likely to result in long-term improvements in complementary feeding practices than general recommendations as it takes into account cultural diversity and differences in food availability. This presentation aims to describe development of CFR using linear/goal programming (LP) approach.

Methods: Four modules in LP were used (1) to formulate optimal CFR given local food availability, food pattern, and food affordability; (2) to evaluate nutrient adequacy and identify absolute or partial problem nutrients, (3) to identify locally available nutrient-dense foods to fill the nutrient gap, and (4) to choose from amongst alternatives of CFRs based on the comparative cost and nutritional benefits. Data for the analysis was from the National Basic Health Survey (Riskesdas, 2010) and several studies conducted in rural, peri-urban, and urban area of Indonesia.

Results: The developed CFRs for different age groups revealed similarities and differences in the problem nutrients across age groups. Comparing results from several studies in Indonesia, while calcium, iron, and zinc were the typical problem nutrients, the extent of deficiency and the potential nutrient-dense foods vary across age groups, area (rural, peri-urban, urban) and socioeconomic level. Animal source foods and fortified foods were identified as nutrient-dense foods which can improve micronutrient adequacy from the complementary foods.

Conclusion: CFR from locally available foods can be optimized by including available nutrient-dense foods. Achievement of nutrient adequacy from the CFR varies by age groups, area and socio-economic condition.

Key words: Complementary feeding recommendation, linear/goal programming, local foods, problem nutrient.

USE OF OMENA FISH IN KENYA

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High levels of infections with increased pregnancy-related nutrient demands and inadequate food supplies can place some pregnant women in resource-scarce settings in a vulnerable health status, often associated with inadequate weight gain, low-birth weight, prematurity, fetal deaths and maternal and child mortality. Animal-source foods provide a rich source of high quality protein and variety of micronutrients required for adequate growth. However, a majority of these foods are not accessible to a large proportion of populations in poor countries. Locally available small fish like Omena (Rastrinobola argentea) offers a likely source of nutrient-rich and affordable food among communities in Kenya. However, its potential to improve nutritional status among pregnant women is still unknown. We utilized a cross-sectional study design to assess the acceptability of fish-enhanced supplemental snacks among a sample of pregnant women in rural Kenya. Isocaloric fish-enhanced, soy-enhanced and wheat snacks were compared on taste, odor, texture and color. Wheat snacks were most preferred with more than 95% of mothers indicating that they liked its taste, odor, texture and color. Over 85% of mothers indicated that they liked the taste, odor, texture and color of the fish-enhanced snack and over 81% of mothers indicated that they liked the taste, odor, texture and color of the soy-enhanced snack. No significant differences were noted across mother's HIV status. Focus group discussions with the mothers further revealed that the fish-enhanced snack was well-liked for its crunch, taste, dark-brown color and spice. Our analysis demonstrates the potential use of locally available and affordable small animal food sources to improve nutritional status of vulnerable population groups in low-income nations.

Key words: Small fish, fish-enhanced snacks, pregnant women, Kenya.

MEATS AS COMPLEMENTARY FOOD FOR OLDER INFANTS

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The relatively high iron and zinc requirements of breastfed infants older than about 6 mo of age, and the physiologic composition of human milk dictate that they must consume either cellular animal protein foods (meats or organ tissue), or rely on fortified foods or supplements. Common infant feeding practice, however, is to introduce meats only as one of the last foods for older infants. The reasons for this include expense of meats; assumption that infants can't or won't eat meats; perception that meats are too difficult to digest until later. Data obtained by a feeding survey from infants in 4 diverse settings indicated that meats were fed to > 60% of toddlers, but to < 25% of infants, suggesting that availability and affordability were not the limiting factors within households. Prior to the Agricultural Revolution, mothers most likely pre-masticated meats to enable the infants to eat them. We have undertaken several studies to examine the potential impact of consuming meats vs cereals (fortified and unfortified) by older infants. The forms of meat used for older infants and toddlers included commercially available pureed meats; freeze dried meat cubes, which could be eaten either dry or in soups and porridges, and either as a powder or finger foods; cooked and shredded meats; and crumbled and/or mashed liver. Infants' acceptance of the meats was excellent in all studies, although cultural norms favored cereals over meats as an appropriate infant food. Animal source proteins contribute micronutrients that are critical to older infants and toddlers, and availability of meats may actually be greater than fortified products in resource poor settings. Education efforts are warranted to encourage the use of meats as complementary foods for older infants.

Key words: Infants, meat, toddlers, complementary foods, micronutrients.

CONSUMPTION OF ANIMAL SOURCE FOODS AND COGNITIVE PERFORMANCE OF PRIMARY SCHOOL CHILDREN IN HAWASSA TOWN, SOUTHERN ETHIOPIA

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Cognitive development of children is influenced by nutritional, socioeconomic and environmental factors. This cross-sectional survey of primary school children (n=116) examined associations among anthropometrics, animal source food (ASF) consumption and cognitive performance. Five schools were randomly selected from fifty-one in Hawassa Town using

probability proportional to size sampling. Twenty-five students were randomly selected from the seven to nine year old children in these schools. Family socio-economic characteristics and child diets were collected from primary caregivers using individually-administered questionnaires. Dietary diversity was assessed using the eight indicator food groups identified by the Food and Nutrition Technical Assistance Project. Anthropometric measurements were transformed to Z-scores using WHO AnthroPlus Software. Cognitive testing utilized Raven's Colored Progressive Matrices (CPM, board version) and selected tests from the Kaufman Assessment Battery for Children (KABC-II). Data were analyzed using SPSS v.19. Median child age was eight and most had some preschool education. Thirty-six percent of mothers had no formal education while 35% had completed primary education. Thirteen percent of children were stunted and 13% were underweight. Only 3.4% of children consumed eggs in the 24 hours preceding the dietary survey and only 13.8% consumed meat, poultry or fish. Stunted (height-for-age Z [HAZ] <-2) children had significantly lower scores on the Raven's CPM, on pattern reasoning and on tests of short-term memory. Children not consuming flesh foods or eggs had lower scores for short-term memory and visual processing. Multiple regression models including HAZ, ASF, preschool attendance and maternal education predicted 18 to 26% of variability in cognitive scores. These results add to the body of data supporting importance of nutritional status for cognitive function.

Acknowledgement: Supported by Hawassa University School of Graduate Studies and NIHR01HD053053 [NICHD & Fogarty International Center].

Key words: Animal foods, children, cognitive performance.

MICROCREDIT WITH ENTREPRENEURIAL AND NUTRITION EDUCATION INTERVENTION IMPROVED WOMEN'S INCOMES AND CHILDREN'S ANIMAL SOURCE FOOD INTAKE AND NUTRITION IN GHANA

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The Enhancing Child Nutrition through Animal Source Management (ENAM) project (2004-2009) emanated from participatory formative research that identified six principal constraints to the inclusion of animal source foods (ASF) in Ghanaian children's diets: low caregiver income, poor producer-consumer linkages, inadequate nutrition knowledge and skills of extension staff and caregivers, cultural beliefs, and inequitable household food distribution. To address these constraints, the ENAM project implemented an integrated microcredit, entrepreneurship and nutrition education initiative with 181 caregivers of 2- to 5-y-old children in six rural communities across three agro-ecological zones of Ghana. Six matched communities from the same zones served as comparison sites. Methods included surveys, anthropometry, and dietary assessment to assess the intervention effect on children's dietary intakes and growth and 12 qualitative case studies to examine household and caregiver outcomes of interest. Women reported that the ENAM experience opened opportunities for obtaining microcredit for the first time, which helped increase their business success. Significantly more participant caregivers expanded and diversified their small businesses ($p<0.01$), tended to have higher profits ($p<0.01$), and had significantly higher savings ($p<0.05$) than non-participant caregivers. Participant households tended to spend more money ($p<0.10$) and consumed significantly more amounts (in monetary value) of ASF ($p<0.01$) than non-participant households. About one-third of the caregivers were engaged in an ASF-related business, such as selling smoked fish or eggs, or selling cooked food that contained ASF. After accounting for locale, being involved in an ASF-related business positively predicted children's ASF diversity ($p<0.001$). The intervention had a positive effect on children's nutritional status ($p<0.05$). Evidence suggests that the microcredit-education link benefited women's lives with respect to their small businesses and their personal development as well as the diet and health of their young children.

Acknowledgement: Supported by GL-CRSP/USAID Grant No. PCE-G-00-98-00036-0.

Key words: Child nutrition, animal source foods.

FOOD-BASED APPROACHES TO IMPROVE MULTIPLE MICRO-NUTRIENT DEFICIENCIES AND PROTEIN QUALITY

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Recently completed and ongoing research studies using animal source foods to improve a range of nutritional problems will be presented. Researchers form Asia, Africa, and elsewhere will make presentations during this symposium. This is a very important topic now that we have evidence-based research to support the use of food-based approaches to combat multiple micronutrient deficiencies and improve protein quality and nutrition status and function in resource-poor countries. This important approach holds promise in terms of sustainability and reaching hard to reach rural populations comprised mainly of subsistence farmers. Although short term nutrient supplements are necessary in cases of severe deficiency, we wish to share research outcomes related to the use of food-based approaches by households and communities to combat multiple micronutrient deficiencies and improve function. The

planned presentations include: Introduction and overview of global micro-nutrient Deficiency and Protein Quality, Dietary Approaches to Diet Quality Improvement Using Locally Available Foods, Ongoing Intervention Study among Pregnant Woman in Vietnam, Meat Intervention in Chinese Infants, Food-Based Approaches in Ethiopia, Use of Omena Fish in Kenya, Community Interventions for Dietary Improvements in Ghana, and Meat vs. Soy Biscuit Intervention Trial in HIV Drug Naïve Kenyan Women and Children to Protect Nutrition Status and Prevent Progression of HIV to AIDS.

Key words: Animal source foods, diet quality, micronutrients.

HIGH NUTRITION BISCUITS AS A SUPPLEMENT TO INCREASE ANIMAL PROTEIN IN DIETS OF HIV-INFECTED KENYAN WOMEN AND THEIR CHILDREN

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This project is evaluating effects of protein quality and micronutrients found in meat on the health and nutritional well-being of women living with HIV in rural Kenya and the health and development of their children. Women receive their medical care within the USAID supported Academic Model Providing Access to Healthcare (AMPATH) partnership in Western Kenya. By means of a randomized nutrition feeding intervention we are determining if meat in the diets of HIV-infected women and their children (1) protects the immune system and prevents severe infection, (2) prevents the loss of lean body mass, enhancing the quality of life among these drug naïve women and enabling women to carry out activities of daily living, and (3) supports the growth and development of their vulnerable children when compared to those given supplements with the same amount of energy, but with either soy or wheat protein. Through continuous collaboration, the research team developed the intervention foods to be basic biscuits made with wheat flour; dried beef or soy flour is added to the recipe. Boiled water is added for porridge consistency for young children and those with difficulty chewing. The beef biscuits provide women and children with significantly greater amounts of lysine, vitamin B12, bio-available zinc and iron than those in the soy or wheat groups. Data analysis is ongoing and study outcomes will soon be disseminated. The "biscuit model" is useful for nutrition supplementation studies because it can be safely provided in a blinded and randomized fashion to a highly stigmatized population, it is well received by adults and children, it is produced with available and affordable technology and can accommodate the comparison of different sources and amounts of protein.

Acknowledgement: Research is supported by USAID Grant No. PCE-G-00-98-00036-00, 1R01HD57646-01A1 (CFDA #93.865) and Heifer Project International.

Key words: Food supplement, protein, vitamin B12.

PS2-16 Food composition (FAO)

IMPACT OF FOOD COMPOSITION DATA ON NUTRIENT INTAKES, REQUIREMENTS, PROGRAMMES AND POLICIES

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Accurate food composition data are essential both for assessing nutrient intakes and for planning nutritious diets. Too often, the role of food composition tables (FCTs) is not recognized when evaluating intakes, setting requirements, and designing appropriate national and regional programmes and policies. This should be an iterative process with the first step the collection of food intake data for a population group. To determine if dietary nutrient inadequacies exist within the group, the food intake data must first be converted to nutrient intake data using a FCT that contains the foods consumed by the population of interest. Then the intakes may be compared to nutrient standards using analytic techniques that consider variation in both intakes and requirements. Sometimes nutrient standards are not available and must be imputed; intakes of these nutrients are sometimes used to decide if the standards from other countries or regions are appropriate. Standards for potentially excessive intakes are also needed to decide if intakes of some nutrients need to be reduced (e.g., calories, saturated fat, sodium, sugars). To achieve a comprehensive evaluation, FCTs need to include a wide array of food components with potential effects on health outcomes. Once the prevalences of inadequacies and potential excesses have been determined, food sources of nutrients of concern can be identified and incorporated into educational programs or dietary interventions for the population. The development of standards for the school meals program in the United States illustrates how FCTs play a key role in this process. Ultimately, an important goal of these activities is to develop dietary guidance that will (1) achieve nutrient adequacy and avoid excess; (2) maintain healthy body weights; and (3) reduce risk of chronic diseases.

Key words: Food composition, intake assessment, nutrition policy.

THE ROLE OF FOOD COMPOSITION DATA FOR NUTRITION LABELING

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Changing dietary patterns, expanding food trade and growing rates of obesity and diet-related non-communicable diseases have stimulated interest in the provision of nutrition information to consumers to enable them to choose foods that are appropriate for their health needs. Nutrition labeling on food products and in food outlets is becoming a common type of nutrition information that can be relevant to improving nutritional status worldwide. A variety of nutrition labels are found in markets around the world and the preponderance of labels will continue to grow.

Whether a nutrition label system is mandatory or voluntary, including a Back of Pack panel or a Front of Pack symbol, reliable and accurate food composition data are essential to ensure the credibility of the label. Yet small and medium size food enterprises, especially in developing countries, may be challenged to obtain the food composition information that is required to be compliant with labeling requirements in local or foreign markets.

Food composition data specialists play an important role in the implementation of food labeling policies. What is the public health rationale for nutrition labels, including evidence that consumers use and understand labels? What is the latest information from the Codex Alimentarius Commission related to nutrition labels? What do regional agreements and national legislative bodies require in terms of food composition information for food labeling? The challenges to expand food composition information will be discussed and options to improve the availability of food composition data will be proposed.

Key words: Food standards and legislation, consumer information.

THE CORRECT USE OF FOOD COMPOSITION DATA

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Reliable food composition data must be available for several purposes such as epidemiological studies, food labeling, planning of institutional meals, plant and animal breeding programmes, among others and, therefore, government from different countries have been investing in gathering food composition data in databases which are made available in different formats and medias. The final users of these data, usually, are not aware of the complexity behind the development of a food composition database and the methodology by which data are gathered and this may lead to misuses of data with serious implications for nutrition, health and agriculture related programmes and policies. The correct use of food composition data must consider several aspects which are related to (i) the food item (or food group), such as identifying the correct name of the food items, to (ii) the nutrients, due, for example, to differences in definition and the analytical methodology, and to (iii) procedures for estimating nutrient values for foods, households recipes, cooking method or commercial products, or (iv) food matching. Other current and relevant aspect is the identification, in the food composition database, of the food item until the cultivar/varietal/breed level, which is essential for evaluating the impact of food biodiversity on nutrition. We intend to discuss these issues and, by doing so, contribute to a better use of food composition data.

Key words: Food composition data, misuses, nutrient evaluation.

THE NEED OF NEW HIGH-QUALITY ANALYTICAL DATA FOR FOOD COMPOSITION TABLES AND FOR BIODIVERSITY AS WELL AS WILD AND UNDERUTILIZED FOODS

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Traditionally Food Composition tables (FCT) have been used world-wide for national nutrition monitoring and research into association between diet and disease. Many FCT contain nutrient data based on old methodology leading to serious errors while interpreting nutritional or epidemiological data threatening higher costs and inefficient use of resources. Updates in the FCT due to improved analytical techniques have shown changes in nutrient intakes as well as in the proportion of population with inadequate intakes. On the other hand studies have revealed that estimates of mineral intake from FCT versus analyzed values are not in agreement due to compromised mineral data in the FCT. Such studies illustrate the necessity for new high quality nutrient database. Reliable food composition data are essential for the provision of dietary guidelines as well as identification of sources of these nutrients. Significantly large nutrient variation exists within food cultivars that can be used to nutritional advantage. Glycemic index (GI) of foods is currently of interest to study the associations of diet and chronic disease. Rice has GI values ranging from 52 to 86 indicating the nutrient biodiversity within rice varieties and the importance of quoting appropriate GI in the FCT. Agrobiodiversity is essential for sustainable food and nutrient security, yet the nutrient composition of wild and underutilized plant foods remains neglected in most FCT severely compromising nutritional studies of indigenous populations. The

diversity of wild and underutilized foods offers vast scope for economic and nutritional benefits. In the absence of accurate food composition database as well as data on wild and underutilized foods evaluation of diets for nutritional adequacy and epidemiological research will be weak and less significant. The need to obtain high quality analytical nutrient data for foods using appropriate quality control and sampling procedures is discussed in detail.

Key words: Agobiodiversity, food composition databases,biodiversity.

LINK BETWEEN FOOD COMPOSITION, NUTRITION, AGRICULTURE AND BETTER FOOD SUPPLY TO COMBAT MALNUTRITION THROUGH FOOD-BASED APPROACHES

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Background and objectives: Global agricultural production is theoretically sufficient to feed the world's population, yet one billion people are hungry and two billion suffer from micronutrient deficiencies. Many countries and agencies attempt to combat malnutrition with short-term health and nutrition interventions such as supplementation, fortification and sporadic health and nutrition policies and programmes. Since 2004, several international bodies have recognized the important linkage between food composition, biodiversity, nutrition and agriculture. It has been scientifically proven that compositional differences at intra-species level are statistically significant, and more importantly, nutritionally significant, with up to 1,000-fold differences documented. Therefore, the consumption of one variety or breed rather than another could represent the difference between nutrient deficiency and adequacy.

Methods: FAO and INFOODS have generated, compiled and disseminated compositional data of biodiverse foods and have included biodiversity in guidelines, tools and material for capacity development to be used in food composition, nutrition and agriculture.

Results: Databases with genetic and agricultural features are intending to link to the FAO/INFOODS Food Composition Database for Biodiversity. Member States of the Commission on Genetic Resources for Food and Agriculture recently endorsed the linkage between nutrition, biodiversity and agriculture and requested FAO and partners to continue updating the FAO/INFOODS database and to develop guidelines on integrating biodiversity into food consumption surveys. Increasingly, food composition compilers and agricultural research institutes are collaborating to explore the composition of foods before selecting those for breeding.

Conclusions: This positive trend will hopefully continue and will lead to a large-scale agricultural production taking into account biodiversity and environmental-friendly factors, and thus resulting in sustainable food and agricultural systems. Food-based approaches based on food biodiversity can significantly contribute combating all forms of malnutrition in a sustainable manner.

Key words: FAO, INFOODS, food composition, agriculture, sustainable diets.

PS2-24 Sugars and health: The controversies continue

SWEETNESS, HEDONIC IMPACT AND FOOD INTAKE

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Sweetness is a potent psychobiological phenomenon. The importance comes about because the sweet taste, in nature, is normally associated with the presence of energy and therefore humans (and other animals) are likely to be strongly attracted to sweetness in foods and drinks. The sweet taste is also associated with a potent pleasure sensation. Sweetness can make foods palatable that otherwise would not be pleasant to eat; it can also raise the palatability of foods that are already pleasant. In this way sweetness offers an important strategy to increase the attractiveness of foods and to encourage consumption. The hedonic properties of sweetness means that it embodies strong reward potential with the capacity to reinforce its own consumption and behaviour associated with consumption. For this reason it can be expected that sweetness will exert positive and distinctive effects on eating behaviour, food selection and other aspects of appetite control. This talk will review some of the current thinking on the psychobiology of sweetness and taste in relation to appetite: For example, the role of sweetness in the control of food intake (satiation and satiety) and food reward (liking and wanting); interactions between sweet taste and individuals at risk of overeating; habitual high sugar consumers (sweet preferring phenotypes); and experimental approaches to examine the effects of sugar/sweet on hedonic impact and food intake. It is arguable that sweetness may have qualitatively distinct attributes of pleasure – because of the unique role of sweetness in nature. Sweetness is likely to have a 'facilitative' or 'permissive' effect on eating behaviour; however sweetness can be conferred through different types of molecules which may have distinguishable properties.

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Key words: Sweetness, liking/wanting, appetite, sugar, health.

EFFECTS OF SUGARS ON METABOLIC HEALTH

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The prevalence of obesity and diabetes has increased in the last century. In the search for potential reasons, the hypothesis has been advanced that sugars, or more specifically its fructose component, may play a role in the development of metabolic diseases. Some specific features of fructose metabolism may potentially account for adverse metabolic effects. Unlike glucose, fructose is extensively metabolized by the gut and the liver, where it is converted into glucose, glycogen, and lactate. It can also be converted into fatty acids, although this is a minor pathway, which are then either stored as intrahepatic fat or released as VLDL-triglycerides. This may secondarily favour ectopic lipid deposition in skeletal muscle and cause insulin resistance through "lipotoxic" mechanisms. Ingestion of large amount of fructose also increases the uric acid production, which could increase the risk of gout, and also contribute to metabolic dysregulation. In animals, adding fructose, either as sucrose or as pure fructose, to rat's diet makes them become obese and diabetic, and increases their liver and muscle fat content. Similar observations are made when rats are fed a high-fat diet, however, the relative role of fructose vs excess energy intake is still debated. In humans, fructose increases plasma triglyceride concentrations and impairs hepatic insulin sensitivity, but these effects are observed with large daily fructose intake, exceeding that of the average population. Hypercaloric fructose intake also increases plasma uric acid concentrations and intrahepatic fat content, and there is concern that it may lead to the development of muscle insulin resistance and diabetes in the long term. The effects of isocaloric fructose intake on these parameters remains to be assessed.Another concern is that fructose may favour the development of obesity by increasing food intake. The physiological mechanisms relating fructose intake to inadequate satiety responses are still controversial and further studies are required to assess whether fructose specifically impairs food intake control, or is just consumed in excess as a constituent of energy-dense palatable foods.

Key words: Energy-dense palatable foods , food intake, fructose, lipotoxicity, metabolic disease, satiety.

SUGARS TO DEAL WITH FATIGUE DURING EXHAUSTING ENDURANCE PERFORMANCE

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Carbohydrate (CHO) is the most important energy source for high intensity endurance performance during which high oxidative energy production rates are determinants of performance capacity. Energy release from glucose is has been shown to be 3 times as fast as from fatty acids. Glucose, stored as muscle glycogen, may, depending on exercise intensity, be depleted within 45-60 min. after which impaired glucose availability will reduce muscle power generation capacity and induce protein catabolism. CHO ingestion during exercise allows sparing of glycogen stores, reduces protein utilization and delays fatigue. Appropriate CHO ingestion during intense endurance performance and between 2 training sessions/day is important to avoid progressive fatigue development and recover well. CHO sources to be used during high intensity exercise should preferentially be rapid digestible and absorbable and should be combined with sufficient fluid intake. Glucose supplying CHO sources such as starch, hydrolyzed starches/maltodextrins/glucose polymers, glucose as simple sugar and also sucrose, are absorbed rapidly and transported to muscle for a subsequently uptake and rapid oxidation. Fructose as simple sugar is absorbed relatively slowly, converted partially to lactate and is preferentially taken up by liver leaving only in minor amounts to reach the blood. The subsequent oxidation rate is accordingly low. Supply of CHO's that are an efficient fuel for muscle, to optimize performance, is not only recommended for long distance runners and cyclists but has also been shown to improve performance in down hill skiing, ice hockey, tennis, football and other repeated sprint like sports. The use of energy drinks by children participating in leisure sports activities is not required for supporting performance and may contribute to unfavourably inducing a positive energy balance.

Key words: Glucose, fructose, sucrose, starch, sports performance, fatigue.

PS3-32 Low-calorie sweeteners: Are they safe and can they help with weight management?

DIETARY HABITS AND USE OF LOW-CALORIE SWEETENERS: AN EFFECTIVE TOOL IN THE PREVENTION OF OBESITY AND DIABETES

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Providing sweetness without the calories, low-calorie sweeteners (LCS) help to reduce dietary energy density while maintaining diet palatability. Recent analyses based on 5 cycles of the National Health and Nutrition Examination Survey (NHANES 1999-2008) explored both demographic and time trends in LCS consumption in the US. These data were for a nationally representative survey sample of 22,231 non-pregnant adults who completed a 24-hour dietary recall. Additional analyses

focused on health behaviors of LCS users, with an emphasis on smoking, alcohol use, physical activity and weight management. Further analyses examined the cross-sectional association between LCS consumption and body mass index category, diabetes and systemic inflammations. On any given day, 30% of Americans consumed LCS contained in beverages, foods and tabletop sweeteners. Among those consumers, about 50% consumed LCS beverages, 30% consumed LCS foods, and 20% consumed tabletop LCS. The temporal increase in LCS consumption from 1999 to 2008 paralleled a drop in the consumption of added sugars in the US, both in beverages and in solid foods. LCS consumers were older, better educated and had higher incomes than did consumers of sugar sweetened beverages (SSB). Although LCS use was associated with higher obesity rates in the cross sectional NHANES database, most LCS users indicated that they were trying to actively manage body weight. This is important evidence for reverse causality, that countering suggestions that it was LCS use that led to overweight. In general, LCS users had better health behaviors, smoked less and exercise more and had better quality diets than did SSB consumers. It would appear that LCS use may be an index of positive health behaviors that are associated with the prevention of obesity and diabetes.

Key words: Energy density, diet palatability,low-calorie sweeteners,physical activity, weight management.

LOW-CALORIE SWEETENERS: SHOULD THE PUBLIC BE CONCERNED?

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All low-calorie sweeteners are subject to comprehensive safety evaluation by regulatory authorities, prior to approval. Definitive independent information on the safety of sweeteners is freely available on the websites of regulatory authorities 1, 2, 3.

The safety testing of food additives requires studies in animals to determine what effects the compound is capable of producing when administered at high daily doses, or high dietary concentrations (hazard identification). The studies cover all life phases, including in utero and lactation. Very high dose levels are used to increase the ability of the study to detect any possible adverse effects. The highest level of intake that does not produce any adverse effect, the no-observed adverse effect level (NOAEL), is used to establish a human intake with negligible risk, which is called the acceptable daily intake (ADI). The ADI is usually calculated as the NOAEL (in mg/kg body weight per day) divided by a 100-fold safety/uncertainty factor, which is to allow for possible species differences and human variability. Metabolism data are usually available from studies in humans to support extrapolation of toxicity data from the test species to humans.

The concentrations of each sweetener that are permitted in different foods and beverages are established by regulators so that even high intakes from all sources do not exceed the corresponding ADI value. Extensive intake surveys show that actual intakes are well below the ADI values.

Although low-calorie sweeteners are often used as blends, interactions would not occur because the only shared biological property is their activity at the sweet-taste receptor.

Low-calorie sweeteners are among the most extensively studied of all food additives. Media stories about "health concerns" usually focus on a single recent observation and ignore the totality of the database available.

1.http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_home.htm 2.http://ec.europa.eu/food/fs/sc/scf/reports_en.html 3.http://www.who.int/ipcs/food/jecfa/en/

Key words: Sweeteners, safety, ADI, no-observed adverse effect leve.

PS3-40 FESNAD forum

NUTRITION AND HEALTH CLAIMS: DIFFERENT ASPECTS

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Different aspects related to nutritional and health claims on foods taking into account the point of view of scientists, manufacturers and consumers are discussed.

In the case of scientist one of the most challenging tasks is the substantiation of health claims, due to the difficulty in detecting physiological benefits in healthy individuals. The need of new health markers stands out. Another point to taken into account is the frontier between functional foods and drugs.

On the other hand manufacturers interested in developing functional foods are frustrated by the difficulties encountered to have the health claims approved by EFSA. The efforts make in research do not always find recognition and approval, fact that can lead to a slowing down in research and innovation. What happens in the consumer area? Are claims understood by the consumers? What would the wording be in order to obtain clear and understandable health claims? Finally, the role that nutritional and health claims can play on the diet of populations needs to be evaluated by public health experts.

Key words: Food, nutrition, health claims.

HOW IMPORTANT ARE HEALTH CLAIMS IN INFANT NUTRITION?

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In order to get a health claim on a food EFSA has required evidence that a particular ingredient has a particular benefit for a particular population. The vast majority of claims for lipids, prebiotics, probiotics and nucleotides claiming to provide some advantages on infant's or mother's health have been rejected on the basis of very few –if any- high quality clinical studies. Some other components have received approval: addition of DHA and arachidonic acid on infant formula helps visual acuity, as the first in the row. Some people consider that health claims in infant feeding undermines confidence in breastfeeding quality and should not be allowed.

Very few others health claims have been approved: thiamine (B1) and normal neurological development and function in infants and children up to three years of age. North American FDA pointed in 2010 that for healthy infants who are not exclusively breastfed and who have a family history of allergy, feeding a 100% whey protein partially hydrolyzed infant formula from birth up to 4 months of age instead of a formula containing intact cow's milk proteins may reduce the risk of developing atopic dermatitis throughout the first year of life.

There are no data on how much of this information is known by parents and how it influences which kind of infant formula they choose, as publicity for general population on infant formula is not allowed. Professionals received this information from companies. There is a clear interest in knowing how food labels play a role in getting information both for consumers and professionals. Some European projects are dealing to study this relationship and to provide guidelines on how food labels should be. CLYMBOL ('Role of health-related claims and symbols in consumer behaviour') project is investigating consumer understanding and behaviour with respect to health information.

Key words: Children, paediatrics, health claims

CLAIMS RELATED TO FUNCTIONAL FOODS IN THE CARDIOVASCULAR AREA

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In developed countries cardiovascular disease is the leading cause of death. In recent years a high number of studies have been done to evaluate the importance of dietary pattern, certain foods and specific nutrients provided by different foods on cardiovascular risk factors. Considering that the new European legislation regulates the possibility of nutritional claims in foods, the food industry has seen in functional foods for cardiovascular disease a business opportunity. During the last years a number of dossiers have been submitted by industry to the European Food Safety Agency for evaluation and a large proportion of them have been rejected for different reasons among which are: the lack of characterization of the food, the lack in the appropriate definition of the claim argument, and the lack of data demonstrating a cause-effect relationship between the consumption of a food or a constituent and the claimed effect. The guidelines published by the EFSA Scientific Committee on the requirements or effects to substantiate have approximate the positions between industry and EFSA. Most functional foods designed to control cardiovascular risk have focused on the improvement of the plasma lipid profile, oxidative stress or endothelial function, as well as decrease satiety, postprandial blood glucose levels or body weight. As improvement on classical or emerging factors of cardiovascular risk is not always associated with a reduction of cardiovascular events or mortality from these causes, it is expected that in a more or less near future requirements on functional foods increased. It is also expected that in the future personalized nutrition limits the marketing of functional foods. Studies in different populations and settings suggest that consumers need more information on the use, benefit and risk of use of functional foods.

Key words: Cardiovascular disease, functional foods, health claims.

COMMUNICATION ON FOOD AND NUTRITION IN HOSPITAL

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Corporate social responsibility of the hospital in relation to training and information to patients on nutritional habits makes up an increasingly important role within the public health institution. The commitment of health professionals on this area should be organized as an integrated task specialized in healthcare ensuring further continuity within primary health care. The management of knowledge concerning healthy eating and nutrition habits and their transmission to the patient-user, and their families, should be taken as a new responsibility of health centers, which car intervention should not be limited to the patient's admission period, but should continue through dissemination activities and information to the patient, once recovered from the health crisis. In addition, hospitals must become true and valued authoritative sources of nutrition information in relation to the media, in order to transmit the messages on food and nutrition to as many citizens as possible.

Key words: Nutrition, food communication ,healthy habits, hospital.

HEALTH CLAIMS. MORE SEVERE THAN THE EUROPEAN FOOD SAFETY AUTHORITY (EFSA): TO BE OR NOT TO BE?

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Food advertising has a great ability to influence the behavior of the population. Promises made through advertising should be consistent with reality. Tangible fraud can be easily recognized. However, non-tangible fraud (such as nutrition and health claims) is difficult to be detected by the "reasonably well-informed, and reasonably observant and circumspect consumer". Regulation 1924/2006 (1) establishes the legal framework for such statements. While nutritional claims are well established in the regulation annex, health claims need to be specifically evaluated by an EFSA scientific panel before they can be used. Can Regulation 1924/2006 and EFSA assessments prevent all nutritional and health claim frauds? Are there loopholes that could potentially allow misleading claims? Can EFSA deny a health claim that may be scientifically well founded? Can a denied health claim be accepted in the future? Can EFSA panels have conflicts of interest? (2) The study of Regulation 353/2008 (3), the EFSA scientific opinions issued up to date, and the evidence-based medicine (4) are the key points to answer these questions. Healthcare professionals should ensure that the information delivered to consumers, whether legal or not, is scientifically proven and promotes public health. References: 1. Regulation 1924/2006 (CE) of the european parliament and of the council of 20 December 2006 on nutrition and health claims made on foods. OJEU; L404:9-25. 2. European Court of Auditors. Management of conflict of interest in selected EU Agencies. Report nº15. ECA; 2012 3. Commission Regulation 353/2008 of 18 April 2008 establishing implementing rules for applications for authorization of health claims as provided for in Article 15 of Regulation (EC) No 1924/2006 of the European Parliament and of the Council. OJEU; L109:11-16 4. Rosenberg W, Donald A. Evidence based medicine: an approach to clinical problem-solving. BMJ. 1995;310:1122-6.

Key words: Legislation, nutritional claims, health claims, evidence-based medicine, fraud.

HEALTH CLAIMS IN MEAT BASED FUNCTIONAL FOODS

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In recent years, there has been a considerable accumulation of studies concerning strategies to optimize the presence of specific components (exogenous and endogenous) with health implications for designing of potential meat-based functional foods. Because of the amount and frequency of consumption, contribution to dietary intakes of different nutrients, diversity of presentations, possibility of modifying their composition using non-meat ingredients, high consumer acceptability, etc., meat and meat products are excellent foods for delivering bioactive compounds without changing dietary habits. However despite the numerous efforts carried out to improve their composition (using strategies basically concerning with animal production practices, meat processing and storage, distribution and consumption conditions), there are very few studies involving these foods to verify whether those modifications are of relevance to human health. The objectives of this paper are to analize the possibility to application of health claims based on generally accepted scientific proof to meat and meat products designed as functional foods, as well as to present an overview of the human intervention studies to check the functional capacity of meat-based potentially functional foods.

Key words: Health claims, meat based product.

FUNCTIONAL FOODS IN SCHOOL FEEDING PROGRAMMES

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School Feeding Programs (SFP) reach about 90,000,000 children in Latin America and the Caribbean. In principle established with the purpose to contribute to learning, better performance and adherence to school to prevent dropout, and targeted to most vulnerable children populations. One additional goal is to improve health, facing problems of malnutrition and its consequences in the generation of learning disabilities, cognitive ability damage, stunted growth and overall development capacity decrease. SFPs are a factor of risk protection and prevention in relation to: limitation of learning and school performance: school dropout; decrease of family budget; food and nutritional insecurity due to financial, political and environmental instability; nutritional deficiencies and chronic noncommunicable diseases The state investment in PAE is impor-

tant, but distributed as an average in the region of 0.4$ /child/ day, resulting in most countries in school breakfast or snack based milk/ milk drink and bread/ cookie, which begin to be fortified mainly in iron and the presence of locally produced cereals. One aspect that SFPs have been facing is malnutrition that characterizes the population in the region and particularly children. The existence of malnutrition in several countries, the coexistence of malnutrition and obesity, in others, and in some, overweight and obesity as a fundamental characteristic makes SFPs include in their programs a view of nutrients in deficit or excess in delivered food. In this context, even modest SFP, in which locally produced food associated with culture and eating habits emerges as healthy food source, the room for functional foods is still very minor, despite their potential importance to face malnutrition. There are some recent assessments in Chile to change the nutritional structure of SFP, to confront the great problem of overweight and obesity among others by increasing the presence of antioxidants and fiber. Some results in this area are discussed.

Key words: Health, Latin America, malnutrition, school feeding programs.

PS4-48 Bellagio report on healthy agriculture, healthy nutrition, healthy people

BELLAGIO REPORT ON HEALTHY AGRICULTURE, HEALTHY NUTRITION, HEALTHY PEOPLE

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The Bellagio Report on Healthy Agriculture, Healthy Nutrition, Healthy People is the result of the meeting held at the Rockefeller Foundation Bellagio Center in Lake Como, Italy, 29 October–2 November 2012. The meeting was science-based but policy-oriented. The role and amount of healthy and unhealthy fats, with attention to the relative content of omega-3 and omega-6 fatty acids, sugar, and particularly fructose in foods that may underlie the epidemics of non-communicable diseases (NCD's) worldwide were extensively discussed. The report concludes that sugar consumption, especially in the form of high energy fructose in soft drinks, poses a major and insidious health threat, especially in children, and most diets, although with regional differences, are deficient in omega-3 fatty acids and too high in omega-6 fatty acids. Gene-nutrient interactions in growth and development and in disease prevention are fundamental to health, therefore regional Centers on Genetics, Nutrition and Fitness for Health should be established worldwide. Heads of state and government must elevate, as a matter of urgency, Nutrition as a national priority, that access to a healthy diet should be considered a human right and that the lead responsibility for Nutrition should be placed in Ministries of Health rather than agriculture so that the health requirements drive agricultural priorities, not vice versa. Nutritional security should be given the same priority as food security.

Key words: Agriculture, fats, foods, fructose, nutrition, omega-3 fatty acids, omega-6 fatty acids, sugars.

MARINE N-3 PUFA INTAKE AND RISK OF BREAST CANCER

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The aim of the systematic review was to investigate the association between intake of fish and n-3 polyunsaturated fatty acids (n-3 PUFA) and the risk of breast cancer and to evaluate the potential dose-response relation. Twenty six publications, including 20 905 cases of breast cancer and 883 585 participants from21 independent prospective cohort studies were eligible. Eleven articles (13 323 breast cancer events and 687 770 participants) investigated fish intake, 17 articles investigated marine n-3 PUFA (16 178 breast cancer events and 527 392 participants), and 12 articles investigated alpha linolenic acid (14 284 breast cancer events and 405 592 participants). Marine n-3 PUFA was associated with 14% reduction of risk of breast cancer (relative risk for highest v lowest category 0.86 (95% confidence interval 0.78 to 0.94), I2 =54), and the relative risk remained similar whether marine n-3 PUFA was measured as dietary intake (0.85, 0.76 to 0.96, I2=67%) or as tissue biomarkers (0.86, 0.71 to 1.03, I2=8%). Subgroup analyses also indicated that the inverse association between marine n-3 PUFA and risk wasmore evident in studies that did not adjust for body mass index (BMI) (0.74, 0.64 to 0.86, I2=0) than in studies that did adjust for BMI (0.90, 0.80 to 1.01, I2=63.2%). Dose-response analysis indicated that risk of breast cancer was reduced by 5% per 0.1g/day (0.95, 0.90 to 1.00, I2=52%) or 0.1% energy/ day (0.95, 0.90 to 1.00, I2=79%) increment of dietary marine n-3 PUFA intake. No significant association was observed for fish intake or exposure to alpha linolenic acid. We concluded that Higher consumption of dietary marine n-3 PUFA is associated with a lower risk of breast cancer. These findings could have public health implications with regard to prevention of breast cancer through dietary and lifestyle interventions.

Key words: Breast cancer, marine n-3 polyunsaturated fatty acid, fish, cohort study.

CONSUMPTION PATTERNS AND TRENDS FOR SUGAR-ADDED BEVERAGES IN MALAYSIA: IMPLICATIONS FOR HUMAN HEALTH

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The prevalence of obesity has increased dramatically over the past three decades in different population groups in Malaysia. Obesity is now regarded as a major public health challenge because of its significant adverse association with development of several non-communicable diseases (NCDs). It is widely accepted that the escalating prevalence of obesity and NCDs are linked either to excessive food energy intake from unhealthy dietary practices or to low energy expenditure because of inactive lifestyles or to a combination of both of these factors. Hence, healthy and balanced dietary and active lifestyle practices are important strategies to diminish the risk of excessive weight gain with subsequent lower risk of acquiring NCDs throughout life. One unhealthy dietary practice is the consumption of sugar-added beverages (SSB), which has been associated with a higher risk of obesity and NCDs such as type-II diabetes, cardiovascular and other metabolic disorders. The aim of this presentation is to examine the patterns and trends of SSB consumption status in adolescent and adult populations in Malaysia and to identify any association with NCD risk factors. The trends of SSB consumption have increased considerably in people of all ages in Malaysia. Based on the recent National Health and Morbidity Survey 2011 data, three common SSB consumption practices were identified among populations in Malaysia namely the consumption of i) beverages with added sugar, ii) beverages with sweetened condensed milk or creamer and iii) carbonated soda drinks. Beverages with added sugar are reported as the most common sources of SSB, with about half of adolescents (13-18y) and adults (≥18y) reported to consume such beverages every day. Beverages with sweetened condensed milk or creamer (20-27%) were the next most commonly consumed and the least was the consumption of carbonated soda drinks at <5% daily. Not much difference was found between consumption of these SSBs between sexes, or between urban and rural geographical regions. Adults had significantly higher consumption of beverages with added sugar by at least 3 cups per day compared to adolescents (18.9% vs. 6.7%). In contrast, adolescents had almost two times greater intakes of carbonated soda drinks of 2 cups or more in a day than adults (7.0% vs. 4.3%). An almost similar pattern was found between adolescents and adults in the consumption of beverages with sweetened condensed milk or creamer for 2 cups or more a day (23.5% vs. 29.1%). In general, SSB consumption is very common in Malaysian populations, particularly among adults. In addition, multivariate regression analysis to examine the relationship between consumption of beverages with added sugar of at least 3 cup per day and the NCD risk factors in adults, in which every state of Malaysia was used as a unit of analyses, showed that consumption of 3 cups per day or more of beverages with added sugar was significantly associated with a higher risk of becoming overweight (p=0.008), or developing diabetes (p=0.044) or hypercholesterolemia (p=0.011), after adjustment for fruits and vegetables intake and physical activity. This finding suggests that high daily consumption of SSBs exerts adverse health effects in adults. Several initiatives have been formulated by the Malaysia National Strategic Plan for NCD (NSP-NCD) in various settings such as community, workplaces, and schools to prevent unhealthy dietary and lifestyle practices; including the reduction of the high consumption of sugary foods and beverages among different populations in Malaysia.

Key words: Sugar-added beverages, obesity, non-communicable diseases, adolescents, adults.

SUGAR-SWEETENED BEVERAGES CONSUMPTION AND OBESITY

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To explore the associations between sugar-sweetened beverage (SSB) consumption and obesity as well as obesity-related cardiometabolic disorders among children in China. A total of 6974 (boys 3558, girls 3412) children aged 6-13 years participated in the study. Each participant's height, weight, waist circumference, fasting glucose, triglycerides, total cholesterol, highdensity lipoprotein cholesterol, and low-density lipoprotein cholesterol were measured. The type of beverage consumption was determined using a self-administered questionnaire. SSBs were consumed regularly by 46.1% of the children. The prevalence [adjusted odds ratio (95% confidence internal (CI)] of obesity was 7.6% [as the reference group (ref.)], 10.1% [1.36(1.07, 1.74)], and 11.6% [1.46(1.21, 1.75)], among children who regularly drank milk, other beverages and SSBs, respectively. Regularly drinking SSBs elevated the likelihood

of abdominal obesity [adjusted odds ratio (95% CI): 1.36(1.17, 1.59)]. The prevalence [adjusted odds ratio (95% CI)] of obesity among children who regularly drank sports/caloric beverages, carbonated beverages, sweet tea, and plant protein beverages was 16.8% [2.00(1.31, 3.07)], 12.7% [1.52(1.23, 1.88)], 11.5% [1.52(1.18, 1.95)], and 10.4% [1.41(1.03, 1.94)], respectively, which was higher than that of regular milk drinkers [7.6% (ref.)]. The prevalence [adjusted odds ratio (95% CI)] of abdominal obesity among children who regularly drank sweet tea, fruit/vegetable juices, and carbonated beverages was 17.7% [1.55(1.26, 1.90)], 16.2%[1.36(1.09, 1.70)], and 15.3% [1.24(1.03, 1.50)], respectively, which was much higher than that of regular milk drinkers [12.8% (ref.)]. Regular SSB consumption was positively related to obesity and abdominal obesity. This relationship should be investigated further using a longitudinal study design.

Key words: Sugar-sweetened Beverages, Obesity, Children.

PS4-56 Food and nutrition reporting in the media

DO MEDIA HEADLINES EQUAL CREDIBILITY AND TRUST? A LOOK AT US CONSUMER INSIGHTS ON TRUSTED SOURCES FOR FOOD & HEALTH INFORMATION

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Research studies focusing on food, health, and nutrition often result in wide-spread media coverage. Alarming headlines span across traditional and social media platforms. This often generates global attention, but do consumers find the sources for this information credible? Do consumers view media as a trusted source for information? International Food Information Council Foundation (Foundation) research published in the peer-reviewed journal Nutrition Today found, "media outlets are the primary sources of consumer information on nutrition, food safety, and health; accuracy and helpfulness may be lacking because of consistent lack of context in news coverage." When the Foundation asked consumers what impact a variety of factors would have on their willingness to believe new information about food and health, Americans indicate doing their own research would have a major impact (59%), as well as hearing the same information from many different sources (41%) and hearing the information from someone who has an advanced degree in health or nutrition (40%). Moreover, in the area of food safety, the Survey results show consumers trust primary care physicians and other health professionals to delivery accurate information (89%)—while media sources such as television news stories not so much—only 66%. These insights come from the Foundation's 2012 and 2013 Food & Health Survey, a US-based survey that has captured consumer attitudes toward food safety, nutrition & health since 2006. Most recently the Journal of American Academy of Nutrition and Dietetics published a 5-year retrospective of the Foundation's Food & Health Survey titled, Is it Time to Rethink Nutrition Communications? In short, the answer is yes. IFIC Foundation research reveals that frequency of available information does not equate to the same level of credibility and trust for the consumer—demanding a new way to think about nutrition communications. Health professionals and scientists will need to embrace new communications concepts to promote consumer understanding, belief and ultimately behavior change. Their extended use of new communications concepts will help facilitate better communication of scientific context, information and ultimately credibility that may enable consumers to make better well-informed decisions about their diet and health.

Key words: Behaviour, consumers, nutrition communication.

COMPARISON OF REPORTING OF FOOD BENEFITS AND RISKS IN EUROPEAN NEWSPAPERS

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The media is an important source of information for the public. It can interpret messages in certain ways and can be selective regarding the information it transmits to its audience. Therefore, as the main information disseminator in our society, the media can act as an agenda builder and can shape or change public's perceptions, attitudes, beliefs, and behaviour. Food plays as central role in all our lives and is therefore commonly reported in newspapers and other communication channels. However, research published in 2011 on health claims reported in UK national newspapers, found that misreporting is widespread (Cooper et al., 2011). This may contribute to public misconceptions about food and health.

The objective of this research was to investigate reporting about the positive benefits and negative risks associated with food in national newspapers from eight European countries. Newspapers were selected based on circulation and readership figures (gender and socio-economic class) and were sampled over a four week period, i.e. 2 weeks in September 2011 and 2 weeks in March 2012. This research looked at i) the balance of reporting on positive benefits (e.g. nutrition claim) versus negative risks (e.g. risk/safety statement), ii) the content of the statements/claims (e.g. food type, health issue), iii) the source of the information (e.g. scientist, health authority) and iv) the accuracy of the reporting.

Key words: Consumer information, health claims, media, newspapers, nutrition.

THE CHALLENGES OF REPORTING ABOUT NUTRITION; A JOURNALIST'S PERSPECTIVE

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Communication on nutrition has some aspects that are specific. First of all, nutrition is a topic well known by everyone (or that's what they think): everyone eats every day, hopefully several times a day. It means that, like in football, everyone has his or her own opinions. and exposure to nutrition topics in the media can influence their opinions. In Spain we had, years ago, a very strong campaign to promote seed oils instead of olive oil, for instance, or about the risks of eating fish contaminated with heavy metals. Olive oil and fish are two core elements of the Mediterranean diet, so conflicting or alternative messages about these foods, can create confusion in some consumers. The second issue is that information on the health benefits of foods or specific ingredients, in the form of health claims on food products and adverts, is mostly provided by food companies. Some of the studies used to support those claims are naturally sponsored by industry, as the submission of scientific dossiers is needed for EFSA to evaluate the science basis for the claims. Regardless of the scientific validity of those studies, the journalists perception would be of suspicion and funding bias. The third one is that the major newspapers are not very interested in topics about positive nutrition benefits. It is not news. The fourth is not specific to nutrition: there is a problem of communication (and trust) between scientists and journalists. Sometimes they speak, literally, a different language.

Key words: Nutrition communication, mediterranean diet.

PS5-64 Feeding workers

NUTRITION AT WORK: THE INTERNATIONAL LABOUR ORGANIZATION´S APPROACH.

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Good nutrition constitutes a basic human right and, nevertheless, it has often been ignored in the context of labour rights. The ILO has showed a concern on this matter from its foundation. The ILO Recommendation No. 102 (1956) on social services for workers recognizes the importance of nutrition in the workplace and recommends the provision of facilities such as canteens, cafes, The Recommendation No. 102 (1956) on social services for workers: recognizes the importance of nutrition in the workplace and recommends the provision of facilities such as kitchens, canteens, cafes, kitchens or kitchenettes. The ILO publication "Food at Work. Workplace solutions for malnutrition, obesity and chronic diseases" was conceived in 2005 as a response to the lack of attention given to food at work. The study concluded that an inadequate nourishment of workers can cause losses of up to 20% in productivity, as well as the connection between the lack of a good nutrition and the onset of fatigue and sleepiness, with consequent implications in occupational safety and health. In line with this concern, the ILO's educational programme SOLVE, in an effort to integrate the promotion of health in the policies of safety and health at the workplace, as well as in the actions at company level, includes contents for the promotion of healthy eating habits in the workplace. Using the analytical framework established by "Food at Work" and the obvious need to deepen in the relationship between nutrition and the world of work in Chile, promoted by Sodexo and Edenred, the ILO conceived the project "A comprehensive approach to improving nutrition at the workplace: A survey of Chilean companies and tailored recommendations", turning Chile into the pilot country for this type of research at worldwide level.

Key words: Chronic diseases, labour, malnutrition, obesity.

A COMPREHENSIVE APPROACH TO IMPROVING NUTRITION AT WORKPLACE IN CHILE

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Background and objectives: An important factor in the health of workers is food and eating healthy at work helps prevent chronic diseases linked to diet. To analyze labor feeding practices in Chile, knowledge, attitude and behavior of workers and employers in this regard.

Methods:. Literature review, structured surveys in 995 workers from different regions of the country, interviews and focus groups with representatives from government, employers, workers and academics.

Results: The legislative framework refers only to the hygienic conditions and the time allotted for lunch. There are major shortcomings in the supply system Chilean in the feeding system of Chilean workers: 39% did not receive any benefit, 22% do not have a place to eat, improper cleaning, insufficient time, inadequate food quality. The lack of lunch generates physical and psychological discomfort that affects productivity. There is a significant prevalence of diet-related diseases, which increase with age. Most workers want a healthy diet during the workday

Conclusions: It is a priority to implement a variety of measures to improve workers' access to food, which are cost-effective and improve job satisfaction. These programs should be part of the labor policies be sustained over time and evaluated in its implementation and results. Investments in power companies recover reducing sick days, fewer accidents and increased pro-

ductivity, which determines to be cost-effective. It is necessary to establish tripartite tables that include the State, workers and employers, to strengthen social dialogue in relation to labor, employment and food security.

Key words: Feeding practices, workers, work place, Chile.

'PROGRESS AND CHALLENGES OF THE NUTRITIONAL SITUATION IN PREGNANCY IN URUGUAY: DEVELOPING AN EASY SURVEILLANCE TOOL'

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Background and objectives: Existing data emphasizes the importance of having nutritional information systems. The objective was to develop a nutritional surveillance module based on the Perinatal Informatics Information data (SIP from CLAP/OPS/OMS).

Methods: all available Anthropometric References in pregnancy were reviewed and applied to 2010 SIP data base. That from the Ministry of Health from Chile was selected. Indicators were built: anthropometrics, weight increase and perinatal outcomes. A computer system was develop which interact with the SIP.

Results: An informatics module was developed and actually giving anthropometric information. An interface between data SIP and ANTHRO (World Health Organization) was made. This interface allowed to evaluate women from de database and showed data in friendly tables and charts that can show nutritional situation, by age, by subsector, by region, or national. Also this module can associate anthropometric women status with maternal and perinatal results. This Program showed that 14.3% (CI: 13.6-14.9) of women present low weight at beginning, 24.1% (IC:23.3-24.9) overweight and 10.0% (IC:9.4-10.6) obesity. At the end of pregnancy, 13.7% (IC:13.0-14,3) of women were with low weight, 28,8% (IC:27,9-29,7) with overweight and 17,3% (IC:16,6-18.0) with obesity. The average weight gain for women is within the recommended range among women which began normal was 13 kg (IC:13.005-13.260), with no statistically difference with those which began with low weight: 12.930 kg (CI:12.,693-13.166) (p=NS), but showed difference with those overweighed and obese 12.318 kg (IC:12.097-12.539) (p<0,05) y 9.1022 kg (IC:8.700-9.504) (p<0.05). Overweight and obesity, as well as excess weight gain is associated to birth weight> 4000g, Caesarean section, assisted delivery and pregnancy pathologies: hypertension, diabetes, and pre-eclampsia.

Conclusions: The informatics module allowed to do nutritional surveillance in an easy way. Malnutrition is a problem in pregnancy associated with worse maternal and perinatal results.

Acknowledgements: FAO and UNICEF

Key words: SIP, surveillance, malnutrition

PS5-72 The shift toward a modern industrialized food system, potential implications for nutrition-related chronic diseases and for public policies

EVOLUTION FROM TRADITIONAL FOOD SYSTEMS TO THE GLOBALIZING FOOD SYSTEM: A POSSIBLE MISMATCH BETWEEN HUMAN DIET AND HEALTH?

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The relationship between foods, dietary patterns and health is very complex and requires an interdisciplinary and comprehensive analysis of food systems. Food systems have changed from the Palaeolithic era to the current globalizing world. Building on an evolutionary perspective, we compare features of traditional food systems to the globalizing food system, and discuss the implications for human health. Traditional food systems are the products of an adaptation process between culture and nature. They share basic features including the reliance on a diverse range of local resources, the use of minimal food processing, modes of food learning based on family and peers, the importance of food symbolism and conviviality. The globalizing food system is a new and fast-changing model built on economic and political ideologies of the 20th century. Its features include the production and distribution of foods at the global scale, the reliance on a few crops, the ultra-processing of foods, trends from family and public modes of food learning to industry and private ones, and the focus on individualism. Building on an evolutionary perspective and the mismatch theory, our hypothesis is that several features of the globalizing food system have transformed traditional food systems in ways that are beyond the human capacity to adapt to food. Humans are capable to adapt to a wide variety of food and diets. However, most if not all ultra-processed products have an intrinsic unbalanced nutritional composition and share characteristics that interfere negatively with the mechanisms that regulate appetite. Food learning channels, food symbolism, modes of eating and food production have also changed in ways that undermine the selection mechanisms that operate in the development of healthy diets. If the mismatch hypothesis is confirmed, then healthy diets need to be based on a model which takes into account several features of traditional food systems.

Key Words: food system, ultra-processed products, traditional food systems, mismatch theory, evolution

THE NEW ROLE OF INDUSTRIAL FOOD PROCESSING IN FOOD SYSTEMS: IMPACT ON NUTRITION AND HEALTH – A PERSPECTIVE FROM THE SOUTH

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Across several low- and middle-income countries (LMIC), traditional food systems are being challenged by the globalizing food market. Our hypothesis is that industrial food processing is now the main shaping force of the global food system, and the main determinant of changes in diets and related states of health and well-being in LMIC. To investigate this hypothesis, we have developed a new classification of foodstuffs based on the extent and purpose of food processing. Every item in the diet is classified into unprocessed or minimally processed foods, processed culinary ingredients and processed or ultra-processed ready-to-consume food and drink products. Our studies in several countries show that ready-to-consume products taken together are more energy-dense, have more free sugars, sodium, and saturated or trans fats, and have less fiber, iron, zinc, potassium, and vitamin C than foods made into dishes and meals with culinary ingredients (such as oils, flours, sugar and salt). As expected, the dietary share of ready-to-consume products is strongly and inversely related with the quality of overall diet. Furthermore, because these products are often sold in large portion sizes, are manufactured to be hyper-palatable, when not habit-forming or even addictive, and are extensively and aggressively advertised, they increase the risk of passive energy over-consumption. Our studies also indicate that, today, the most significant dietary change in LMIC is the replacement of freshly prepared meals based on foods and culinary ingredients by ready-to-consume ultra-processed products. To address the epidemic of obesity and related chronic diseases in LMIC, public policies need to offer incentives to, protect and promote long-established, traditional food systems and dietary patterns based on freshly prepared dishes and meals. Reformulation of ultra-processed products may provide some advantages as a harm reduction strategy, but it isn't an option for broader public policies.

Key words: Food systems, food processing, obesity, LMI.

THE MODERN GLOBAL FOOD SYSTEM- ITS EVOLUTION AND CURRENT STATUS AND HOW IT IS RELATED TO HEALTH

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Our modern food supply represents a major shift in eating, drinking, location of eating, and shifts in our entire eating pattern. Before WWII food purchased and consumed corresponded to minimally processed foods and processed culinary ingredients with a small proportion of processed and ultra-processed ready-to-consume food and drink products. The first grocery chains in the West emerged before WWII with minimally processed items developed over the late 19th and early 20th century [from freshly puffed whole grain cereals to peanut butter to carbonated beverages). In the US the only chain prior to WWII was the Great Atlantic and Pacific (A & P). In contrast today, we present the depth and breadth of foods and beverages available. Annually well over 1 million unique bar coded consumer packaged foods and beverages are sold globally. In the US we have documented 600,000 with about 200,000 having unique ingredients. The nature of these foods and beverages and the vast usage of added caloric sweeteners in them are used to highlight the type of shifts we are seeing globally as are related new eating behaviors (snacking). Finally levels of penetration of these modern convenience stores and supermarkets and growth of consumer packaged foods and beverages across the LMIC are presented. For instance, China, India and Vietnam are seeing annual compound growth in sales from these retailers of 28-50% each year of this new millennium. This has led to a shift from farmers selling through a complex chain to farmers selling directly to processors and supermarkets. It has also led to an explosion in access to ultra-processed foods and beverages. We then present new data from China, Mexico and Russia on the proportion of total kcal intake from packaged foods and beverages and how this differs from other foods.

Key words: Food system, sweeteners, snacking, supermarkets.

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Oral Communications

O001

TUMOR SUPPRESSOR GLYCINE-N METHYLTRANSFERASE REGULATES ONE CARBON TRANSMETHYLATION KINETICS

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Background and objectives: Glycine-N methyltransferase (GNMT) is a potential tumor suppressor that is commonly inactivated in human hepatoma. However, the regulation of GNMT in 1-Carbon transmethylation kinetics remains to be established. The objective of the present study was to systematically investigate how GNMT expression affects folate status, antifolate cytotoxicity and methyl group kinetics in vitro and in vivo.

Methods: GNMT was over-expressed in GNMT-null cell-lines. Cell-lines with and without GNMT expression were cultured under different folate and methyl supplies. Folate dependent pathways and methyl group status were investigated in wildtype, GNMT transgenic (GNMT-tg) and GNMT knockout (GNMT-ko) mice. The 1-carbon flow in homocysteine transsulfuration and remethylation, and folate dependent de novo nucleotide biosynthesis were investigated using stable isotopic tracers and GC/MS.

Results: GNMT expression increased methionine clearance by inducing homocysteine transsulfuration and remethylation metabolic fluxes in high or adequate methionine. On the other hand, restoring GNMT in GNMT-null cells did not lead to sarcosine synthesis in low methionine, indicating that normal GNMT function helped conserve methyl groups because scarcosine synthesis under such condition would waste methyl groups. GNMT expression also significantly improved folate status, induced methylfolate-dependent homocysteine remethylation flux, and reduced antifolate methotrexate cytotoxicity. In addition, GNMT helped enhance de novo nucleotide biosynthesis in folate depletion that can protect cells from DNA damage both in vitro and in vivo. These data indicated that other folate cofactor dependent reactions were also enhanced by GNMT.

Conclusion: We demonstrated that GNMT affects transmethylation kinetics, facilitates the conservation of methyl groups by limiting homocysteine remethylation fluxes. Restoring GNMT assists methylfolate-dependent reactions and ameliorates the consequences of folate depletion. GNMT expression in vivo improves folate retention and bioavailability in the liver and helps reduce DNA damage both in vitro and in vivo. The present study demonstrated additional mechanisms by which GNMT can participate in tumorprevention/suppression in humans.

Key words: DNA damage, Glycine-N methyltransferase, tumour suppresor, folate status

O002

RELATIONSHIP BETWEEN VITAMIN A STATUS OF LACTATING SENEGALESE WOMEN AND THEIR 6 MONTHS OLD INFANTS

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Background and objectives: Breast milk is the main source of vitamin A (VA) to meet the infants' needs and build liver stores. Because of the lack of conclusive evidence of VA deficiency (VAD) among lactating Senegalese women and their 6 months old infants, we undertook this study to assess the VA status of mother-infant pairs, VA intake from human milk, and the infant's VA liver stores.

Methods: A comprehensive study was undertaken in 34 nonpregnant lactating women and their infants. None of the infants had received a VA supplement. Mothers were grouped as supplemented with 2 doses of 200,000 IU (60,000 μg; 210 μmol) retinol as retinyl palmitate (n = 13) or nonsupplemented (n = 19) after delivery. Breast milk intake was measured by the deuterium dilution technique. Plasma and breast milk retinol concentrations were measured by HPLC. Infants' VA liver stores were assessed by the modified relative dose-response (MRDR) test.

Results: Plasma retinol detected 15% VAD among infants and the MRDR test (α=0.06) indicated 73.5% with low VA liver stores. Infants' milk VA intakes were close to estimated

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requirements (375 μg/d). No correlation was found between infants' plasma retinol and MRDR value. Infants' MRDR value was lower in the group from supplemented mothers (0.055 ± 0.017 vs. 0.073 ± 0.017; P = 0.009), but no difference was observed between plasma retinol concentrations of both groups of mothers; 8.8% of mothers were VA deficient based on plasma retinol <;0.7 μmol/L).

Conclusion: High prevalence of vitamin A deficiency was detected by the MRDR test in 6 months old Senegalese infants, and postpartum VA supplemented mothers significantly enhanced their infants' VA liver stores.

Key words: Milk retinol, plasma retinol, MRDR test, breast milk intake, Senegal.

O003

GENOME-WIDE VARIANCE CONTRIBUTION OF GENOTYPE BY ERYTHROCYTE N-3 POLYUNSATURATED FATTY ACIDS INTERACTION TO DIABETES-RELATED TRAITS

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Background and objectives: Little is known about the interplay between individual omega-3 fatty acid and genetic variants for type 2 diabetes (T2D) traits at the genome-wide level. The present study aimed to examine the variance contribution of genotype by environment (GxE) interaction between different types of erythrocyte membrane omega-3 fatty acids and genetic variants for T2D-related traits at the genome-wide level in a white population living in the U.S.A (n = 820).

Methods: A tool for Genome-wide Complex Trait Analysis (GCTA) was used to estimate the variance contritution of GxE interaction for T2D-related traits: homeostasis model assessment of insulin resistance (HOMA-IR), fasting insulin, fasting glucose, and adiponectin. GxE genome-wide association study (GWAS) was conducted to illustrate the results of GCTA, and for each E factor, which showed significant GxE variance contribution, another non-significant E factor was served as a control.

Results: C22:5n-3 contributed a most significant GxE variance to the total phenotypic variance of both HOMA-IR (26.5%, P=0.034) and fasting insulin (24.3%, P=0.042). C20:4n-6/(C20:5n3+C22:6n-3) ratio contributed a most significant GxE variance to the total variance of fasting glucose (27.0%, P=0.023). GxE variance of C20:4n-6/C20:5n3 ratio showed a marginally significant contribution to the adiponectin variance (16.0%, P=0.058). For each trait, GxE GWAS identified a larger number of single-nucleotide polymorphisms (SNP) (P-interaction<10E-5) for the E factor contributed a significant GxE variance than the control E factor: 9 vs. 3 SNPs for HOMA-IR, 21 vs. 6 SNPs for fasting insulin, 36 vs. 1 SNPs for fasting glucose, and 13 vs. 7 SNPs for adiponectin.

Conclusion: Erythrocyte omega-3 fatty acids contributed a significant GxE variance to T2D-related traits at the genome-wide level. Different types of omega-3 fatty acids showed different GxE patterns.

Key words: variance contribution, GCTA, GxE interaction, type 2 diabetes, omega-3 fatty acid

O004

THE METABONOMIC RESEARCH ON PRETERM INFANTS WITH NRDS

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Background and objectives: Neonatal respiratory distress syndrome (NRDS) still has a higher mortality and morbidity among premature infants. There are many complex factors contribute the NRDS. Meanwhile, the nutritional therapy of NRDS in clinical is complicated and full of argues. The metabolites which reflect the physiologic or pathologic status can be used in the diagnosis and prognosis and can indicate the organ homeostatic condition by metabonomics The objective was to detect the different metabolites in preterm infants with or without NRDS and to find the biomarkers of NRDS in prematures.

Methods: All the 40 preterm infants divided into 2 groups(NRDS and control) with no differences in the gestational age and birth weight. All the blood was collected within 2 hours after birth. Two methods were used: 1. Based on 1H-NMR metabonomics with PCA and PLS-DA. 2.GC-MS. The metabolites were identificated from the total ions chromatogram within the NIST02 library and processed by software named MarkerLynx, then analized multivariate statistically by SIMCA-P10.0 software package.

Results: 1.1H-NMR:There were much higher concentration of lactate, some lipid and alcohol and lower concentration of glucose, creatine, glutamine,OAc,NAc, alanine, valine,isoleucine and isobutyric acid in group NRDS.There were much lower concentration of HC=CH lipid,NAc, PtdCho ,LDL and VLDL in group NRDS by LED method. 2. GC-MS:The concentration of lactate, uric acid and creatinine were much higher while glucose, fructose, aspartic acid, palmitic acid and stearic acid were much lower in group NRDS.

Conclusions: 1.NRDS have lactate accumulation which can lead the anaerobic threshold shift left. 2. NRDS lack the main energy substances like glucose and important amino acids . 3. There exist metabolic disturbance of macro- nutrients such glucose, amino acids and lipid in preterm infants with NRDS.

Key words: Neonatal respiratory distress syndrome, metabonomics, NMR, GC-MS

O005

THE EXPRESSION OF TASTE RECEPTOR HTAS2R FAMILY OF DIABETICS.

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Background and objectives: Diabetes becomes so prevalent in the world that UN made a political declaration of warning. Taste is important for joy of life and used to be useful tools to judge foods maybe to manage nutrition intake. Diabetes may change taste as known. We studied to make clear the expression of taste receptor hTAS2Rs of diabetics.

Methods: The diabetics without appeal of taste disorders (DM, n=31) and healthy control (HC, n=92) were tested. Sample tissues were scraped from their foliate papilla and the expression characteristics of hTAS2R isoforms (1, 3, 4, 5, 7, 8, 9, 10, 13, 14, 16, 38, 39, 40, 42, 43, 44, 45, 47, 48, 49) were defined by the RT-PCR method. Food frequency questionnaire (FFQW65) was studied as a food and nutrients intake.

Results: The average age of DM were 63.9+/-15.4 yrs. and HC were 44.6+/-20.7 yrs. The average energy intake of DM were 1972+/-263 kcal/day, average energy adequacy were 110.5+/-15.9%. The average number of hTAS2R isoforms expressed in the DM subjects was 1.5+/-1.5, those in the HC were 10.4+/-5.2. hTAS2R8 was expressed in more than 90% of the HC in 40-79 yrs., but that was expressed less than 33% of DM. hTAs2R3, 10, 16 were expressed in more than 75% of the HC in 40-79 years old, but they were expressed less than 20% of DM. The expression of hTAS2R1, 13 47, 48 were not shown in DM, in contrast they were expressed more than 50% of HC.

Conclusions: The expression of taste receptor hTAS2Rs of DM was significantly suppressed than that of HC. This result suggested that diabetics have the poor taste and low satisfaction of eating, that may make their QOL lower than healthy people. There are misgivings for diabetics about eating behaviour and nutrient intake.

Key words:taste receptor, hTAS2Rs, diabetes.

O006

LEPTIN RECEPTOR GENETIC VARIANTS ARE SEX-SPECIFIC ASSOCIATED WITH BMI IN OBESE CHILDREN

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Background and objectives: Leptin (LEP) is a hormone secreted mainly from adipose tissue that plays a role on food intake and energy expenditure by activating the leptin receptor (LEPR). LEP also regulates glucose homeostasis and lipid metabolism independently of its central weight regulatory function, partly via direct action on pancreatic â-cells and hepatocytes. Genetic variation in LEP and LEPR genes modulate the LEP activity resulting in changes on body weight. We assessed the association of 28 LEPR polymorphisms with BMI and estimated the relationship of these polymorphisms with obesity-related phenotypes, inflammation and CVD risk biomarkers in Spanish children.

Methods: 532 children (292 obese and 240 with normal-BMI) were genotyped. Anthropometric data were measured and clinical, metabolic, inflammation and CVD biomarkers were analysed.

Results: All anthropometric, clinical and metabolic factors as well as inflammatory and CVD risk biomarkers were higher in the obese than in the normal-BMI group, except glucose, LDL-c and matrix metalloproteinase-9. We found five intro-

nic polymorphisms (rs11208659, rs11804091, rs10157275, rs9436303 and rs1627238) associated with BMI in the whole population. When we performed the analysis separated by sex, we observed that rs11804091 and rs10157275, and additional rs1327118, located in the promoter region, were associated with BMI only in the female group. Interestingly, the carriers of the rs11804091 risk allele have higher leptin, height, waist circumference, systolic blood pressure, insulin, HOMA-IR and TNF-á, and lower adiponectin and apolipoprotein A. No association of these polymorphisms were observed in males.

Conclusions: Our results suggest a sex-specific influence of the significant polymorphism on the early onset of obesity, and additionally, the rs11804091 on LEP and metabolic syndrome features. The obesity association of the SNPs reported here must currently be viewed as preliminary results, which require further validation in independent samples of bigger size.

Key words: Leptin, leptin receptor, childhood obesity.

O007

THE MTHFR 677TT GENOTYPE AND ITS INTERACTION WITH RELATED B-VITAMINS IN HYPERTENSION

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Background and objectives: Individuals who are homozygous for the 677C>T polymorphism (TT genotype) in the gene encoding methylenetetrahydrofolate reductase (MTHFR) are reported to have elevated blood pressure (BP). Furthermore we showed that BP can be significantly decreased in this genetically at-risk group by intervention with riboflavin; a cofactor for MTHFR [1,2]. The aim of this investigation was to examine the role of this polymorphism relative to other determinants of hypertension in a cohort of premature CVD patients and controls.

Methods: Baseline data collected from GENOVIT, a study to examine the association between genetic factors and B-vitamins in cardiovascular disease, were analysed. From a larger initial sample pre-screened for the MTHFR genotype, a total of 325 participants (TT n 70 and matched individuals with CC n 123 or CT n 132 genotypes) were available for this investigation.

Results: Of the factors analysed, the following were found to be significant determinants of hypertension; age (p 0.05), BMI (p 0.01), anti-hypertensive medication use (p ¡Ü0.001) and the TT genotype (p 0.010). After adjusting for these factors, low compared to high riboflavin status (as determined by the biomarker erythrocyte glutathione reductase activation coefficient; EGRac) significantly increased the risk of hypertension (OR 1.82; 95% CI 1.13-2.94; p 0.014). Red cell folate (RCF) was not found to be a risk factor for hypertension; however the combination of the TT genotype and low RCF significantly increased the risk of hypertension (OR 3.71; 95% CI 1.38-9.95; p 0.009).

Conclusion: The MTHFR 677TT genotype is a significant predictor of hypertension; an effect that is significantly modulated by B-vitamin status in this population.

Key words: Hypertension, MTHFR, B-vitamins References 1.Horigan G, McNulty H, Ward M et al. 2010 J Hypertens 28, 478-486 2.Wilson CP, Ward M, McNulty H et al. 2012 AJCN 95, 766-72

O008

PRECLINICAL EVALUATION OF THE INFLUENCE OF FEEDING WITH SLOW DIGESTING CARBOHYDRATES DURING PREGNANCY ON PROGRAMMING OFFSPRING METABOLIC HEALTH (NIGOHEALTH STUDY)

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Background and objectives: Maternal obesity and obesogenic dietary intake prior to and through pregnancy program offspring to a broad spectrum of metabolic and physiological alterations later in life such as adiposity, obesity, diabetes, changes on skeletal muscle and bone development and on cognitive performance. This work summarizes preclinical results obtained up to date on NIGOHealth (Nutrition Intervention during Gestation and Offspring Health) study. The main goal for this study is to evaluate the effects of feeding with slow digesting carbohydrates (SDC) during pregnancy on programming health and prevention of disease in the offspring from obese mothers during infancy and later in life.

Methods: Rats were assigned to one of three experimental groups: Control dams fed a standard rodent diet before mating and throughout pregnancy; dams fed a high fat (HF) diet for 6 weeks before mating and then fed a HF diet containing either SDC or high digesting carbohydrates (HSD) throughout pregnancy. Offspring's body composition was analyzed by using Magnetic Resonance Imaging technology. Plasma biochemical analysis was performed by using an autoanalyzer. Western blot was used to analyze signalling pathways. Muscle transcriptome was analyzed using the Agilent whole rat genome microarray and Ingenuity software was used for biofunction pathway analysis. Morris water maze and novel object recognition were performed to test learning and memory. Bones were analyzed by Micro-CT technology.

Results: Reduction on adiposity was associated to reduce levels of plasma glucose, triacylglycerides and cholesterol.

Offspring from pregnant rats fed with SDC also showed changes on adipose tissue glucose transporters and insulin signalling, that were consistent with reduced adiposity, at weaning and adolescence. Feeding with SDC during pregnancy also enhanced skeletal muscle development in the offspring. On the other hand offspring from mother fed with SDC had improved bone architecture and bone strength at adolescence and also showed improving learning and memory.

Conclusions: Results from this study point out the importance of nutrition during critical periods of development and show the role of carbohydrate profile on maternal diet influencing metabolism and several biochemical and physiological outcomes in the offspring. This influence may translate into prevention of metabolic diseases and other alterations later in life.

Key words: Early programming, dietary carbohydrate

O009

BREASTFEEDING ATTENUATES THE EFFECT OF LOW BIRTH WEIGHT ON ABDOMINAL ADIPOSITY; THE HELENA STUDY

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Background and objectives: Low birth weight has shown to have a programming effect on abdominal adiposity later in life, while breastfeeding in infancy has been suggested as a protective nutritional factor on the long term risk of obesity.The aim of this study was to examine whether breastfeeding may reduce the programming effect of birth weight on abdominal adiposity. Subjects and

Methods: Abdominal (in three regions: R1, R2, and R3) and truncal adiposity were measured by dual-energy X-ray absorptiometry in a total of 314 adolescents. Breastfeeding duration, birth weight, duration of gestation and maternal educational level were obtained from questionnaire. Physical activity was objectively measured by accelerometry.

Results: We detected significant interaction effects between breastfeeding and birth weight on truncal and abdominal adiposity in the three regions (Ps= 0.02 to 0.07). Stratified analyses by breastfeeding categories (never vs. > 3 months of breastfeeding) showed significant associations of birth weight with truncal and abdominal adiposity in the 3 regions in the group who had never been breastfed (beta=-0.19 to -0.23; Ps<0.05), while no evidence of association was found in adolescents who had breastfeeding for >3 months (beta = -0.03 to -0.07).

Conclusion: Breastfeeding may reduce the adverse influence conferred by low birth weight on abdominal adiposity in adolescents. Our findings suggest that breastfeeding may be used as a primary prevention nutritional factor of abdominal adiposity in individuals at increased risk due to fetal programming.

Key words: Abdominal adiposity, adolescents, breastfeeding, fetal programming.

O010

NUTRITION EFFECT OF YYB INTERVENTION ON 6-24 MONTHS INFANTS IN WENCHUAN EARTH QUACK REGION IN CHINA

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Background and objectives: Previous survey had showed the 2008 Wenchuan earth quack brought a serious nutrition problem of infants in the affected regions. MOH, supported by UNICEF, organized 1.5 years intervention project by freely supply YingYang Bao (YYB), a soy bean powder based complimentary food supplement and infant feeding manual to the 6-23 month infant families.

Methods: YYB was distributed to 27,872 infants in 8 earth quack counties in Sichuan, Shaanxi, and Gansu Provinces through the public health system. A baseline survey was done just before beginning the distribution of YYB and follow-up surveys were done 6 months, 12 months, and 18 months thereafter. Weight, height and Hb were measured and angular stomatitis, glossitis, and rickets were determined by physical examination. Questionnaires were designed to survey family condition and daily feedings. Averagely 1129 infants were PPS sampled for each survey in 4 selected counties.

Results: Program compliances were 91.9%, 87.4% and 84.1% in 6, 12 and 18 month surveys respectively. Anemia rates decreased from 49.5 % to 24.2 %, 24 %, 22.9% in 6, 12 and 18 months survey. Stunting rate significantly decreased and

wasting rate remained unchanged as it was already very low in the baseline survey. The prevalence of angular stomatitis, glossitis and rickets were declined. A large proportion of mothers improved their knowledge of infant feeding and aware of the benefits of YYB.

Conclusion: The observation showed that YYB was benefit to at risk 6-23 month infants and it may consider feasible for public nutrition intervention on infants.

Key words: nutrition intervention, infant, ying yangbao, anemia, stunting

O011

INFANT MACRONUTRIENT INTAKE AND CARDIOVASCULAR STRUCTURES AND FUNCTION IN CHILDHOOD: THE GENERATION R STUDY

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Background and objectives: Early nutrition may influence cardiovascular development. Not much is known about the associations between dietary composition and cardiovascular risk factors in childhood. We investigated the associations between infant macronutrient intake and cardiovascular structures and function in 2882 children participating in a population-based cohort study.

Methods: Information on macronutrient intake at the age of 1 year was obtained from food frequency questionnaires filled in by the parent. Systolic and diastolic blood pressure, carotid-femoral pulse wave velocity, left cardiac structures (left atrial diameter, aortic root diameter, and left ventricular mass), and fractional shortening were measured at the age of 6 years. Linear regression analyses were performed using residual-adjusted macronutrient intakes, adjusted for maternal, child, and dietary factors.

Results: Higher total fat intake was associated with higher carotid-femoral pulse wave velocity (difference 0.11m/s, 95% confidence interval (CI) 0.02 to 0.20 for the third tertile, as compared to the first tertile), whereas higher intakes of total carbohydrate and mono- and disaccharides were associated with lower carotid-femoral pulse wave velocity. No consistent associations were observed for macronutrient intake with systolic blood pressure, diastolic blood pressure, aortic root diameter, and fractional shortening. Higher total fat, saturated fat, and monounsaturated fat intake were associated with lower left atrial diameter (P values for trend <0.01, 0.02, and <0.01, respectively). Furthermore, the third tertile of mono- and disaccharides intake was associated with a higher left ventricular mass (difference 1.02g, 95% CI 0.18 to 1.85). There was no sufficient evidence for interaction by child's sex, BMI, or ethnicity in the associations between macronutrient intake and cardiovascular outcomes.

Conclusions: Dietary macronutrient composition may lead to cardiovascular developmental adaptations in childhood. Further studies are needed to investigate whether these adaptations have consequences for the risk of future cardiovascular disease.

Key words: cardiac development, cardiovascular function, macronutrient intake, children

O012

MICRONUTRIENT DEFICIENCIES OF ADOLESCENT GIRLS IN CENTRAL MOZAMBIQUE – ZANE-STUDY

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Background and objectives: Micronutrient deficiencies are a global nutritional problem. Especially vulnerable may be adolescent girls in low-income countries who are still growing but likely to become pregnant. Here we report the prevalence of low serum concentrations of zinc, ferritin (iron), retinol and folate of girls living in different environments in central Mozambique.

Methods: A cross-sectional study was carried out among girls aged 14 to 19 years in January-February and May-June 2010. The study areas were Quelimane city (urban area), as well as the centres and rural villages of a coastal and an inland district. Non-fasting serum samples were analysed in Finland. Multiple micronutrient deficiency (MMD) was indicated if three or four out of the four micronutrient concentrations were below the relevant cut-off values.

Results: Data on micronutrient status are available from 510 girls. In the different areas, 2 to 16% of the girls were pregnant. The BMI-for-age was mostly normal but overweight existed in Quelimane (13% of non-pregnant girls) and district centres (2 and 6%). Proportions of girls with low serum concentrations ranged from 25 to 52% for zinc, 11 to 57% for ferritin, 11 to 30% for retinol and 0 to 20% for folate. MMD was most prevalent in Quelimane (17%) while it was 7% in the district centres, and 1 and 3% in the rural areas. The proportions of girls with no deficiencies were 15% in Quelimane, 30 and 39% in the coastal and inland centres, and 44 and 53% in the coastal and inland villages, respectively.

Conclusions: Micronutrient deficiencies are common among adolescent Zambezian girls. MMD is most prevalent in the city where also overweight is most common. This may indicate adverse effects of nutrition transition.

Key words: micronutrient deficiency, adolescent girl, Africa

O013

IS THE CURRENT STATUS CONTRIBUTING TO REDUCE THE EXCLUSIVE BREASTFEEDING LENGHT?

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Background and objectives: Breast milk is the best food for infant and must be offered for infant under six months in an exclusive way. The "current status" method is recommended to estimate exclusive breastfeeding length (EBL). To compare EBL for under six months infants by actual and retrospective data using different methods.

Methods: Data came from 4 pooled Demographic Health Survey (DHS) - Bolivia, Brazil, Colombia and India – carried out from 1992 to 2010, available in Measure DHS website. A total of 9522 infants under six months, alive and living with their families was included in the analysis. EBL was calculated using two different methods: M1 from mother's declared information about the age of the first time that a varied of foods and liquids introduced – retrospective data (survival time) and M2 from mother's declared information about foods offer in last day – actual data (current status). At the first way, for infants never breastfed time of EBL was considered 'zero', for infants no longer in lactation was used information recalled by mother, and for infants in exclusive breastfeeding it was used current age. In the second way, median was calculated by the current status, according to the World Health Organization (WHO) and Macro International.

Results: A total of 110 mothers (1.1%) declared that never breastfed her infants. According M1 and M2, 3934 (41.3%) and 4053 (42.5%) were in exclusive breastfeeding at the time of interview and 5589 (58.0%) and 5470 (57.4%) were no longer in exclusive breastfeeding, respectively. The EBL in M1 was 3.7 months and in M2 was 2.3 months, a 1.4 months difference.

Conclusions: Current status gives estimates lower than mother's information. In some countries differences are minimal. The basics and causes of differences will be explored in further work.

Key words: exclusive breastfeeding, current status,.

O014

EFFECT OF ANIMAL-SOURCE FOODS AND MICRONUTRIENT-FORTIFICATION COMPLEMENTARY FOODS ON BODY COMPOSITION, LINEAR GROWTH, IRON STATUS – THE WINFOOD PROJECT IN CAMBODIA

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Background and objectives: The nutritional quality of CF in developing countries is often insufficient to sustain optimal growth. The Winfood project evaluated the efficacy of two new, processed rice-based CF with local ASF in Cambodia: non-fortified 'WinFood' (WF) with 14% by dry-weight ASF from small-sized fish (Esomus longimanus and Paralaubuca typus) and edible spiders (Haplopelma sp.)); an adjusted 'lite' WinFood (WF-L) with 10% by dry-weight ASF from small-sized fish of mixed species, and fortified with mineral/vitamins. The products were precooked by extrusion. The WF-products were compared with two standard products from World Food Programme: Corn-Soy-Blend (CSB+) and CSB++ (8% by dry-weight skimmed-milk powder), in a single-blinded randomized trial.

Methods: 419 Cambodian infants at age 6 months were randomized to daily rations of one of the four products for nine months. BC (deuterium dilution) and iron status (serum ferritin and hemoglobin) were measured before and after intervention and anthropometry (knee-heel-length, length, weight, MUAC, head circumference and skinfolds) monthly. Data were analyzed by intention-to-treat.

Results: Among 358 children completing the study, no significant difference in BC between the groups where found, but knee-heel length increments differed (P=0.046: WF-L: 3.6 cm, CSB++: 3.6 cm, WF: 3.5 cm, CSB+: 3.4 cm), suggesting that micronutrient-fortified products with 8-10% ASF (CSB++ and WF-L) promoted better linear growth than products without fortification or ASF. Knee-heel and total length increment was

significantly higher in the highest food compliance quartile compared to the lowest, across foodgroups. There were no differences in ferritin and hemoglobin concentration. There was higher prevalence of anemic children in the WF group.

Conclusion: Products with ASF (milk or small fish) and micronutrient premix resulted in slightly better linear growth. Small fish is a cheap ASF with high potential to improve locally produced industrially processed CF.

Key words: Complementary foods (CF); Body composition (BC); Animal-source foods (ASF)

O015

MATERNAL LCPUFA STATUS DURING PREGNANCY AND CHILD INTERNALISING AND EXTERNALISING PROBLEMS. THE GENERATION R STUDY

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Background and objectives: Maternal prenatal omega 3 (n3) and 6 (n6) long-chain polyunsaturated fatty acids (LCPUFAs) as well as the n3:n6-ratio are important for foetal brain development and have been linked to cognitive development. Their association with offspring behaviour is less consistent. The present study aimed to assess the associations between maternal prenatal LCPUFA status and child problem behaviour.

Methods: Within a population-based cohort, we measured maternal plasma LCPUFA concentrations in second trimester of pregnancy. Child internalising and externalising problems were assessed with the Child Behaviour Checklist (CBCL) at 6 years in 5,307 children. We assessed the associations of maternal docosaheaenoic acid (DHA), eicosapentaenoic acid (EPA), arachidonic acid (AA) concentrations and n3:n6-ratio with child internalising and externalising problems using logistic regression analysis. For consistency, analyses were repeated for teacher reported problem behaviour at 6 years (Teacher Report Form).

Results: After confounder adjustment, maternal DHA and n3:n6-ratio were negatively associated with child internalising problems (ORDHA = 0.90, 95% CI: 0.83-0.99; ORn3:n6 = 0.92, 95% CI: 0.84-1.00), which was also observed in both the clinical range as well as teacher report of internalising problems. A similar association was found for maternal report of externalising problems, but this finding was not observed in the teacher report or at the clinical level.

Conclusions: Higher maternal DHA concentration and n3:n6-ratio are negatively associated with increased risk of child internalising problems. Further research into optimal prenatal intakes of LCPUFAs is needed.

Key words: Prenatal; LCPUFA; internalising problems; externalising problems; child

O016

VITAMIN B12 SUPPLEMENTATION OF BANGLADESHI WOMEN DURING PREGNANCY AND LACTATION INCREASES VITAMIN B12 IN BREAST MILK AND IMPROVES INFANT STATUS

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Background and objectives: Vitamin B12 deficiency is associated with adverse outcomes in pregnancy and infancy, and results in low milk B12, increasing risk of neurological and developmental disorders in exclusively breastfed infant. It is of critical importance to know whether combined effective intervention during pregnancy and lactation can improve breast milk and infant status in populations with low animal source food intake. The objective was to evaluate effect of vitamin B12 supplementation during pregnancy and lactation on breast milk and infant B12 status.

Methods: Bangladeshi women (n=69, 18-35 y, Hb<115 g/L, 11-14 wk pregnant) were randomized to receive 250 µg/d B12 or placebo through 4 month postpartum. Both supplements contained 400 µg folic acid + 60 mg Fe. Data collected on mothers and infants included anthropometry, plasma and milk B-12 and dietary diversity.

Results: Demographic, dietary diversity and biochemical variables did not differ between groups at baseline, when 26% women were B12 deficient (<150 pmol/L), and 39% had marginal status (150-220 pmol/L). Supplementation significantly increased median plasma B12 in mothers (416 vs. 242 pmol/L) and infants (328 vs. 200 pmol/L) at 4 month (all P<0.001). B12 concentrations indicated deficiency in 29% and marginal status in 35% of infants of placebo compared to 9% deficient and

9% marginal deficiency in supplemented group. Median B12 in colostrum of supplemented group increased to 778 vs. 320 pmol/L in placebo (P<0.001), and 235 vs. 170 pmol/L (P<0.05) at 4 month in milk. Maternal B12 at baseline remained correlated (r=0.40, P<0.01) with milk concentrations at 4 month; colostrum (r=0.28, P<0.05) and milk B12 (r=0.51, P<0.001) were correlated with infant B12 at 4 month among all participants.

Conclusions: 250 µg/d B12 supplements during pregnancy and lactation are transferred to breast milk and consequently to infant, resulting in normal infant B12 status.

Key words: Vitamin B12, Pregnancy, Lactation

Acknowledgements: Nestle Foundation

O017

DIGESTIVE HEALTH AND BOWEL FUNCTION DURING THE MENSTRUAL CYCLE: THE EFFECT OF DIET AND HORMONAL CONTRACEPTIVE USE.

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Background and objectives: Previous research suggests that women experience variations in digestive discomfort and bowel function during the menstrual cycle. Harder stools are more likely during the luteal (premenstrual) phase with looser, more frequent stools during menstruation. This study examines the link between the menstrual cycle, stool type and frequency, digestive discomfort and wellbeing.

Methods: The study was an online UK survey of 1012 premenopausal women aged 18-48 years, representative of the female population for age and socio-economic status. The survey required women to rate their bowel movements before, during and after menstruation using the pictorial Bristol Stool Form Scale. Information on other symptoms of digestive function, psychological state and wellbeing during these phases of the menstrual cycle were also reported on 5 point Likert scales. Respondents provided demographic and other health data including use of hormonal contraception. They also indicated how comfortable they felt and with whom they would discuss menstruation and bowel function.

Results: Over 164 different patterns of stool form across the cycle were identified. Only one third of women showed the previously accepted typical pattern of bowel function. Use of hormonal contraceptive methods was associated with more stable stool form suggesting that female hormonal fluctuations do affect bowel function. Strategies to manage bowel function included medication and diet. Women were often embarrassed and reluctant to discuss their digestive health even with health professionals.

Conclusions: Bowel function is an important indicator of health and can be altered by diet as well as hormonal milieu as shown in this representative survey. Given the wide range of experiences of stool form and different patterns during the cycle, it is important that reliable sources of advice and information for women in relation to this sensitive and personal experience are available.

Key words: bowel function, digestive health, wellbeing, menstrual cycle

O018

EVIDENCE ABOUT SUGAR-SWEETENED BEVERAGES AND WEIGHT GAIN: IS THE POTENTIAL FINANCIAL CONFLICTS OF INTEREST BIASING THE CONCLUSIONS?: A SYSTEMATIC REVIEW

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Background and objectives: Industry sponsorship of biomedical research might bias scientific conclusions. However, available research has focused on pharmaceutical studies and little is known about the potential role of industry sponsorship in the area of nutrition. Our objective was to review if the reported financial conflicts of interest are related to the main conclusions of the systematic reviews conducted in the field of sugar sweetened beverages (SSB) and weight gain or obesity.

Methods: We conducted a search of PubMed and Cochrane databases and a hand search of reference lists to identified published systematic reviews or meta-analyses (SR/M) up to January 2013 on the association between SSB consumption and weight gain or obesity. SR/Ms were independently classified by two blinded researchers according to their conclusions into two groups: positive and non-positive association. Information about the financial conflicts of interest reported by the authors in the manuscript was also abstracted.

Results: We identified 15 systematic reviews. In 6 of them a financial conflict of interest with some food industry was disclosed. Among those reviews without any reported conflict of interest 80% stated that SSB consumption could be a potential risk factor for weight gain. By contrast, 83.3% of those disclosing some financial conflict of interest with the food industry concluded that the scientific evidence was insufficient so far to support a positive association. Those reviews with conflicts of interest were almost 5 times more likely to present a non-posi-

tive conclusion than those without them (relative risk adjusted for year of publication: 4.8, 95% CI: 1.1-20.2).

Conclusion: Financial conflicts of interest may bias conclusions regarding the association between SSB consumption and weight gain or obesity, with potentially adverse consequences for knowledge and public health.

Acknowledgements: Instituto de Salud Carlos III. Project FIS: PI1002293.

Key words: sponsorship, bias, financial, soft drinks, obesity

O019

IRON FORTIFICATION INTERVENTIONS: SYNTHESIS OF RESULTS FROM THREE RANDOMIZED TRIALS IN ASIA

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Background and objectives: This study was conducted to examine the collective results of iron fortification interventions on iron status, from three randomized trials in Asia.

Methods: Three randomized controlled trials of iron biofortification interventions were included in this analysis (iron-iodine fortified salt, iron biofortified pearl millet, and rice). A total of 686 participants, were enrolled in these trials in India and the Philippines. Iron status (hemoglobin, ferritin, sTfR, body iron), inflammation (CRP, AGP), and anthropometric indices were measured at enrollment, midline, and endline in each trial. The primary outcomes evaluated included 1) hemoglobin and serum ferritin concentrations, 2) incidence of anemia (Hb<12.0 g/dL) and iron deficiency (ferritin<15.0 μg/L), 3) resolution of these outcomes, 4) sTfR, and 5) body iron. Mixed models were used to examine the effects of interventions on hematological outcomes. A meta-analysis using random effects models was conducted with the DerSimonian and Laird method.

Results: At baseline 32% of participants were anemic and 25% were iron deficient in the overall sample. In meta-analyses of data from the three trials, iron interventions significantly increased serum ferritin concentrations, but only among individuals who were iron deficient at baseline ($p<0.05$). Iron interventions did not significantly reduce the incidence of poor hematological outcomes over follow-up. However, iron interventions significantly increased the likelihood of resolution of iron deficiency by more than 50% ($p<0.01$).

Conclusions: Iron fortification interventions resolved iron deficiency during follow-up, and increased ferritin concentrations among individuals who were iron deficient at baseline. Findings provide support for iron-fortified interventions, with increased potential to benefit among iron deficient individuals. A comprehensive approach to prevent anemia and iron deficiency, including larger samples, appropriate dosing, and targeted preventive interventions need to be examined to reduce the burden of iron deficiency in resource-limited settings.

Key words: Iron deficiency, anemia, fortification, intervention, Asia

O020

PARENTAL SPORTS AND TV TIME AS MEDIATORS OF PARENTAL EDUCATION DIFFERENCES IN CHILDREN'S SPORTS AND TV TIME: THE ENERGY-PROJECT

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Background and objectives: Lower socioeconomic status is associated with less favourable physical activity and sedentary behaviours in children. These patterns may be caused by parental modelling. The study aims were to explore whether differences in children's sports participation and TV time according to parental education were mediated by parental sports participation and TV time, and to explore the differences between parental and child reports as potential mediators.

Methods: 5729 children and 5183 parents participating in the ENERGY-project were included. Sports participation and TV time were assessed by child- and parent-reports. Children also reported on parental sports and TV time. Country-spe-

cific multilevel mediation analysis (product-of-coefficients test by MacKinnon) was applied to test the potential mediation effect of parental sports and TV time in the association between parental education and children's sports and TV time. All models were adjusted for children and parental age, gender and parental education.

Results: In the countries were parental education differences in children's TV time were observed (Greece, Hungary, the Netherlands and Slovenia), parent-reported parental TV time significantly mediated the associations. Evidence for mediation by child-reported parental TV time was found in Greece only. For children's sports participation, significant differences according to parental education were also observed in four countries (Greece, Hungary, Norway, Spain) and were mediated by parental self-reported sports in Greece and by child-reported parental sports in Greece and Norway.

Conclusions: Parental behaviours appear to be important in explaining parental educational differences in children's sports participation and TV time. However, Child reports of parental sports and TV time appear to be more relevant than parents' self-report as correlates of children's own sports and TV time, but parental self-reported behaviour appears to be more relevant for explaining parental educational differences in children's TV time and sports participation.

Key words: TV time, sports, parental modelling, mediation analysis

O021

RISK FACTORS FOR PRELACTEAL FEEDINGS IN SEVEN LATIN AMERICA AND CARIBBEAN COUNTRIES.

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Background and objectives: WHO recommends exclusive breastfeeding for six months of life. Prelacteal feeding (i.e., offering liquids before milk begins to flow) has been identified as a risk factor for shorter breastfeeding duration. We aim to identify risk factors for prelacteal feeding in the first three days of life in Latin America and the Caribbean.

Methods: The present study used secondary data from Demographic and Health Surveys conducted in seven countries (Colombia/2010, Bolivia/2008, Guiana/2009, Haiti/2005, Honduras/2005, Peru/2007 and Dominican Republic/2007). Binomial multivariate regression tested the influence of the following covariates on the likelihood of prelacteal feeding: country of residence, wealth index, place of residence (urban/rural), maternal education level, birth weight, type of delivery (vaginal/cesarean), place of delivery (home/hospital), and sex of child.

Results: The final pooled sample (N=58,056 children) had the following characteristics: 51.3% were male; 51.6% were living in urban areas; in the first three days of life, 67.0% of the mothers gave no prelacteal feedings to their baby, 17.9% gave infant formula, 6.4% gave tea or infusions, 5.0% gave milk (other than breast milk), 2.0% gave plain water, and 4.5% gave other liquids before breast milk began to flow. The binomial model adjusted Odds Ratios (OR) for prelacteal feeding that were statistical significance ($p<0.001$) were higher in Haiti (OR=6.65), Dominican Republic (OR=3.57), Guiana (OR=2.76), Peru (OR=2.39), Bolivia (OR=2.35) and Honduras (OR=2.21), when compared against Colombia. The OR were also significantly higher for the wealthiest mothers (OR=1.46), those with higher educational level (OR=1.33), cesarean delivery (OR=2.51), and delivery at home (OR=1.29).

Conclusion: The high prevalence of prelacteal feeding supports the investment in policies targetingthe most vulnerable countries and individuals at risk of practicing this undesired behavior, in order to promote, support and protect breastfeeding.

Key words: breastfeeding, prelacteal feeding, child health, nutrition, epidemiology.

O022

CALORIES AND ENERGY BALANCE: THE IMPORTANCE OF SMALL STEPS TO TRIGGER BIG CHANGE TOWARDS REVERSING OBESITY

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Background and objectives: Sixteen of the largest food and beverage manufacturers in the United States came together to form the Healthy Weight Commitment Foundation (HWCF). Comprising the largest industry initiative in any nation, these companies collectively pledged to reduce calories by 1 trillion by 2012 and 1.5 trillion by 2015, towards the nation's goal of reversing childhood obesity. This study compares the total number of calories HWCF companies sold in 2012 with the total number of calories HWCF companies sold at baseline (2007) to determine whether the HWCF reached its 1 trillion calorie pledge.

Methods: For the 16 participating HWCF companies data was obtained from multiple sources, including Nielsen ScanTrack, for all point of sale units sold and associated nutrition data. This created a comprehensive food and beverage product

database for analysis. The HWCF product database includes all food and beverages sold, by Uniform Product Codes, and the associated calories per serving for each product recorded during the study periods of interest. We examined the difference between calories at baseline and 2012 employing descriptive statistics. Qualitative analyses were conducted to describe differences in calories between the two study periods of interest.

Results: Between 2007 and 2012 we documented a significant decrease in total calories available in the marketplace. Qualitative results demonstrate that calorie reductions are attributed largely to an increase in lower- and no calorie choices, more calorie and portion controlled food and beverages, and consumers shifting their purchase habits towards lower calorie food and beverages.

Conclusions: Despite an increase in total US retail grocery sales over time, we documented decreases in total calories sold by the 16 HWCF companies. The HWCF initiative offer great potential for incentivizing further industry change and will point the way to future actions needed to prevent childhood obesity.

Key words: Calories, energy balance, obesity.

O023

HEMOCHROMATOSIS GENE (HFE) MUTATIONS AND THE RISK OF GASTRIC CANCER IN THE EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION STUDY

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Background and objectives: Iron has been suggested to play a role in carcinogenesis. Hereditary hemochromatosis (HH) is a strong risk factor of hepatocellular cancer, and mutations in the HFE gene associated with HH and iron overload may be related to other tumors sites, but no studies have been reported for gastric cancer (GC).

Methods: A nested case-control study was conducted within the European Prospective Investigation into Cancer and Nutrition (EPIC) including 365 incident gastric adenocarcinoma and 1284 matched controls. Genotype analysis was carried out for two known functional polymorphisms of HFE (C282Y and H63D) and seven tagSNPs of the HFE genomic region. Association with all gastric adenocarcinoma, and according to anatomical localization and histological sub-type, was assessed by means of the odds ratio (OR) and 95% confidence interval (CI) estimated by unconditional logistic regression adjusted for the matching variables.

Results: We observed a significant association for H63D, with OR=1.32 (CI 1.03-1.69). In sub-group analyses, the association was stronger for noncardia anatomical sub-site (OR=1.60, CI 1.16-2.21) and intestinal histological sub-type (OR=1.82, CI 1.27-2.62). Among intestinal cases two tagSNPs (rs1572982, rs6918586) also showed a significant association that disappeared after adjustment for H63D. No association with tumors located in the cardia or of diffuse sub-type was found for any of the nine SNPs analyzed.

Conclusions: H63D mutation in HFE gene seems to be associated with GC risk of the noncardia region and intestinal type, possibly due to its association with iron overload, although a role for other mechanism cannot be entirely discounted.

Key words: gastric cancer, hemochromatosis, HFE gene

O024

THE SPANISH OBSERVATORY OF NUTRITION AND STUDY OF OBESITY: A NECESSARY ACTION

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Background and objectives: Information systems are essential in the study of obesity. As a great diversity of data sources exist coordination systems are needed in order to obtain suitable and quality information, and to monitor and assess politics and interventions. The aim of this action was to launch an Observatory of Nutrition and Study of Obesity in Spain, within the NAOS Strategy, the comprehensive strategy of the Spanish Ministry of Health for the promotion of healthy food habits, physical activity and obesity prevention.

Methods: An order to create the Observatory was included in the Spanish Law 7/2011 of Food Safety and Nutrition with the main goal of promoting politics and interventions based in scientific evidence. Subsequently a search of information and background concerning working and design of other observatories in Spain and abroad was performed. Features of the observatory as a complete information system were settled: data sources, studies, research projects, campaigns, programs, action plans, bibliography. In addition, a suitable framework and a working system were designed to ensure the achievement of the objectives. A website was designed as the host of information and as a permanent join with users.

Results: Afterwards all those works were performed within the working team of the NAOS Strategy in the Spanish Agency of Food Safety and Nutrition, the Observatory was officially created by the Spanish Council of Ministers in January the 3rd 2013.

Conclusions: The Observatory of Nutrition and Study of Obesity will be an essential tool in planning, monitoring and assessment of politics of obesity prevention and promotion of healthy habits in nutrition and physical activity.

Key words: observatory, obesity,,nutrition; information, evaluation

O025

EFFECTS OF DIETARY SUPPLEMENTATION WITH EICOSAPENTAENOIC ACID AND LIPOIC ACID IN HEALTHY OVERWEIGHT/OBESE WOMEN FOLLOWING AN ENERGY RESTRICTED DIET.

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Background and objectives: Recent studies have shown that dietary supplementation with antioxidants such as lipoic acid and with anti-inflammatory food components such as omega-3 polyunsaturated fatty acids could help to improve obesity treatment and/or alleviate the co-morbidities related with an excessive fat storage. In the present study, the main goal was to investigate the effects of a regular administration of lipoic acid (LA) and eicosapentaenoic acid (EPA) supplements combined with a moderate calorie restriction on weight loss and body composition as well as on glucose and lipid profile in healthy overweight/obese women.

Methods: In this double-blind placebo-control trial, 99 women aged 20-50 years, with a BMI between 27.5 and 40 Kg/m2 were randomly assigned to one of the four experimental groups (Control (placebo), eicosapentaenoic acid (EPA 1.3 g/d), lipoic acid (LA 0.3 g/d) and eicosapentaenoic acid plus lipoic acid (EPA 1.3 g/d + LA 0.3 g/d), all within an energy-restricted diet. Anthropometry's, body composition, blood pressure, energy expenditure, glucose and lipid profile as well as leptin and ghrelin were assessed.

Results: All groups exhibited a significant reduction ($p<0.05$) in body weight, anthropometric measurements and fat mass, that were accompanied by decreases in total and LDL-cholesterol levels and triglycerides as well as on insulin levels and the HOMA index. The weight loss and fat mass reductions were significantly higher ($p<0.01$) when participants were supplemented with lipoic acid. The EPA group had the higher reduction in waist to hip ratio ($p<0.05$). At endpoint of the study was observed a significant ($p<0.05$) reduction of leptin levels in all groups without differences respected to control.

Conclusion: The LA supplementation in conjunction with an energy-restricted diet may be useful to increase the magnitude of body weight and fat mass reduction in healthy overweight/obese women.

Key words: energy-restricted diet, lipoic acid, eicosapentaenoic acid, weight loss.

O026

IMPACT OF VITAMIN A AND ZINC ON DIARRHEAL E. COLI INFECTIONS AND ASSOCIATED DIARRHEAL EPISODES AMONG CHILDREN IN MEXICO CITY, MEXICO

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Background and objectives: Heterogeneity in vitamin A and zinc supplementation efficacy on diarrheal disease may result from their effect on specific diarrheal pathogens. We evaluated vitamin A and zinc supplementation efficacy on diarrheal E. coli pathoytpe (DEP) infections among Mexican children.

Methods: A randomized, double-blind, placebo-controlled trial was conducted among 707 children, 6 to 15 months of age from periurban areas of Mexico City. Children were assigned to receive either vitamin A every 2 months, a daily zinc supplement, a combined vitamin A and zinc supplement or a placebo for 1 year. The primary end points for this analysis were infection rates and associated diarrhea for diffuse-adhering E. coli (DAEC), enteroaggregative E. coli (EAEC), enterotoxigenic E. coli (ETEC) and enteropathogenic E. coli (EPEC) among a subsample of 326 children followed from May to September 2001.

Results: DAEC and EAEC were the most frequently isolated pathogens followed by ETEC and EPEC. Vitamin A and zinc supplementation had no effect on overall pathogen outcomes. Zinc supplementation was associated with reduced DAEC infections among boys but not girls. In contrast, zinc supplementation was associated with reduced DAEC associated diarrhea among girls. EAEC infections were significantly reduced among 12-18 month old vitamin A and zinc supplemented children.

Conclusions: Vitamin A and zinc supplementation was associated with distinct DEP-specific health outcomes. These findings confirm that heterogeneity in pathogen supplementation efficacy may contribute to overall heterogeneity in supplementation efficacy.

Key words: vitamin A, zinc, diarrhea, pathogenic E. coli

O027

INPATIENT MANAGEMENT OF INFANTS SUFFERING FROM ACUTE MALNUTRITION AND THEIR OUTCOME DEPENDING OF THEIRS CHARACTERISTICS

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Background and objectives: Acute malnutrition remains a public health problem in developing countries including Cameroon. It increases the mortality rate by 50 %. In the North region of Cameroon, its prevalence (10.2 %) exceeds the 10 % limit of acceptability recommended by WHO. Amongst these children, 3.4 % suffer from severe acute malnutrition. Within the context of our work, our objective was to evaluate the effect of acute malnourished children's characteristic on their management's issues.

Methods: To attain its, we have did a cohort study of children aged 6 to 59 months and suffering from acute malnutrition with medical complication managed at in-patient therapeutic feeding center (ITFC) of regional hospital of Garoua from April to August 2012. Anthropometric parameters were measured and noted on a card. Information on dietary practices (mainly breastfeeding practices) and vaccination status of the child was gotten from the caretaker. HIV status was determined on admission.

Results: This study revealed that most of the children suffered from severe acute malnutrition (n = 101; 82 %). In addition to be affected by acute malnutrition, 62 % of the children were suffering from chronic malnutrition. There was a significant relation between weight variation during hospitalization and infant's issue, those who lose weight having the higher mortality rate (m= 17.8 ; p = 0.01). The mortality rate of hospitalized children suffering from severe acute malnutrition rise to 13 %, the recovery rate was 7 %, the transfer rate was 60 % and the default rate was 20%. Mean upper arm circumference lower than 115 mm is the anthropometric factor that increased significantly the mortality rate of children suffering from severe acute malnutrition (m= 6.7 ; p = 0.04). Children aged 6 to 24 months and breastfed during hospitalization had lower mortality risk.

Key words: severe acute malnutrition, child, management, mortality, ITFC

P028

EFFECTS OF L-CARNITINE SUPPLEMENT ON PLASMA COAGULATION AND ANTICOAGULATION FACTORS IN HEMODIALYSIS PATIENTS

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Background and objectives: Hypercoagulability is an important risk factor for thrombosis and its complications in hemodialysis patients. This study was designed to investigate the effects of L-carnitine supplement on plasma coagulation and anticoagulation factors in hemodialysis patients.

Methods: Thirty-six hemodialysis patients were randomly assigned to either a carnitine or a placebo group. Patients in the carnitine group received 1000 mg/day oral L-carnitine for12 weeks, whereas patients in the placebo group received a corresponding placebo. At baseline and the end of week12, 5 mL blood was collected after a 12- to 14-hour fast and plasma fibrinogen concentration, activity of plasma proteinC, coagulation factors V, VII, IX, and serum concentrations of tissue plasminogen activator (tPA), plasminogen activator inhibitor type-1 (PAI-1), free carnitine, and C-reactive protein (CRP) were measured.

Results: In the carnitine group, mean serum free carnitine concentration increased significantly to 150% of baseline ($p < 0.001$), whereas plasma fibrinogen and serum CRP had 98 mg/dL ($p < 0.01$) and 41% ($p < 0.01$) significant decreases, respectively, at the end of week 12 compared with baseline. The reductions were significant compared with the placebo group ($p < 0.05$).No significant differences were observed between the two groups with regard to mean changes of the activity of plasma protein C, coagulation factors V, VII, IX, and serum PAI-1 to tPA ratio.

Conclusion: L-Carnitine supplement reduces serum CRP, a marker of systemic inflammation, and plasma fibrinogen, an inflammation-related coagulation factor, in hemodialysis patients. Therefore, L-carnitine may play an effective role in preventing cardiovascular diseases in these patients.

Key words: anticoagulation factors, coagulation factors, hemodialysis, inflammation, L-carnitine.

O029

THE BENEFICIAL EFFECTS OF THE RESMENA DIETARY PATTERN ON OXLDL IN PATIENTS WITH METABOLIC SYNDROME

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Background and objectives: The prevalence of metabolic syndrome MetS) is increasing worldwide. Insulin resistance, hyperglycemia and type 2 diabetes have been considered major traits of the MetS. Moreover, oxidative stress is considered an important contributor to these pathophysiological complications. Therefore, the aim of the present study was to evaluate the interactions and effectiveness of a weight loss dietary pattern on improving the oxidative stress status on patients suffering MetS with hyperglycemia.

Methods: Seventy-nine volunteers recruited according to specific inclusion criteria were randomly assigned to two low-calorie dietary treatments (-30% Energy): the Control diet based on the American Heart Association criteria and the RESMENA diet based on a different macronutrient distribution (30% proteins, 30% lipids, 40% carbohydrates), which was characterized by a high adherence to the Mediterranean diet, increased meal frequency (7times/day), low glycemic load (mainly in the afternoon and at night) as well as high total antioxidant capacity and omega-3 fatty acids content. Anthropometrical measurements and biochemical analyses were performed before and after 6-months of intervention. Plasma ox-LDL were measured using a capture ELISA assay kit.

Results: Both dietary groups significantly decreased body weight, BMI, waist circumference and total fat ($p < 0.001$ both groups) as well as plasma TG ($p < 0.05$ Control, $p < 0.005$ RESMENA), insulin ($p < 0.001$ both groups) and HOMA-IR ($p < 0.005$ Control, $p < 0.001$ RESMENA) levels, associated to the energy restriction. Interestingly, after the intervention, only subjects of the RESMENA group significantly reduced plasma oxLDL, the main variable of the study, resulting in significant differences between groups ($p < 0.025$).

Conclusions: the RESMENA dietary pattern might be a good option for patients specifically suffering Mets and hyperglycemia not only due to the beneficial effects of weight loss, but also on oxidative stress status.

Key words: metabolic syndrome, hyperglycemia, oxidative stress, oxLDL.

O030

EFFECT OF PHYSICAL ACTIVITY OR NUTRITION EDUCATION ON ANTHROPOMETRY AND BLOOD PRESSURE OF OVERWEIGHT OR OBESE ADOLESCENTS

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Background and objectives: Overweight and obesity are increasing worldwide, intervention programs have given limited results. The objective of the study was to observe changes in body mass index (BMI), adiposity and blood pressure in 12 to 14 year old overweight or obese adolescents, with nutrition education (NE), physical activity (PA) or combined programs.

Methods: Adolescents from public schools in Tuxtla Gutierrez (TG) and Toluca (TO) in Mexico, participated during 26 weeks as follows: 1) NE-TG, 2) NE-TO, 3) PA-TG, 4) PA-TO, 5) NE+PA-TG, 6) NE+PA-TO. Weight and stature for BMI, waist circumference (WC), body fat (BF), and systolic (SBP) and diastolic (DBP) blood pressure were measured at baseline and weeks 14 and 26. Multivariate analysis was done in SPSS.

Results: Statistically significant effects of time by intervention group ($p<0.05$) and time by study site and gender ($p<0.05$) were found in BMI. WC was significantly affected by time ($p<0.001$); time and study site ($p<0.01$); and time by intervention group ($p<0.05$). Body fat was significantly affected by time ($p<0.001$), time by study site ($p<0.05$), time by gender and time by intervention group and gender. Systolic blood pressure decreased in time with all three interventions with significant effects by time ($p<0.001$), time and study site ($p<0.05$); time and intervention group ($p<0.05$), and time by study site, intervention group and gender ($p<0.05$). Diastolic blood pressure decreased in all cases except in the females from the NE-TG group. Effects were significant for time ($p<0.001$); time by study site ($p<0.05$); time by intervention and gender ($p<0.05$); time by study site, intervention and gender ($p<0.05$).

Conclusions: Physical activity, nutritional education and their combination helped improve anthropometry and blood pressure in overweight and obese adolescents during the first 14 weeks of intervention.

Acknowledgements: This project was financed by UAEM.

Key words: Overweight, obesity, adolescents, physical activity, nutrition education

O031

NUTRITIONAL AND GENETIC DETERMINANTS OF CAROTID ATHEROSCLEROSIS, INFLAMMATORY CYTOKINES AND BONE MASS IN CHINESE ADULTS: A 3-YEAR PROSPECTIVE STUDY

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Background and objectives: Nutritional and genetic determinants of atherosclerosis and bone health remain uncertain. We examined various foods, nutrients, phytochemicals and candidate gene polymorphisms on carotid arthrosclerosis, inflammatory cytokines, and bone mass in a community-based prospective study.

Methods: 3,169 (932 men) Guangzhou residents (45-75y) completed baseline survey during 2008.7-2010.6. 2524 of them was followed up during 2011.5-2012.12. At the baseline and follow-up, face-to-face interviews were conducted to assess dietary intake (by a 79-item FFQ) and general information. We determined anthropometric indices, carotid intima-media thicknesses (IMTs) via ultrasound, body fat and bone density (BMD) by DXA. Fasting blood was collected to test RBC fatty acids, serum phytochemicals (isoflavones, carotenoids, favanones), lipids, cytokines (IL-6, IL-1B, TNF-α, MCP-α, CRP, SVCAM-1), and gene polymorphisms related to lipids, bone metabolism or antioxidation (CYP19A1, CYP2R1, SOST, SOD, DHCR7, VDR, ESR1, MTHFR, OPG, DBP, GPR177, RANK, LRP5, APOE, Wnt16). Independent effects and interactions of the various environmental and genetic factors on IMTs, BMD and cytokines and their changes were analyzed using multivariate models.

Results: After adjustment for potential covariates, we found: (i) greater intake of fruit and vegetables, higher scores of "healthy dietary pattern", higher dietary quality scores, higher blood carotenoids, favanones, n-3 fatty acids were associated with lower IMTs and their increase rates, and with some cytokines; (ii) greater fruit and vegetables, seafoods, lean meat, tea drinking, and higher dietary quality scores, higher blood isoflavones and carotenoids were correlated to better bone density; (iii) significant associations of many gene polymorphisms with IMTs, bone mass and some cytokines; and interactions between many nutritional factors and some gene polymorphisms were observed.

Conclusions: We found many useful independent nutritional and genetic determinants, and their interactions related to carotid atherosclerosis, inflammatory cytokines and bone health in Chinese.

Key words: nutrition, gene polymorphisms, atherosclerosis, inflammatory cytokines, bone density.

O032

EFFECTS OF ZINC SUPPLEMENTATION ON SERUM LEPTIN LEVEL AND INSULIN SENSITIVITY IN OBESE PEOPLE

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Background and objectives: Obesity is a crucial risk factor for many disorders. Level of minerals such as zinc is low in serum, plasma or erythrocytes of obese patients. Zinc plays a role in fat metabolism, appetite control, insulin resistance, and obesity. On the other hand, hormones such as leptin have key role in regulation of energy balance. The aim of this study was to assay effects of zinc supplementation on leptin level and insulin sensitivity in obese people.

Methods: This study was conducted on 60 eligible obese people (BMI >30 kg/m2) that were randomly divided into intervention and control groups. Intervention group received a 30mg/d zinc pill and placebo group received 30mg/d isomaltose pill for a period of 4 weeks. Serum leptin and zinc level were measured by enzyme-linked immunosorbent assay and atomic absorption spectrophotometer, respectively. In addition, Insulin level and Insulin resistance (IR) were determined by immunoenzymometric assay and (HOMA-IR) model.

Results: A significant increase in serum leptin level observed in zinc group ($p<0.05$). There was no significant differences in post intervention serum leptin level between the two groups ($p>0.05$). Serum zinc concentration increased in both groups, but it was significant only in intervention group. Serum insulin level and HOMA- IR index decreased in both groups after 4 weeks. These reduction were significant in zinc group compared to initial level ($p<0.05$).

Conclusions: Zinc supplementation in obese people may be an effective approach in reduces insulin resistance complications and improving zinc deficiency. The future studies are recommended to assay other inflammatory biomarkers and with longer duration in obese population.

Key words: obesity, leptin, zinc, insulin sensitivity.

O033

ASSOCIATION BETWEEN THE IMPROVEMENT IN ANXIETY SYMPTOMS WITH WEIGHT LOSS IN SUBJECTS WITH METABOLIC SYNDROME

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Background and objectives: Metabolic syndrome is a combination of medical disorders whose prevalence is increasing worldwide, leading to an increased incidence of CVD. An association between anxiety disorder and metabolic syndrome has recently been reported, however, the precise interactive pathways between these diseases still remains unclear. This study examined the effects of a hypocaloric treatment to reduce metabolic syndrome features on anxiety status.

Methods: A total of sixty-two non-demented males (n=39) and females (n=23) subjects (Age:50±10 y; BMI:36.1±4.3 kg/m2) with metabolic syndrome according to IDF criteria were enrolled in a randomized controlled clinical trial. Subjects followed two hypocaloric diets (control diet and RESMENA diet) with the same energy restriction (-30% TCV) for six months. The 20-items State-Trait Anxiety Inventory (STAI) was used to measure anxiety symptoms. STAI questionnaire as well as anthropometric and biochemical variables were analysed at the beginning and at the end of the intervention.

Results: The subjects mean weight loss was 8.5±5.0 kg. Anxiety symptoms decreased during the weight loss intervention (ΔSTAI: -14.7±27.0) with no differences between dietary groups ($p>0.10$). Moreover, it was found that those subjects losing more weight during the dietary intervention showed a greater decline in anxiety symptoms (ΔSTAI: -22.6±24.8) than those who lost less weight (ΔSTAI: -7.5±27.2) ($p = 0.024$).

Conclusions: This study demonstrated that an effective hypocaloric diet designed to reduce metabolic syndrome features, also improved anxiety symptoms, being this improvement higher in those subjects losing more weight during the weight loss intervention.

Key words: anxiety symptoms, metabolic syndrome, weight loss

O034

VALIDATION OF THE INTERACTIVE TWENTY-FOUR HOUR RECALL METHOD AMONG GHANAIAN CHILDREN

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Background and objectives: The 24-hour recall is a popular method for collecting dietary intake data but it has poor precision in assessing intakes. An improvement over the 24-hour recall is the interactive 24-hour recall which uses pictures of food items, food models and actual foods to assist with recall. We validated the interactive 24-hour recall method against the weighed food record in a semi-urban community in Ghana.

Methods: Dietary intake data for 51 children (8-18 months) were collected using the weighed food record on day 1 and the interactive 24-hour recall the next day. Intakes from the weighed food record and the interactive 24-hour recall were compared using paired t-test and Pearson correlation.

Results: Estimated mean ± SD energy intake was significantly (p = 0.04) lower for the weighed food record (356.9 ± 303.5 kcal) than the interactive 24-hour recall (410.8 ± 229.6 kcal) but estimates of the other nutrients did not differ between the two methods. Pearson correlation coefficients of the energy and nutrient intakes from the weighed food and the interactive recall method ranged between 0.4 and 0.8.

Conclusion: The interactive 24-hour recall may overestimate energy intake, but it is nearly as good as weighed food records in estimating nutrient intakes among Ghanaian infants.

Key words: 24-hour recall, interactive 24-hour recall, weighed food record, energy intake

O035

BODY COMPOSITION OF KUWAITI CHILDREN; ESTABLISHMENT OF A STABLE ISOTOPE FACILITY FOR ASSESSMENT OF TOTAL BODY WATER IN KUWAIT

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Background and objectives: Assessment of body composition provides a much needed tool to monitor and evaluate interventions to combat obesity, in particular during childhood. Stable isotope technique to estimate total body water (TBW) is the golden standard technique for body composition. The aims of this study were to install the technique for TBW and assess body composition of Kuwaiti children.

Methods: The Isotope Ratio Mass Spectrometer (IRMS) was calibrated with defined international reference water standards. 75 boys and 83 girls (7-9 years) participated in the study. A dose of deuterium oxide (1-3 g) was consumed after an overnight fast and deuterium enrichment in baseline and post dose urine samples was measured. TBW was calculated and used to estimate fat free mass (FFM). Fat mass (FM) was estimated by difference (body weight minus FFM).

Results: IRMS measurements were confirmed to be accurate and precise. Children were classified as normal weight, overweight or obese according to the World Health Organization (WHO) based on BMI-for-age z-scores. Statistically significant differences in body composition were observed between normal weight boys and girls while only minor differences were found in overweight and obese children. Of particular interest is the finding that both boys and girls children classified as normal weight or overweight had high % body fat, over 35% and 40 % respectively.

Conclusion: The introduction of state-of-the-art technology for assessment of body composition provides an opportunity to explore a wide range of applications, within Kuwait as well as in the Gulf region.

Key words: Body composition, stable isotopes, childhood obesity, IRMS, deuterium dilution, Kuwait

O036

PERCENTILE DISTRIBUTION OF ANTHROPOMETRIC VARIABLES OF BODY COMPOSITION IN PREGNANT WOMEN

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Background and objectives: The anthropometric indicators of body composition which reflect the lean and fat body compartments of a pregnant woman are modified along gestation, due to which the use of percentile distribution values for each gestational age is necessary. The purpose of the study was to determine the percentile distribution of skinfolds (biceps, triceps, subscapular, thigh) and fat and muscle areas.

Methods: This cross-sectional study included 4,550 measurements of anthropometric variables in pregnant women between ages 19 and 39 years, who were well-nourished, healthy, without edema, with single pregnancy, and a validated gestational age of ≤13 weeks at admission, evaluated at Centro de Atención Nutricional Infantil Antímano – CANIA from October 1998 to July 2012. The anthropometric measurements were made by standardized anthropometrists. Descriptive statistics and percentiles 3, 10, 25, 50, 75, 90 y 97 were calculated for each gestational age between the 8th and 37th weeks of gestation.

Results: Te number of measurements made for each studied variable ranged between a minimum of 102 and a maximum of 244 per gestational age. The behavior of the studied variables reflecting the fat component showed increases as the gestational age advanced, whereas the muscle area showed decreases. The most noticeable variations were observed in subscapular and thigh skinfolds, as well as in the fat area. Changes in the variables referred to in the 50th percentile were: skinfolds (mm): biceps 1.3, triceps 1.4, subscapular 2.8, and thigh 5,0; and areas (cm2): fat 2.18 and muscle -0.16.

Conclusions: The percentile distribution of anthropometric variables of body composition for each gestational age is a necessary tool in the anthropometric evaluation of a pregnant woman as it allows for an adequate interpretation of the values of variables to correctly classify her nutritional status.

Key words: Percentiles distribution, pregnancy, anthropometry, body composition, nutritional assessment.

O037

GROUNDWATER IRON IN BANGLADESH: DOES IT CONTRIBUTE TO POPULATION IRON NUTRITION?

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Background and objectives: Bangladesh is a country with high prevalence of anemia, and iron deficiency is believed to be high. The present data on iron status of the population was collected as part of the first ever national survey on micronutrients in 2011-2012 in Bangladesh.

Methods: 150 clusters - 50 each from rural, urban, and urban slum strata, were systematically selected from the Multiple Indicator Cluster Sampling (MICS) of 2009. Prevalence of iron deficiency was assessed in preschool age children (6-59 months, Pre SAC), school age children (6-14 years, SAC) and non-pregnant, non-lactating women (NPNLW, 15-49 years). Serum ferritin was assessed by ELISA. CRP and AGP were measured and ferritin was adjusted for infection. Iron deficiency was defined as serum ferritin <12 ng/ml in the Pre SAC and <15 ng/ml in the SAC and NPNLW. The British Geological Survey report of 2001 was used as reference for groundwater iron status of Bangladesh.

Results: Prevalence of iron deficiency was 10.7% and 7.1% in the Pre SAC and NPNLW, respectively and 3.9% and 9.5% in the SAC aged 6-11 years and 12-14 years, respectively. Mean ferritin was higher in the areas with "high" groundwater iron than in the areas with "low" iron in the groundwater ($p<0.001$ in all the population groups). Multiple regression analysis confirmed "high" groundwater iron as an independent predictor of serum ferritin in all groups (NPNLW: $t=4.33$, $p<0.001$; SAC: $t=2.64$, $p=0.009$; Pre SAC: $t=3.35$, $p=0.001$). A contemporary study in Bangladesh also found very low prevalence of iron deficiency in Bangladesh women, and attributed it to high groundwater iron consumed through drinking water.

Conclusion: Prevalence of iron deficiency was found to be lesser than the widely held assumption. High level iron from drinking groundwater might be associated with lower prevalence of iron deficiency in Bangladesh.

Acknowledgement: UNICEF

Key words: Groundwater, Iron deficiency

O038

IDENTIFYING KEY FOOD SOURCES OF VITAMIN A, IRON AND ZINC AND POTENTIAL FOOD FORTIFICATION VEHICLES IN BANGLADESH

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Background and objectives: Bangladesh (BD) has made remarkable progress in improving health of its people over the past three decades. Progress in nutrition has been much slower. We aimed at a national evaluation in BD assessing apparent food consumption patterns and intakes of energy (E) and the micronutrients (MN): vitamin A (VitA), iron (Fe) and zinc (Zn) with the goal of identifying food vehicles for fortification.

Methods: We used the BD 2010 national household consumption and expenditure survey (HCES), with 12,240 households (hhold) and 55,580 individuals. With socio-demographic and food acquisition data from 14 days plus a nutrient database for BD, we calculated hhold distributions of food and nutrient intakes with adult consumption equivalents. Comparing the usual intakes to age/sex-specific estimated average requirements, we estimated prevalences of inadequate intakes using the cut-point (VitA and Zn) and the probability (Fe) methods. Results were stratified by region, urban/rural and poverty groups.

Results: Rice (68%) was the main source of E, followed by oilsand fats (9%) and wheat flour (6%). For vitA, main sources were vegetables (66%) and milk anddairy (10%). Main contributors for Fe were vegetables, rice and wheat flour while sources of Zn were rice, vegetables and meats. Inadequate intakes of micronutrients were detected in 67%, 36% and 42% of the population for VitA, Fe and Zn, respectively. The most affected population was the hard-core poor, with inadequate intakes observed among 87% (VitA), 61% (Fe) and 77% (Zn) of them.

Conclusions: This paper contributes to laying a foundation for better understanding nutrition status in Bangladesh. Taking into account the industrial structure of candidate food vehicles, and focusing only on food purchase we identified potential fortification vehicles and estimate the coverage and quantity of the potential vehicles consumed.

Key words: Bangladesh, food consumption, micronutrient fortification Funding: SPRING Project

O039

ADOLESCENT GIRLS IN INDONESIA ARE AT RISK OF INADEQUATE MICRONUTRIENT INTAKES

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Background and objectives: Due to their specific eating habits and lifestyles, adolescents were commonly at risk for low micronutrient intakes that may result in greater risk of micronutrient deficiencies. Adolescent girls have to consume adequate nutrition to support their rapid growth and development as well as to ensure good pre-conception nutritional status. Previous research on adolescent girls in many countries has shown that this group always did not meet the recommended values for some important micronutrients. Data on micronutrient intakes among Indonesian adolescent girls is limited, particularly those derived from large scale studies.

Methods: Analyses were undertaken on consumption data of 20030 adolescent girls derived from the national survey, RISKESDAS (Basic Health Research) 2010. Micronutrient intakes were calculated based on Indonesian food composition data using NUTRISOFT program. Micronutrient adequacies were determined according to the Indonesian recommended daily allowance 2004 and WHO references 2004. ANOVA test was performed to determine differences in average micronutrient intakes and Chi-Square test was performed to determine differences in risk of micronutrient inadequacy according to age groups, residential location, pregnancy, and menstruation status.

Results: The girls' daily micronutrient intakes (vitamin A, vitamin C, Folic Acid, Iron, Zinc, and Calcium) were low and differences were observed by age, residential location, pregnancy status, and menstruation status ($p < 0.05$, ANOVA). The prevalence of inadequate micronutrient intakes were high (above 90%) and differences were observed by age, residential location, pregnancy status, and menstruation status ($p < 0.05$, Chi-Square).

Conclusions: Indonesian adolescent girls were at risk of low micronutrient intakes that may contribute to greater risk of micronutrient deficiencies. Age, residential location, pregnancy, and menstruation, could contribute to the low intakes.

Key words: micronutrient, adolescent girls, Indonesia

Acknowledgement: This research received grant from LITBANGKES Indonesia.

O040

THE MAIN GROWTH PARAMETERS OF 7 AND 8 YEAR-OLD LITHUANIAN CHILDREN IN HISTORICAL PERSPECTIVE

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Background and objectives: The monitoring of a growing child is important for diagnosis of overweight and obesity. The objective of this research was to evaluate the growth and nutritional status of 7-8 year old children and compare the results with previous surveys conducted in Lithuania.

Methods: Study was performed participating in the WHO Childhood Obesity Surveillance Initiative. A cross-sectional anthropometrical study of a national representative sample of first-formers was performed in ten districts of Lithuania. In 2008 4939 and in 2010 4986 first-formers were anthropometrically measured (response rate 85.2% and 83.1% respectively). As there were no significant differences among the data on nutritional status of first - formers in 2008 and 2010 year, the final sample of 9790 7-8 year old children was used for the analyses. Nutritional status was evaluated by BMI using the growth reference recommended by the International Obesity Task Force (IOTF).

Results: The estimated mean values of body mass index (BMI) of surveyed 7 and 8 year old boys were higher than the values of girls. In 2008-2010 the prevalence of overweight and obesity among 7 and 8 year old children was 11.5 %/11.7 % and 5.9 %/4.7 % respectively. Analyzing by gender no differences were found in nutritional status of seven and eight year old boys. But the percentage of obese girls in the age group of seven was 1.4 times more if compared with the age group of eight (p=0.01).

Conclusion: The mean values of height, weight and BMI of 7 and 8 year old children were higher in comparison with previous studies conducted in 1985 and 2000.

Key words: Obesity, children, nutritional status

O041

CROSS-SECTIONAL ADIPOSITY AND LEAN MASS OF SIX MONTH OLD INFANTS DETERMINED BY DEUTERIUM OXIDE DOSE-TO-INFANT IN RURAL KENYA

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Background and objectives: Adiposity and lean mass in infancy can determine health status later in life. There is inadequate data on body composition in early infancy in resource poor settings. The aim of this study was to determine body composition of six month old infants in Mumias, Kenya.

Methods: A cross-sectional study of six month old infants n=445 sampled from three health centers in Mumias district in Kenya. Participants were dosed with 3g deuterium oxide (0.5g/Kg body weight). Saliva was collected from each infant before the oral administration of the dose (baseline sample) and then at 1-hour and 3-hours after administration. Deuterium enrichment in saliva was determined by Fourier Transformed Infrared Spectrophotometry.

Results: Mean weight was 7.5 Kg (95% CI: 7.4; 7.6). Mean Fat Free Mass (FFM) was 6.4 Kg (95% CI: 6.3; 6.5). Mean Fat Mass (FM) was 1Kg (95% CI: 1.0; 1.1). In secondary analysis, male infants had significantly greater FFM [6.6±1.0 kg vs 6.2±1.1 kg ($p<0.01$)] and weight [7.7±1.1 kg vs 7.3±1.0 kg ($p<0.01$)] compared to female infants.

Conclusions: Males have greater lean mass than girls as early as infancy. This study has contributed valuable information on adiposity and lean mass in early infancy in resource poor settings.

Key words: adiposity, lean mass accrual, deuterium dose-to-infant technique, Kenya

O042

DADIZEIN SOY ISOFLAVONE AND ITS GUT METABOLITE,EQUOL: A REVIEW OF ANIMAL AND HUMAN STUDIES.

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Background and objectives: Several studies have shown that the hypolipidemic, antioxidant and bone maintenance properties of soy products are primarily due to the isoflavones component. Recent studies demonstrate that equol,a metabolite of the Isoflavone daidzein that is produced by the intestinal flora, may have therapeutic benefits.Not all humans can produce Significant amounts of equol. Equol and its health benefits have been widely studied. This review article summarizes the analysis of articles on:1)the identification of intestinal strains of bacteria capable of equol production in vitro; 2)modification of gut microflora in non equol-producers via probiotic or prebiotics administration; and 3)clinical trials examining natural S-equol supplements.

Methods: Articles including in vitro or animal studies as well as clinical trials published between 2000 and 2012 in the PubMed data base on these three topics were reviewed

Results: Various bacterial strains such as those from the bifidobacterium or lactobacillus families have been isolated from the feces of different animals and humans and are able to convert daidzein to equol in vitro. Most studies observed the ability of some strains of bacteria to shift a human from being a non-equol producer to the equol-producer phenotype; however, the results of human interventional studies on the effect of probiotics on equol production are inconsistent, likely due to differences in the dose or kind of probiotic strain used. Few clinical trials examine the S-enantiomer of equol from natural supplements and its protective action in metabolic syndromes or alleviating hot flashes in postmenoposaul women.

Conclusions: Further studies are needed to evaluate if the equol producer phenotype is a fixed characteristic of an individual or if it may be subject to probiotic,prebiotic or synbiotic manipulation.

O043

EFFECT OF FRUCTOOLIGOSACCHARIDES AND GALACTOOLIGOSACCHARIDES IN GERM FREE MICE

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Background and objectives: Fructooligosaccharides (FOS) and galactooligosaccharides (GOS) are widely known prebiotics products, i.e. they favor the selective growth of host friendly bacteria in vivo. However, they can also exert direct effects on the intestinal mucosa. Here we test the effect of FOS and GOS enriched diets on germ free mice.

Methods: NMRI mice were fed with a 5% supplemented diet with either FOS or GOS (5%) for 4 weeks immediately after weaning. Some animals also received an sterile bacterial homogenate (SBH). Small bowel and colonic tissue were processed for the determination of enzymatic activities and hematoxilin-eosin staining. Immunoglobulins were measured in plasma with a multiplex kit. Colonic RNA was isolated and analysed by using an Illumina mouseWG-6 v2.0 array platform.

Results: GOS and FOS supplementation resulted in significant changes in disaccharidase activity in the intestine. An increase in microvilli length in small bowel and a decrease in liver weight was also observed. FOS significantly reduced IgG in plasma. At the genomic level GOS and FOS induced the differential expression of 254 and 306 sequences, respectively. SBH was added to some animals to reproduce the luminal presence of bacterial antigens, resulting in changes in the expression of 408 sequences. PRRX1 was upregulated by all treatments, while 9 genes were repressed in common, including endothelin 1 and the β/δsubunits of the epithelial sodium channel (EnaC). These are expressed at low levels in normal mice.

Conclusions: FOS and GOS have significant effects on the intestine of germ free mice and may help to reestablish normal water homeostasis in these animals.

Key words: genomics, prebiotic, germ-free mice

O044

DEVELOPMENT OF MULTIFUNCTIONAL BAKERY BIO-INGREDIENTS CONTAINING TWO IMPORTANT VITAMINS, FOLATE AND B12

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Background and objectives: Microorganisms and their metabolites produced by biofermentations offer interesting benefits for food applications, e.g. production of specific vitamins; biopreservation and reduction of E-numbers, and improved texture of foods. Two problematic vitamins in nutrition are folate and B12, especially among women of child-bearing age, the aging population and strict vegetarians. This study aimed to develop new, natural sources of these important vitamins as well as other functional substances for adding value to bakery products.

Methods: A co-culture technology (a) using strains of Lactobacillus plantarum and Propionibacterium freudenreichii selected for complementary carbon metabolism and high production of folate and Vitamin B12, respectively, was used to produce these vitamins along with anti-microbial compounds, mainly organic acids (propionic, acetic acids and others). The resulting mixture of multifunctional (MF) bio-ingredients was tested in Semmeli breads to assess stability and effects on product quality. Dough, partly- and fully-baked Semmeli were enriched with MF bio-ingredient at 0.1% or 0.2% equivalent propionate, levels shown to exert strong anti-microbial activity in previous work.

Results: The MF bio-ingredient contained vitamer 5-formyltetrahydrofolate, known to be metabolically active and shown in baking tests to have higher stability (ca 60% recovery) than endogenous folate (35% recovery) derived from flour. Production of liquid MF ingredient in cereal-based medium using optimal conditions led to levels of folate and B12 as high as ca 6000 ng/ml, and 1000 ng/ml, respectively. Most bread-making and final quality determinations were acceptable for industry applications, as shown by physico-chemical, texture and sensory analyses.

Conclusions: This co-culture technology and MF bio-ingredients have good potential for natural food fortification, allowing to reach or exceed vitamin levels required for EU authorized health claims. In addition to bringing innovation to the baking sector, it represents a new source for developing natural food supplements.

Key words: Functional ingredients, vitamin fortification, folate, vitamin B12 (a)2010 Hugenschmidt et al. Patent WO2010078670-A2 202010078670-A3

O045

ANTI-INFLAMMATORY EFFECTS OF HYDROALCOHOLIC EXTRACT FROM EUTERPE OLERACEA MART. (AÇAÍ)

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Background and objectives: The consumption of polyphenol-rich foods is associated with a decreased risk of mortality from cardiovascular diseases. We have demonstrated that the stone of Euterpe oleracea Mart. (açaí) from the Amazon region exerts vasodilator and antioxidant actions. The aim of this study was to evaluateitsanti-inflammatory effects in an in vivo model of renovascular hypertension (RH) and in endothelial cells (ECs).

Methods: Rats were treated with ASE 200 mg.kg-1.day (or vehicle) for 40 days. Oxidative damage, antioxidant activity and the expression of endothelial nitric oxide synthase (eNOS), superoxide dismutase 1 and 2 (SOD 1 and 2), metalloproteinase (MMP-2) and tissue inhibitor of metalloproteinases (TIMP)-1 were determined. Structural changes in the aortic and mesenteric MMP-2 levels were evaluated. In in vitro experiments, ECs were treated with 100 ug/mL of ASE and the expressions of inflammatory markers were evaluated.

Results: ASE reduced the increased mesentery levels of malondialdehyde and carbonyl protein in hypertensive rats. SOD, catalase and glutathione peroxidase activities and SOD1 and 2, eNOS and TIMP-1 expressions were reduced. ASE prevented the vascular remodeling, as well as, the increased MMP-2 expression and levels found in hypertensive rats. In ECs ASE was able to decreased TNFα, eNOS and IL-8 mRNA expression.

Conclusions: These results suggest that ASE prevents the endothelial dysfunction and vascular structural changes associated with hypertension. Financial Support: FAPERJ.

Key words: açaí, polyphenols, oxidative stress, vascular

O046

COMPARING THE EFFECT OF PROBIOTIC AND CONVENTIONAL YOGHURT CONSUMPTION ON LIPID PROFILE IN PATIENTS WITH NON-ALCOHOLIC FATTY LIVER DISEASE (NAFLD)

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Background and objectives: Non-alcoholic fatty liver disease is frequently associated with obesity.The purpose of this study was to investigate the effects of probiotic and conventional yogurt on the lipid profile in non-alcoholic fatty liver disease people.

Methods: In a randomized double-blind controlled trial, 72 people (33 males and39 females) with non-alcoholic fatty liver disease were assigned to 2 groups. Participants consumed daily 300 g of probiotic yogurt containing Lactobacillus acidophilus La5 and Bifidobacterium lactis Bb12 or 300 g of conventional yogurt for 8 wk. Fasting blood samples, anthropometric measurements and 3-d, 24-h dietary recalls were collected at the baseline and at the end of the trial.

Results: Probiotic yogurt consumption caused a 8.4% decrease in total cholesterol and a 7.45% decrease in LDL-C compared with the control group. No significant changes from baseline were shown in triglyceride and high-density lipoprotein cholesterol (HDL-C) in the probiotic group. Probiotic yogurt improved total cholesterol and LDL-C concentrations in non-alcoholic fatty liver disease people.

Conclusion: The consumption of fermented milkks with specific probiotics may may contribute to the improvement of cardiovascular disease risk factors in non-alcoholic fatty liver disease.

Key words: probiotic yogurt, lipid profile, non-alcoholic fatty liver disease

O047

ROLE OF POLYPHENOL JUICE DRINKS IN THE PREVENTION OF POSTPRANDIAL INFLAMMATORY STRESS IN HUMANS

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Background and objectives: In western societies where most of the day is spent in the postprandial state, the existence of higher oxidative and inflammatory stress, as a result of sustained dietary hyper- lipidemia and glycemia, make postprandial stress a factor involved in the development of cardiovascular risk. The response to a High Fat Meal (HFM) is mediated by pro-inflammatory cytokines, glycemia/insulin and oxidized lipids. We investigated the effect of a dietary stressor (HFM) with and without Polyphenol-Containing Juice Drinks (PJD) composed by multiple fruit juice and extracts, on markers of lipid metabolism, redox and inflammatory status in healthy overweight volunteers.

Methods: HFM was 1344 kcal meal delivering 55% energy as fat, 30% as carbohydrates and 15% as protein. In a double-blind, crossover design (10-day washout) 14 overweight volunteers were randomly assigned to HFM+500 ml placebo-beverage free from fruit juice or extracts or HFM+500 ml PJD.

Results: The ingestion of a HFM induced a clear increase in inflammatory cytokines [IL-6 ($p<0.001$); TNF-α ($p<0.001$)], cholesterol ($p<0.01$), triglycerides ($p<0.001$), glucose ($p<0.001$) and insulin ($p<0.001$) plasma levels. The ingestion of a HFM in conjunction with PJD strongly reduced the production of inflammatory cytokines TNF-α and IL-6 with a concomitant reduction of the metabolic redox response to inflammation and with a decline in the absorption of cholesterol and triglycerides, the efficiency of which was related to antioxidant and polyphenol composition.

Conclusions: The ingestion of PJD provided the body with an exogenous and ready to use source of redox ingredients that helped the body better cope and neutralize metabolic pathways leading to inflammatory stress as a consequence of the HFM. The results of the study and a review of the available evidence on the effect of plant foods on postprandial stress, will be presented and critically discussed.

Key words: fruit-juice drink, triglycerides, inflammation, human, postprandial stress.

O048

THE EFFECT OF DAILY ORANGE JUICE CONSUMPTION ON BLOOD LIPIDS, IN OVERWEIGHT MEN

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Background and objectives: There is concern in the media regarding citrus consumption and possible adverse effects of fructose on blood lipid profile. Short-term high fructose feeding studies have induced increases in triacylglycerol concentration. However, high dose citrus supplementation has been shown to decrease LDL in hypercholesterolemic patients. The objective was to investigate the effect of daily orange juice consumption on blood lipids, in overweight men, using a randomised, single-blinded, parallel group design.

Methods: Thirty-six overweight, but otherwise healthy men (40-60yrs;27-35kg/m2), with elevated fasting serum cholesterol (5-7mmol/l), were recruited from the general population. None were taking lipid-lowering medication, using nutritional strategies to lower cholesterol, or regular consumers of citrus products. Assessment of fasting total cholesterol, LDL, HDL, non-esterified fatty acids, triacylglycerol, APO-A1 and APO-B concentrations, was made before (V1) and after (V2) participants consumed 250ml/day of orange juice (OJ), or an orange flavoured drink (CON) for 12wks. Drinks were matched for energy and sugars composition. Normally distributed data are presented as the mean (±SD).

Results: The two groups were matched at V1 with respect to all parameters (P>0.05). No variables changed significantly between visits within groups, and no differences were observed between groups, at V2. However, a numerical increase in triacylglycerol concentration at V2 (compared to V1) in CON (+0.22(0.17) mmol/l), and a corresponding numerical decrease in OJ (-0.24(0.13) mmol/l), resulted in a significant intervention effect for this variable (P<0.05). Moreover, in OJ, those with the highest initial triacylglycerol concentration, showed the greatest reduction after 12 wks supplementation (r^2=0.476; P<0.01), whereas there was no correlation in these variables in CON (r^2= 0.121; P=0.157).

Conclusions: Three month's daily consumption of a drink containing 22 g of sugars (including 12g of fructose), did not adversely affect fasting blood lipids. Daily consumption of 250 ml of orange juice may help reduce elevated triacylglycerol concentration.

Key words: orange juice, fructose, blood lipids

O049

A FRAXINUS EXCELSIOR L. SEED EXTRACT, FRAXIPURE® HAS FAVORABLE EFFECTS ON GLUCOSE HOMEOSTASIS IN ELDERLY OVERWEIGHT SUBJECTS

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Background and objectives: Botanical extracts with biologically active compounds may have positive effects on body homeostasis and have been reported to treat different metabolic impairments. In this context, an extract obtained from seeds of the European ash tree (Fraxinus excelsior L; Oleaceae) was investigated in order to determine the potential benefits on insulin sensitivity in overweight/obese subjects.

Methods: The intervention study was carried out in 22 participants (50-80 years-old) with an initial BMI <40.0 kg/m2 (mean value at baseline 31.0 kg/m2), who followed a balanced covert energyrestricted diet (-15% Energy) for 7 weeks. The design was a longitudinal, randomized, crossover, and double-blinded nutritional intervention, with a one week wash-out period between the 2 intervention periods of 3 weeks. Experimental groups were administered 1 g daily of either placebo capsules (control) or capsules containing an extract from Fraxinus excelsior L. seeds (FraxipureR). Anthropometrical and biochemical measurements were performed at the beginning and at the end of the interventions for both cross-over periods.

Results: Statistical analysis revealed that administration of 1 g of FraxiPureR for 3 weeks resulted in significantly lower glucose AUC values (p<0.005) while no significant change was observed in the placebo group (-13.9% vs. -3.9%). Interestingly, fructosamine levels were significantly reduced by the ash tree seed extract (-4.13 ƒÊmol/L vs.7.51 ƒÊmol/L ; p=<0.004) as compared to placebo. The experimental product administration produced no relevant changes on body weight and lean mass as compared to the control, but the fat content was significantly reduced (-1.26% vs. -0.19 %; p=0.042) by the botanical extract compared to placebo.

Conclusions: The administration of an extract from Fraxinus excelsior L. seeds in combination with a hypocaloric diet induced favorable effects in glucose homeostasis in overweight/obese subjects.

Key words: FraxiPureR, Glucose homeostasis, Fructosamine, Elderly This study was financed by Naturex and the Spanish Centre for the Development of Industrial Technology (CDTI) as part of the SENIFOOD project, which belongs to the CENIT subvention program.

O050

RELAPSES FROM ACUTE MALNUTRITION IN A COMMUNITY-BASED MANAGEMENT PROGRAM IN BURKINA-FASO

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Background and objectives: Community-based Management of Acute Malnutrition (CMAM) is an effective strategy for treating Severe Acute Malnutrition (SAM) (WHZ<-3) or Moderate Acute Malnutrition (MAM) (WHZ<-2). However, post-discharge follow-up often lacks. We aimed to assess the relapse rate and the related factors in a CMAM program in Burkina-Faso in which children without medical complications and who have good appetite are treated in their village by community volunteers with a Ready-To-Use-Therapeutic food (for SAM) or Corn Soya Flour (for MAM).

Methods: In one-stage cluster design, the retrospective cohort data for recovered children (WHZ>-2) who were discharged from the program between January 2010 and July 2011 were collected in 45 villages of 210 in January 2012. Children were asked after discharge to return to the community center for follow-up every three months. A questionnaire including sociodemographic and economic variables and information on household food availability (for Household Food Insecurity Access Scale) and the child's food consumption in the last 24 hours (qualitative recall for dietary diversity score) was administered. A multivariate Cox model regression was used to identify the relapse predictors.

Results: Of the 509 children, 14 have died and 123 were lost to follow-up. Children admitted with SAM were more likely to die after discharge. The relapse rate was 14.2 per 100 children-years and the predictors were no oil/fat consumption in the last 24 hours, a mid-upper arm circumference (MUAC) <125mm at discharge, incomplete vaccination and illiteracy of mothers.

Conclusions: The CMAM program should avoid premature discharge (before a MUAC of at least 125 mm) to limit relapses. Nutrition education for mothers should focus on the role of nutrients especially fat as important energy component of diet for children. Promoting good immunization and fighting against illiteracy are essential to promote child growth.

Key words: acute malnutrition, community-based management, relapse, related factors.

O051

NATIONAL DIETARY SURVEY (NDS): FAMILIAL AGGREGATION OF DIETARY PATTERNS IN BRAZIL

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Background and objectives: Over the time, new dietary patterns have been established and associated with aspects involved in the increase of chronic non- communicable diseases, such as environmental, cultural and behavioral factors, and not only the genetic component. The identification of the familial aggregation of dietary patterns is important for clarifying this situation yet poorly understood. The objective of this study wasto identify dietary patterns consumed in Brazil and their possible correlation among members of the same family (father, mother and children).

Methods: It was used the database of the NDS, a nationwide survey conducted in 2008/2009, with individuals of both sexes and more than 10 years old of age. Dietary intakes were estimated based on two food records and the total 1,120 foods cited was classified into 27 groups, according to similarity in content and frequency of consumption. Dietary patterns were identified by using factorial analysis and the familial aggregation by their correlations. Both procedures were executed considering the complexity of the sample survey and the expansion of the data, using the software SAS 9.3.

Results: Three major dietary patterns were identified: Traditional coffee break (1): coffee, breads, cheeses and oils and fats; Traditional main meal (2): rice, beans and other legumes and meats; Fast food type meals (3): sandwiches, processed meats, soft drinks, snacks and pizzas. Highest correlations occurred in Pattern 2 for all family pairs investigated. In Pattern 3 were found inverse correlations with: mother/daughter and mother/son.

Conclusion: It was found familial correlation in Pattern 1, showing the importance of family influence on traditional food. However, children have an inverse relationship with mothers considering the Pattern 3, which suggests greater adhesion of the new generation to contemporary habits, therefore food consumption modification in Brazil.

Key words: dietary pattern, familial aggregation, national survey

O052

THE MEDITERRANEAN DIET IMPROVES THE LOW-DENSITY LIPOPROTEIN PARTICLE SIZE PHENOTYPE IN MEN WITH METABOLIC SYNDROME

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Background and objectives: Studies have indicated that individuals with small, dense low density lipoprotein (LDL) particles are at increased risk of cardiovascular disease. The impact of the Mediterranean diet (MedDiet) on various electrophoretic characteristics of LDL particles has not been extensively studied to date. The objective of the study was to investigate the effect of the MedDiet without weight loss (-WL) and with weight loss (+WL) on various features of the LDL particle size phenotype in men with metabolic syndrome (MetS).

Methods: The diet of 19 men with MetS (NCEP-ATP III, age 24-62 years) was first standardized to a typical North American control diet that they consumed for 5 weeks under isoenergetic feeding conditions (all foods and beverages provided). Subjects were then fed a MedDiet for 5 weeks also under isoenergetic conditions (MedDiet-WL), after which they underwent a 20-week weight loss period in free-living conditions (average weight loss -10.2 ± 2.9% body weight, P<0.01). This was followed by consumption of the MedDiet (5 weeks) under isoenergetic conditions (MedDiet+WL). Features of the LDL size phenotype were determined at the end of each isoenergetic feeding period by polyacrylamide gradient gel electrophoresis.

Results: MedDiet-WL led to a significant increase in LDL-peak particle diameter (LDL-PPD, +0.7%) and in the proportion of medium size LDL (LDL255-260 Å, +11.1%) and reduced the proportion of small dense LDL (LDL<255 Å, -11.7%) vs. the control diet (all P<0.05). MedDiet+WL was associated with a further increase in LDL-PPD (0.2%, P<0.05) but had no further impact on the proportion of small dense LDL compared with MedDiet-WL.

Conclusions: Data from this controlled feeding study suggest that consumption of MedDiet, even in the absence of weight loss, beneficially alters the atherogenic properties of LDL particles in high risk men with MetS.

Key words: Mediterranean diet, metabolic syndrome, weight loss, LDL particle size.

O053

IMPACT OF FORTIFIED FOODS DURING LAST DECADE IN THE NETHERLANDS

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Background and objectives: Since 2006 the addition of vitamins and minerals is regulated in the European Union. This regulation may affect the composition of foods and intake of micronutrients.

Objective: To get insight in the impact of the addition of micronutrients in foods on intake in the Netherlands during the last decade.

Methods: Consumption data and nutrient data from the Dutch National food consumption surveys among young adults aged 19-30 years (2003, n=750) and the general population aged 7-69 years (2007-2010; n =3819) was used. The consumption of fortified foods, the contribution of fortified foods to the intake of micronutrients before and after the implementation of the regulation was estimated.

Results: Among young adults the consumption of fortified foods increased from 2003 to 2007-2010; the number of fortified foods has increased and these products were consumed more often. Also, the contribution of fortified foods to micronutrient intake of young adults and the absolute micronutrient intake amount from fortified foods increased during the last decade. The most recent data from the general population shows that children were more often consumers of fortified products compared to adults. The main food groups enriched with micronutrients are spreads, dairy products and non-alcoholic beverages. In addition, it showed that these fortified foods contributed most to the intake of vitamins and less to the intake of minerals. For vitamin D more than 35% of the intake was derived from fortified foods. For retinol, vitamin E, Vitamin B6, this was about 20-25%.

Conclusion: Since the EU-regulation on addition of vitamins and minerals, the consumption of fortified foods is increased in The Netherlands. These products contributed most to the intake of vitamins. The main food groups enriched with vitamins and minerals are spreads, dairy products and nonalcoholic beverages.

Key words: fortified foods, trends, vitamins, minerals, food consumption survey

O054

FOOD SECURITY AND NUTRITIONAL STATUS OF FISHING COMMUNITIES IN THE BOLIVIAN AMAZON BASIN

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Background and objectives: The Bolivian Amazon, among the poorest regions in Latin America, is undergoing a 'nutrition transition,' facing both under and over nutrition. Fishing communities are thought to be at particularly high risk of malnutrition, despite the availability of high quality protein. However, household food security and nutrition status of households in these communities is unknown. Our objectives were to measure household food security as well as maternal and child height and weight among urban and rural fisher communities along the Bolivian Amazon Basin.

Methods: A cross-sectional survey was conducted among 410 urban and 401 rural households in the low-water season (October-November). A subset of seasonally sensitive questions was repeated among 186 urban and 297 rural households in the high-water season (February-March). Interviewers collected information on demographics, dietary intake and food security status. Height and weight were determined for mothers and their youngest child under five.

Results: Food insecurity, as measured by the Household Food Insecurity Access Scale, was reported by 55% of the urban households in the low-water and 38% in the high-water seasons, (p=0.001). Rural households reported similar food insecurity in both seasons (66.7% and 60.9% respectively, p=0.12). Similarly, urban household dietary diversity averaged 9.2 and 8.7 on a 12 point scale in the low-water and high-water season (p= 0.001), respectively. In the rural population dietary diversity was 7.3 in the low-water and 7.1 in the high-water seasons, (p=0.13). Less than 10% of children and 4% of women were wasted or underweight. However, among urban and rural populations 30% and 44% of children were stunted and 56% and 45% of women were overweight or obese, respectively.

Conclusions: High levels of food insecurity, childhood stunting and maternal overweight are present in urban and rural fishing communities of the Amazon Basin.

Key words: Food insecurity, childhood malnutrition, dietary diversity.

O055

WEIGHT OF MODERNITY PART II: THE NUTRITION AND HEALTH IMPLICATIONS OF THE DISAPPEARING AUSTRALIAN DESSERT

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Background and objectives: A simple, home-made sweet dessert, following the savoury main course, was a traditional part of the Australian family meal until the last few decades. We examine the social, economic and technological changes that have contributed to disappearance of dessert from the family menu.

Methods: This study is based upon a unique set of more than 111 qualitative, in-depth interviews conducted face to face with three generations of Australians whose lives span most of the 20th century and into the 21st century.

Results: Increasingly, middle-aged and younger Australians eat commercially produced sweet and savoury food products at home and in the form of takeaway, and at restaurants and cafés. Older Australians are more likely to retain their traditional food habits. While the dessert is now rarely part of the family meal, sweets, cakes and confectionary are likely to be eaten at any time and in any place. Some participants thought the disappearance of desserts was healthy while others were not so sure. Meanwhile, Australian domestic sugar consumption has declined somewhat.

Conclusions: The disappearance of dessert illustrates the complexity of untangling shifting socio-cultural food practices in the context of broad social change. We discuss what the disappearing dessert means for Australians' health in light of the rising prevalence of obesity.

Key words: Obesity, Australian family meal, sugar.

O056

DIETS OF MALIAN AND MOROCCAN PEOPLE LIVING IN THEIR HOME COUNTRIES AND IN FRANCE AND ITS ASSOCIATION WITH ECONOMIC STATUS

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Background and objectives: Little is known about changes due to migration both within a country (from rural to urban) and outside a country (from home country to host country). The present study focussed on dietary diversity of Malian and Moroccan people living in their home countries and in France and its association with economic status.

Methods: Cross-sectional surveys were conducted in 2010 among Malian and Moroccan households living in urban Ile-de-France (IdF) and in rural and urban areas of Mali (the area of Kayes and Bamako respectively) and Morocco (the Souss and Casablanca respectively). In each area, 300 households were surveyed. Diet was assessed using an Individual Dietary Diversity Score (IDDS) based on 12 food groups consumed/24h. Economic characteristics were collected to classify households into 5 ordered groups.

Results: The mean IDDS was 7.2 for Malians and 7.7 for Moroccans. Compared to urban areas, the IDDS was better in both rural Mali (7.7 vs. 6.4, $p<0.01$) and Morocco (7.8 vs. 7.3, $p<0.01$). In IdF, the mean IDDS was 7.5 for Malians and 8.2 for Moroccans. Compared to rural Moroccans, Moroccans in IdF had greater IDDS ($p<0.01$). IDDS increased with economic status in rural and urban Mali (6.8 to 9.1, $p<0.01$ and 6.0 to 7.1, $p<0.01$, respectively) and in rural and urban Morocco (6.5 to 9.0, $p<0.01$ and 6.5 to 8.3, $p<0.01$, respectively) but decreased for Malian people living in IdF (8.0 to 7.1, $p=0.04$).

Conclusions: In home countries, IDDS was better in rural compared to urban areas. Whilst it increased with economic status in Mali and Morocco, it decreased for Malian people living in IdF. Dietary diversity and its association with economic status depend on living areas and might depend on the stage of the nutrition transition as well.

Key words: Dietary diversity, economic status, home and host countries.

O057

UPGRADE ON THE NUTRITIONAL TRANSITION IN BOLIVIA

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Background and objectives: Latin America is a region that experienced the paradox of economic growth together with social instability in the past decade. This has contributed to rising levels of overweight and the abandonment of traditional diets. The objective of this study is to upgrade the evidence regarding the trends in overweight and obesity in women of childbearing age, and to describe ecologically disparities in food availability within the country.

Methods: Secondary analysis of nationally representative Bolivian Demographic and Health Surveys (DHS) 1994, 1998, 2003 and 2008 to upgrade overweight and obesity trends in women of childbearing age. Datasets have been made available by Measure DHS. Previous estimations of household food availability have been updated with data from the nationally representative Household Surveys of 2005, 2008 and 2009, available publicly through the Bolivian National Statistic Institute.

Results: DHS survey data revealed a steady raising trend in levels of overweight and obesity among women in childbearing age (20–45 years), reaching 50% if both combined by 2008 and revealing disparities. The increment in overweight levels was more pronounced if women were poor, uneducated or dwellers of rural areas. Underweight remained below 2%, although it is concentrated in women between 15-30y. Household Survey data highlighted the "within-country" disparities in food availability that could be ecologically associated to the observed nutritional status. Rural households systematically recorded lower amounts of food available. Households in lower income quintiles recorded higher availability for potatoes and cereals.

Conclusion: This overview highlights that Bolivia is further into the nutrition transition, with half of the women being overweight. Further, underscores the importance of including prevention of weight gain in future Bolivian public health nutrition policies, together with the promotion of traditional diets, mostly based on foods of plant origin.

Key words: Bolivia, Nutrition Transition, Women, Demographic and Health Surveys.

O058

INFLUENCE OF PROXIMATE VALUES ON VITAMIN A STABILITY OF NIGERIAN WHEAT FLOUR AND BREAD

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Background and objectives: Nigeria embarked on a mandatory vitamin A fortification of wheat flour (30 IU/g or 9.0μgRAE/g) to eradicate vitamin A deficiency (VAD). Study aimed at determining influence of proximate values on vitamin A stability in wheat flour and bread.

Methods: Retinyl palmitate content of sixteen and fourteen samples of commercial wheat flour and bread respectively were randomly selected from bakeries in four Local Government Areas in Lagos Metropolis. Samples were analyzed at 0, 5 days (bread) and 0, 30 days (wheat flour) respectively at room temperature using High Performance Liquid Chromatography. Proximate analysis was done using AOAC, (2005). Results were analyzed using SPSS 17.0.

Results: Vitamin A stability was 0-83% (wheat flour) and 0-68% (bread). Mean proximate values for wheat flour were 0.88±0.18; 0.77±0.09 (ash contents) and 12.51±0.16; 13.10±0.55 (moisture contents) at zero and 30 days storage respectively. Mean proximate values for bread were 1.78±0.25; 1.68±0.24 (ash) and 24.74±2.6; 31.30±2.24 (moisture) at zero and 5 days storage respectively. There was an inverse relationship between vitamin A content of wheat flour samples and proximate values which was not statistically significant ($F = 0.857$; $P = 0.447$). However, there was a statistically significant difference between the ash content of flour at zero and 30 days storage ($P<0.05$). Statistical significant relationship also existed between vitamin A, ash and moisture contents of bread at 0 and 5 days ($p<0.05$).

Conclusion: Proximate values influenced vitamin A content and stability in flour and bread. For adequate vitamin A stability in wheat flour, extraction rate and ash content must be lower than standard for normal flour. Copper content should be zero. Adequate total quality control must be insured.

Key words: Vitamin A, retinol, wheat flour, bread.

O059

THE DISTRIBUTION AND CONTENT OF FOUR PURINES IN 600 COMMON FOOD

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Background and objectives: Eating habits and gout incidence in large number of men it was found to be due to eating food rich in purines . The aim of study was to determinate the four purines content in a variety of food items in China.

Methods: Near 600 food samples including animal and plant food selected from the supermarket China. The HPLC test method were optimized and used to determine the content of purines include adenine, guanine, hypoxanthine, and xanthine in common foods and cooking food .

Results: The content of purine varied significantly among different kinds of food. Totally shrimps is the highest food containing purines; the purine content in visceral organs was 2.5 times higher than inmeats, liver: 2752 mg/kg; duck liver: 4150 mg/kg, similar with Mussel meat. The main componentareguanine and adenine in livers, hypoxanthine is higher in meats. The content of purine in dried fungi and dried legumes and legumes products were higher than other plant foods, The content of purine in vegetables and vegetables products and fruit and fruit products was low.

Conclusions: As a whole, the content of purines was in the shrimps > livers > meats > dried fungi and algae > dried legumes and legumes products > nuts and seeds > fresh fungi and algae > cereals and cereals products > vegetables and vegetables products > fruit and fruit products > tubers, starches and products.

Key words: Purine content and components ; animal and plant foods ; HPLC.

O060

NUTRITIONAL AND TOXICOLOGICAL ANALYSES OF LEAVES AND FRUITS OF SOLANUM MACROCARPON LINN (SOLANACEAE) IN COTONOU (BENIN)

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Background and objectives: Vegetables are very important sources of protein and minerals. Despite the large number of studies carried out on various vegetables and vegetable crops, very few have scientifically explored the usefulness of S. macrocarpon. This study identified the main groups of chemicals and mineral elements. It has also identified some toxic elements contained in this vegetable.

Methods: Cytotoxicity shrimp larvae test has been done on S. macrocarpon. Phytochemical screening was carried out on the leaves. Some mineral elements were determined by Atomic Absorption Spectrophotometry (sodium, potassium, calcium, magnesium) while protein, phosphorous, iron, copper, zinc and toxic metals (lead, cadmium) were determined by Molecular Absorption Spectrophotometry. Fat, ash, moisture and vitamins were sought. After hatching shrimp larvae for 48 hours, they were brought into contact with aqueous dilutions of the leaves as well as fruit. The variation in larval mortality as a function of concentration has been translated by a curve and semi-lethal concentrations were determined.

Results: The study showed that the leaves of S. macrocarpon were very nutritious. The high protein content of the leaves suggests an interesting nutritive property. The presence of chemical groups and toxic elements (lead, cadmium) in S. macrocarpon require that the consumption of vegetables should be as varied as possible. Vitamins C, A and K1 were found in this vegetable very rich in water while vitamin E has not been detected. S. macrocarpon also contains lipids at various levels. In addition, the values of the half-lethal concentration were all greater than the upper limit of toxicity.

Conclusions: This vegetable can therefore be used both in traditional medicine and nutrition without immediate or medium-term major risks.

Key words: Cytotoxicity, vegetables, nutrients.

O061

AN EVALUATION OF THE HEALTH AND ECONOMIC IMPACT OF THE CURRENT NATIONAL POLICY TO ELIMINATE TRANS FAT ACIDS (TFA) IN ARGENTINA

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Backgrund and objectives: On per-calorie basis, TFA increase risk of coronary heart disease (CHD) more than any other macronutrient. Argentina has initiated a national policy to reduce TFA through voluntary agreements with industry (2001), mandatory labeling (2006) and elimination of industrialized TFA by 2014. We aimed to evaluate the impact of this policy on the reduction of CHD events, DALYs and costs.

Methods: A review of dietary trials/local studies, and consultations with experts/ industry were performed to estimate baseline consumption in 2000 (2%E) and replacements used from 2001-2012, where TFA were substituted mainly by high-oleic sunflower oil and beef tally. We built an epidemiological simulation model calculating two scenarios: 1) estimating the effects of isocaloric replacement of TFA on the change of total and HDL cholesterol ratio Δ TC/HDL) by using alternatives to partially hydrogenated oils; 2) accounting for pleiotrophic effects of TFA reported in prospective studies. We used Framingham risk equations to generate the expected pattern of first CHD events according to person's age-sex-risk factors distributions (including ΔTC/HDL) on an Argentine population-based sample. We estimated CHD risk before (2000) and after full policy implementation (2015), weighting by age-sex-CHD risk factor prevalence, and calibrated our I; of CHD risk to the risk reported by national statistics.

Results: From 2001-2015, based on changes in TC/HDL, 2,802 deaths and 24,708 non-fatal CHD events, and 145,715 DALYs will have been averted, and USD 106,762,155 saved. If we include the effects reported in prospective studies, almost 10% of CHD events would have been averted. Thus, given the approximated 200,000 annual CHD events in Argentina, near-elimination of industrial TFA might avoid between 2% to 10% of CHD events each year.

Conclusions: These results will help inform evidence-based policies in Argentina and other developing countries on the huge impact of nutritional interventions.

Key words: TFA,CHD,health-policy.

O062

LEAF PROTEIN CONCENTRATES FROM INDIGENOUS PLANTS FOR IMPROVING NUTRITIONAL QUALITY OF LOCAL FOODS IN THE GARHWAL HIMALAYAS, INDIA

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Background and objectives: Many of nutritious plants in the Garhwal Himalayas, India are destroyed by farmers to keep their land free from unwanted foliage. These may be used to develop protein and mineral concentrates for nutritional improvement of the local population. The objectives were:I. dentify indigenous plants for protein extraction.2.Standardize protein extraction techniques.3.Develop fortified foods from protein concentrates

Methods: Selection of Study Area was done through purposive sampling technique.Data was collected using standardized survey schedule. Nutritional analysis was done through Proximate analysis andassessment of toxicants was also done. Protein extraction was done by the method given by A.E. Ghaly et al. in American Journal of Applied Sciences 7 (3): 331-342, 2010.Value added products using traditional recipes were developed. Sensory evaluation of developed products was done to ascertain the feasibility of protein extracts for food fortification.

Results: 152 families in 22 villages were studied to identify indigenous wild plants known for their nutritional properties.6 most popular used plants Rumex dentatus, Murraya koenigii, Bahunia variegata, Chenopodium, Urtica dioica, and Amaranthus caudatus were shortlisted for analysis. Nutritional estimation of plants revealed that Chenopodiumhad the highest protein content(19.215%). Rumex dentatus had oxalic acid content of 0.2025 as well as a 50% increased protein concentration in the extracted protein concentrate. Different ratios of protein concentrates of Rumex dentatus and Urtica dioica were incorporated as an ingredient in a popular local snack called "mathri". Sensory evaluation of the snack revealed that "mathri"with 10% Urtica dioica protein concentrate had higher acceptability than "mathri"with 20% content. The response was similar for Rumex dentatus. Between the 2 protein sources the former had a better acceptance.

Conclusions: Based on the protein content it may be concluded that Chenopodium leaf protein concentrate has better potential for utilization as an enriching component of the local diet in the Himalayas.

Key words: Protein Concentrates, Indigenous plants, Himalayas, Chenopodium

O063

EVALUATION OF MACRO AND MICRO NUTRIENT COMPOSITION ON SOME PROCESSED LESSER KNOWN GREEN LEAFY VEGETABLES IN SOUTH EAST NIGERIA

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Background and objectives: Lesser known vegetables (LKVS) that have high nutritional and medicinal values are in most cases reported not to be in regular utilization and consumption because they are going extinct. Our objective is to evaluate macro and micro nutrient compostion of some processed LKVS (Vitex doniana, Pteracarpus santalinoides, Myranthus arboreus, Ficus capensis, Ficus thonningli and Mucuna pruriens).

Methods: The sampled leaves were separated into three equal parts; one part was shade dried and milled, second part was cooked for five minutes and the third was blended raw. The macro and micro nutrient composition were analysed chemically in triplicates by standard methods of AOAC. The data collected were subjected to statistical ananlysis and means were compared using the analysis of variance (ANOVA) and FLSD at 0.05% level of probability.

Results: The results macro and micro nutrient content showed that M. pruriens had (17.42%) protein and crude fibre (10.82%); P. santalinoides (15.09%) protein and crude fibre (14.73%); V. doniana had (13.85%) protein and crude fibre (7.67%). Vitamin C, A, and calcium content of F.capensis were (6.25 mg, 42.92 mg and 158.58 mg/100 g) respectively while F. thonningli had highest vitamin C (59.69 mg/100 g). Generally, shade drying increased significantly ($P<0.05$) some of the macro and micro nutrient such as protein, crude fibre, ash, iron and calcium.

Conclusion: We recommend the consumption of these vegetables because of their high nutrient composition

Key words: Macro and micro nutrient evaluation, processing, green leafy vegetables

O064

THE HIGHER THE INTAKE OF PROCESSED AND ULTRA-PROCESSED FOOD PRODUCTS, THE LOWER THE AMOUNT OF FRUITS IN THE BRAZILIAN DIET

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Background and objectives: Processed food products are manufactured by adding substances such as salt, sugar, or oil to whole foods. Ultra-processed products are formulated mostly or entirely from industrial ingredients, and typically contain little or no whole foods. These products are unhealthy. They have an unbalanced nutrient profile, they are liable to be overconsumed, and they tend to displace fresh and minimally processed foods. The objective of this study was to evaluate the association between consumption of processed and ultra-processed products and the consumption of fruits, in Brazil.

Methods: Data analyzed were from a national representative sample of 34,003 Brazilians aged >10 studied in 2008-2009. Dietary data were obtained through two 24-hour food records. For this study, foodstuffs were classified into three groups: processed or ultra-processed products; fresh fruits; and all other food items. We estimated the amount (in grams) and the dietary share (% of total calories) of fruits according to quintiles of the dietary share of processed and ultra-processed products. The association between consumption of processed or ultra-processed products and consumption of fruits was tested by linear regression, controlling for income.

Results: The dietary energy share of processed and ultra-processed products averaged 30.5%. This ranged from 5.4% of total dietary energy in the lowest quintile, to 60.1% in the highest quintile. The share of fruits averaged 3.0%. This decreased across the quintiles of the share of processed and ultra-processed products, from 3.4% to 2.7%. This inverse association increased after control for income. Income-adjusted intake of fruits among people in the lowest quintile of processed and ultra-processed products consumption was 14 g higher than the intake in the highest quintile ($p<0.05$).

Conclusions: The higher the intake of processed and ultra-processed food and drink products, the lower the amount of fruits in the Brazilian diet.

Key words: food processing, fruits, Brazil

O065

STUNTING AMONG CHILDREN UNDER TWO IN RURAL NEPAL: THE ROLE OF WOMEN'S EMPOWERMENT IN AGRICULURE

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Background and objective: Undernutrition among Nepali children (<5y) is high; 41% stunted, 29% underweight, and 11% wasted. Women's disempowerment is hypothesized to contribute to persistent child malnutrition in South Asia, since women are primary caregivers. This study investigates the contribution of women's empowerment in agriculture to undernutrition among children (<2y) in rural Nepal.

Methods: We conducted a cross-sectional survey of 1,787 rural households with children (<2y) in 16 districts of Nepal. Multivariate regression analyses were used to test associations of child (<2y) undernutrition and women's empowerment in agriculture including decision-making regarding household food production, access to resources, control of income, community leadership, and time devoted to work and leisure activities. Regression models were used to adjust for district-level clustering and control for child, maternal, and household characteristics.

Results: Women's empowerment in agriculture is positively associated with HAZ (β=0.41, P=0.001, R2=0.33) and WAZ (β=0.32, P=0.040, R2=0.20), but not WHZ, even after controlling for child age and sex; maternal age, height, and education; and household socio-economic status and total number of children under five. Four domains of women's empowerment in agriculture explain most of the statistically significant association with HAZ: access to and decision-making on credit (β=0.26, P=0.003), control of income (β=0.24, P=0.001), confidence speaking in public (β=0.30, P=0.002), and time for leisure activities (β=0.36, P=0.001). For WAZ, access to and decision-making on credit (β=0.21, P=0.028), control of income (β=0.18, P=0.024) and autonomy in production decisions (β=0.20, P=0.045) are statistically significant, whereas time for leisure activities is only marginally significant (β=0.26, P=0.077).

Conclusion: Women's lack of empowerment contributes to low child HAZ and WAZ in rural Nepal. Programs and policies

prioritizing women's empowerment within agricultural households are required to address undernutrition, particularly during the most vulnerable period of the first two years of life.

Key words: Under-nutrition, South Asia, women's empowerment.

O066

TOTAL ENERGY AND SATURATED FAT INTAKE MODULATE THE ASSOCIATION BETWEEN AN OBESITY GENETIC RISK SCORE AND BMI

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Background and objectives: Combining multiple genetic variants related to obesity into a global genetic risk score (GRS) might improve identification of individuals at risk of developing obesity. Moreover, characterizing gene-diet interactions is a research challenge aimed at investigating dietary recommendations for individuals with higher predisposition to obesity. The aim was to analyze the association between obesity GRS and BMI in a US population, with focus on gene-diet interactions with total and saturated fat intake.

Methods: A cross-sectional study including 783 participants from the Genetics of Lipid lowering Drugs and Diet Network study. A weighted GRS was calculated based on 11 obesity-associated variants. Biochemical measurements were made by using standard procedures. Dietary intakes were estimated with a validated questionnaire.

Results: Interactions were observed between total energy and fat intake and the obesity GRS for BMI (P for interaction=0.021 and 0.004, respectively for continuously evaluated dietary and GRS variables). We also identified an interaction between saturated fat intake and GRS evaluated continuously for BMI (P for interaction=0.004). Finally, we obtained similar results when the GRS was evaluated dichotomously according to low and high values (P for interaction=0.034 for categorical GRS). In subjects with high GRS, saturated fat intake was associated with greater BMI (β=0.0861 kg/m^2; 95% CI: 0.0109 to 0.1612; P=0.025) but in those with low GRS, saturated fat intake was not associated with BMI (β=0.0130 kg/m^2; 95% CI: -0.0463 to 0.0723; P=0.668).

Conclusion: Total energy and saturated fat intake interact with an obesity GRS in determining BMI in a US population.

Key words: BMI, genetic risk score, saturated fat

O067

OBESITY IN ADOLESCENTS FROM SOUTH OF EUROPE VERSUS CENTER-NORTH OF EUROPE: ROLE OF PHYSICAL ACTIVITY, DIET AND GENETICS

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Background and objectives: Coordinated European projects using standardized methodology can identify health inequalities across Europe. The HELENA study, involving adolescents from 10 European cities provides a unique opportunity to address this issue. We aimed to: 1) compare overweight/obesity prevalence and adiposity levels in adolescents from South versus Center-North of Europe; 2) explore whether physical activity (PA), diet or selected genetic factors explained these differences.

Methods: The HELENA study comprised 3528 adolescents from South (4-cities) and Center-North (6-cities) of Europe. Fitness (strength, speed-agility and cardiorespiratory fitness), total and central fatness (anthropometry and bioelectrical impedance analysis (BIA)) and cardiometabolic risk (z-scores including fitness, fatness, lipids, insulin resistance and blood pressure markers) were assessed. The analyses were adjusted for socioeconomic factors, objectively measured PA (accelerometry), total energy intake and diet quality, and genetic variants of the FTO rs9939609 polymorphism.

Results: The prevalence of overweight/obesity was higher in adolescents from South compared to Center-North of Europe, i.e. 31% versus 21%, Odds Ratio=1.7, 95% Confidence Interval=1.42-2.05. Likewise, adolescents from South of Europe had higher levels of total and central fatness, as indicated by body mass index, fat mass and waist circumference, compared to adolescents from Center-North of Europe, all P<0.001. Differences in total and central fatness were not explained by PA, nor energy intake, diet quality or FTO rs9939609 polymorphism.

Conclusions: Adolescents from South of Europe are fatter than those from Center-North of Europe, yet the causes for

these geographical differences remain. The inclusion of different markers of total and central fatness measured by different methods, the objective assessment of PA, the inclusion of dietary and genetics variables, and the thorough standardization of the measurements and timeframe for data collection, make of this study one of the most comprehensive examinations about health inequalities in adolescence across Europe.

Key words: fatness, obesity, body fat distribution, adolescence

O068

RIBOFLAVIN LOWERS BLOOD-PRESSURE IN HYPERTENSIVE'S WITH THE MTHFR 677TT GENOTYPE

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Background and objectives: Intervention with riboflavin has been shown to produce a genotype-specific lowering of blood pressure (BP) in premature cardiovascular disease (CVD) patients homozygous for the 677C>T polymorphism (TT genotype) in the gene encoding the enzyme methylenetetrahydrofolate reductase (MTHFR)1. Whether this effect is confined to high risk CVD patients is unknown. The aim of this randomized trial, therefore, was to investigate the responsiveness of BP to riboflavin in hypertensive individuals with the TT genotype but without overt CVD.

Methods: From an available sample of 1427 hypertensive patients, 157 with the MTHFR 677TT genotype were identified, 91 of whom agreed to participate in the trial. Participants were stratified by systolic BP and randomized to receive placebo or riboflavin (1.6mg/d) for 16 weeks.

Results: A significant improvement in the biomarker status of riboflavin was observed in response to intervention. Correspondingly, despite being prescribed multiple classes of antihypertensive drugs, a significant decrease from 141.8 mmHg ± 19.4 mmHg to 137.1 mmHg ± 19.8mmHg in systolic BP was achieved (P=0.031), with no significant change in diastolic BP.

Conclusion: In conclusion, these results show that riboflavin supplementation targeted at hypertensive individuals with the MTHFR 677TT genotype can significantly lower BP compared to treatment with antihypertensive drugs alone, and indicate the potential for a personalized approach to the management of hypertension in this genetically at-risk group. 1. Horigan G, McNulty H, Ward M et al. (2010) J Hypertens 28, 478-486.

Key words: Hypertension, MTHFR, riboflavin

O069

CHRONO-NUTRITION: MOLECULAR MECHANISM OF DISRUPTION OF LIVER CLOCK BY IRREGULAR FEEDING

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Background and objectives: Circadian rhythms in peripheral tissues are controlled strongly by feeding, including the liver. We have demonstrated that suppression of feeding timing (irregular feeding) shows hypercholesterolemia in rats even if rats eat the same amount of same diet (1). In addition, the feeding has been revealed to synchronize the liver clock via insulin (2). In the present study, in order to examine how suppression of feeding timing act on core clock genes in the liver, we measured clock gene expression at mRNA level and at transcription level.

Methods: Male Wistar rats were challenged by an irregular feeding regimen. Results and discussion: Serum cholesterol level was increased in the irregular feeding group, and the peak of CYP7A1 gene expression advanced. The peak of DBP gene expression also advanced. However, apparent advance of DBP transcription was not observed, although it was advanced. Therefore, phase advance of DBP mRNA level was mainly due to the stability of the mRNA by irregular feeding. On the other hand, Dec1 became bimodal and Dec2 rhythm was lost at mRNA and transcription levels. Amplitude of Clock, Per1,2 and Cry1 rhythms was smaller at mRNA and transcription levels. There was no effect on Rev-erbα,β, RORα and Bmal1.

Conclusions: From the above results, the irregular feeding disrupt Dec1,2 rhythm and reduced the amplitude of the core clock gene loop, then leading to phase advance of DBP and CYP7A1. Irregular feeding broke hepatic circadian rhythm of clock genes at a transcription level, causing abnormalities of lipid metabolism. 1) Yamajuku, D. et al., Circulation Res. 105, 545-548 (2009) 2) Yamajuku, D. et al., Scientific Rep. 2, 439; DOI:10.1038/srep00439 (2012)

Key words: feeding timing, liver clock, clock gene, circadian rhythm

O070

DIETARY LOW PROTEIN COMBINED WITH HIGH FAT INDUCES ABDOMINAL FAT ACCUMULATION IN RATS

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Background and objectives: Although dietary protein restriction is well known to have a strong impact on body composition and energy balance, the mechanism underlying the alteration of glucose and lipid metabolism by protein nutrition remains to be elucidated. It was reported that dietary supplementation with arginine also affects lipid metabolism. Here we examined in mature rats the effects of protein restriction combined with high fat and arginine supplementation on body fat deposition. Then the hepatic gene expression profiles were compared focusing mainly on the regulation of glucose and lipid metabolism.

Methods: Male Wistar rats were divided into 5 groups, normal protein group (15P: 15% protein, 12.5% kcal fat), normal protein-high fat group (15P-HF: 35% kcal fat), low protein group (5P: 5% protein, 12.5% kcal fat), low protein-high fat diet group (5P-HF), and low protein-high fat with 2% arginine diet group (5P-HFA). Total RNA was extracted from the liver and subjected to DNA microarray analysis. 5P-HF group showed increased abdominal fat weight and increased ectopic lipid content (liver and muscle) as compared with rats of 15P or 5P group. These effects were alleviated by arginine supplementation (5P-HFA). No difference was observed in abdominal fat weight and ectopic lipid content between 15P-HF and 15P group. Hierarchical clustering analysis of DNA microarray data demonstrated clear separation of low protein diet groups (5P, 5P-HF, 5P-HFA) and normal protein diet groups (15P, 15P-HF). In addition, low protein-high fat diet groups showed higher expression of genes related to glycolysis and fatty acid synthesis, which remain unchanged or even decreased in 15P-HF.

Conclusions: Feeding low protein diets may accelerate de novo synthesis of fatty acid through up-regulation of related genes, leading to accumulation of visceral and ectopic fat.

Acknowledgements: This work was supported by the Program for Promotion of Basic and Applied Researches for Innovations in Bio-oriented Industry.

Key words: low-protein diet, high-fat diet, obesity, insulin sensitivity

O071

THE ANTI-PROLIFERATIVE EFFECT OF BOWMAN-BIRK INHIBITORS ON HT29 COLON CANCER CELLS IS ASSOCIATED WITH THE INHIBITION OF SERINE PROTEASES

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Background and objectives: Bowman-Birk inhibitors (BBI) from legumes are naturally-occurring plant protease inhibitors which inhibit specifically serine (predominantly trypsin- and chymotrypsin-like) proteases. BBI can survive both acidic conditions and the action of proteolytic enzymes within the stomach and small intestine, permitting physiologically relevant amounts to reach the large intestine where they may exert anti-carcinogenic and anti-inflammatory properties. Recent studies have demonstrated a significant concentration- and time-dependent decrease in the growth of HT29 human colon adenocarcinoma cells in vitro, following treatment with BBI from several legume sources, including soybean, pea and lentil. In this study, we have investigated the relationship between the anti-proliferative properties of TI1, a major isoinhibitor from pea seeds, on colon cancer cells and the inhibition of serine proteases.

Methods: Using HT29 colon cancer cells, we have compared the effect on cell growth of variant TI1 proteins, heterologously expressed in Pichia pastoris. The study included a mutant protein, engineered to have an amino acid substitution at the P1 position of each inhibitory domain.

Results: The active TI1 protein inhibited both trypsin and chymotrypsin, with Ki values at nanomolar concentrations, whereas the mutant protein was inactive against both serine proteases. The proliferation of HT29 colon cancer cells was significantly affected by active TI1 in a dose-dependent manner (IC50 = 31±7 μM); in contrast, the mutant protein did not show any significant suppressive effect on cell growth. Neither protein affected the growth of control non-malignant colonic fibroblastic CCD-18Co cells.

Conclusions: Cellular serine proteases should be considered as BBI targets in further investigations of their chemopreventive properties during early stage colorectal carcinogenesis.

Key words: Bowman-Birk inhibitors, cell proliferation, colorectal cancer cells, protease inhibition, serine proteases

O072

ALDOSE REDUCTASE (AR) ACTIVITY IN RBCS & AR ACTIVITY AND EXPRESSION IN TUMORS OF HUMAN CANCER SUBJECTS

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Background and objectives: Cancer is one of the leading causes of human morbidity and mortality around the world. The Aldo-keto-reductase (AKR) family has 140 proteins including Aldose reductase (AR or AKR1B1) and AR like proteins (AKR1B10). AR is the rate-limiting polyol pathway enzyme that converts glucose into sorbitol and involved in secondary complications of diabetes. It is also upregulated in many cancer cells and is thought to be involved in resistance to chemotherapeutic drugs. To study A) Specific activity of AR in RBCs.(B) Specific activity and expression of AR and AKR1B10 in tumor and non-tumor areas.

Methods: Whole blood samples were collected from 127 cancer patients and 60 Controls. Fresh post-surgical tumor tissues (127) were from stomach (28), colon (21), rectum (14), ovary(18), cervix (11), oral (19) and thyroid (16). AR and AKR1B10 were studied by immunoblotting [for expression] and enzyme activity studies. Histopathology evaluation for typing and grading of tumors was done. Statistical analysis was done using Mann-Whitney U- test.

Results: Specific activity of AR in RBCs of patients was significantly increased compared to Controls and in all three grades of tumors. Specific activity and expression of AR and AKR1B10 levels were increased in tumors compared to non-tumor samples of stomach, cervix, ovary, oral and thyroid samples.

Conclusions: Our study indicates for the first time, presumably, that increased AR activity levels in RBCs correlated with increased levels in tumors and may be useful as an indicator to denote a malignant process underway (stomach, cervix, ovary, oral and thyroid), which could alert the individual to seek medical opinion and extensive screening for detecting possible malignancy at an early stage and improve quality of life in such subjects. Also, AR is not increased in all tumors.

Key words: Aldosereductase, activity, expression, RBC , tumor.

O073

INFLUENCE OF DIET ON COLONIC FERMENTATION AND ENDOGENOUS FORMATION OF N-NITROSO COMPOUNDS

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Background and objectives: High-protein, low carbohydrate diets are popular weight loss regimes. Nonetheless, negative effects on gut health might be expected if less carbohydrate and more protein reach the large intestine, due to shifts in short chain fatty acid (SCFA) patterns and the formation of protein degradation products, including potentially carcinogenic N-nitroso compounds (NOC). Diet is the main driver for endogenous N-nitrosation with red meat being the most important factor, while nitrate and vitamin C also contribute. Previous studies have focused on single dietary components, but to date no study has investigated the combined effect of various dietary components. The aim of the current study was to assess the impact of various dietary components on endogenous formation of NOC and faecal SCFA.

Methods: We conducted three studies in obese men comparing body weight maintenance diets and different high protein weight loss diets. Dietary intakes were estimated from food diaries and correlated with faecal fermentation products and NOC. We studied the effect of protein components (total protein, total meat, red and white meat), carbohydrate components (total carbohydrates, digestible and non-digestible carbohydrates), and vitamin C and nitrate on NOC.

Results: We observed that shifts in the dietary carbohydrate/protein ratio resulted in alterations in faecal SCFA patterns. Furthermore, using random effects multiple linear regression, we confirmed red meat as the strongest contributor to endogenous NOC formation, but nitrate, vitamin C, non-starch polysaccharides and total energy also played a significant role.

Conclusions: We have identified the contributions of various dietary components to endogenous NOC formation and formulated a prediction model for NOC formation in obese men, based on their dietary intakes. This model could improve the estimation of endogenous NOC formation in epidemiological studies into diet and cancer, which is currently based on red meat intake only.

Key words: N-nitroso compounds, diet, faeces, fermentation

O074

MATERNAL OBESITY, PRE-PREGNANCY AND GESTATIONAL DIABETES AND IMPACT ON BIRTH SIZE OF OFFSPRING, AUSTRALIA

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Background and objectives: Maternal obesity and diabetes (DM) are established risk factors for fetal overgrowth. Less is known about the extent birthweight (BW) and other indicators are affected by different grades of maternal obesity. We examined the maternal obesity-birth size association according to obesity levels, and investigated whether BMI modified the pre-pregnancy DM-birth size relationship.

Methods: Retrospective cohort study of 71,510 women with singleton pregnancies, available pre-pregnancy BMI(kg/m2) and offspring BW(g), who gave birth in a tertiary referral maternity hospital, Brisbane (01/1998-12/2009). Anthropometric birth measures included BW, birth length (cm), and ponderal index (PI, g/cm3), small (<10th centile) and large (>90th centile) for gestational age (SGA, LGA), and macrosomia (BW≥4000g). We used multivariate logistic regression models to derive odds ratios (ORs) for the association of maternal BMI with birth size, based on five BMI categories (18.5-25, reference; 25-30; 30-35; 35-40; ≥40), and for BMI≥;40 vs. BMI 30-40, adjusted for selected perinatal/maternal factors.

Results: Of all mothers (mean age 30.5y), 22% were overweight (BMI 25-30), 13% obese (BMI>30). Mean BW, PI, and %LGA and macrosomic newborns, increased significantly across maternal overweight/obese categories, compared to mothers with normal weight. Among obese mothers the risk of a macrosomic birth or high PI (>90th centile) at birth was approximately 2.5-fold or 1.5-fold higher, respectively, than in reference mothers. The likelihood of high BW offspring was not significantly greater among mothers with BMI>40 compared to those with reference BMI 30-40 (adj. OR=1.14, 95%CI 0.96-1.35), neither was the risk of high PI, or LGA. After adjustment for BMI, pre-pregnancy DM, remained a significant risk factor for macrosomia, high PI and LGA; gestational DM was a risk for LGA only.

Conclusions: Higher maternal BMI is strongly related to fetal size while risk differences between morbidly obese and obese women remain small.

Key words: maternal BMI, birthweight, macrosomia

O075

LOW OMEGA-3 INDEX IN PREGNANCY IS A POSSIBLE BIOLOGICAL RISK FACTOR FOR POSTPARTUM DEPRESSION

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Background and objectives: Postpartum depression (PPD) is a common disorder affecting 10-15% women in the postpartum period. PPD can disrupt early mother-infant interaction, and thus constitutes a risk factor for child development. Recently, attention has been drawn to the hypothesis that a low intake of marine omega-3 fatty acids in pregnancy can be a risk factor for PPD. The hypothesis tested in this study was that a low marine omega-3 fatty acid status in pregnancy might be a risk factor for PPD.

Methods: In a community based prospective cohort in a municipality in Western Norway, we investigated both nutritional and psychological risk factors for postpartum depression. The source population was all women who were pregnant within the period November 2009 - June 2011. The fatty acid status (relative and absolute amount) in red blood cells was assessed in the 28th gestation week and participants were screened for postpartum depression using the Edinburgh Postpartum Depression Scale (EPDS) 3 months after giving birth.

Results: In a simple regression model, the omega-3 index was associated with the EPDS score in a nonlinear inverse fashion with an adjusted R square of 17. The omega-3 index explained 16% of the variation in the depression score. The DHA content, omega-3 index, omega-3/omega-6 ratio, and the omega-3 HUFA score were all inversely correlated with the depression score. Depression scores of participants in the lowest omega-3 index quartile were significantly lower than the three other omega-3 index quartiles.

Conclusions: In this study population, low omega-3 index in late pregnancy was associated with higher depression score three months postpartum in an inverse non-linear fashion.

Key words: Marine omega-3 fatty acids, pregnancy, maternal omega-3 index, postpartum depression

O076

EFFICACY OF DRIED AMARANTH LEAVES (Amaranthus cruentus) CONSUMPTION ON VITAMIN A, IRON AND ZINC OF CHILDREN IN KAJIADO COUNTY, KENYA

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Background and objectives: Children under five years are more vulnerable to deficiencies of vitamin A, iron and zinc with a prevalence of 84%, 74% and 50%, respectively in Kenya. Minimal information exists on how intake of dried vegetables incorporated into cereal flours would translate to micronutrient status. The study aimed to assess the efficacy of dried amaranth leaves (DAL) on the status of vitamin A, iron and zinc among children under fives in Kajiado, Kenya.

Methods: A pre-test–post-test control group design was adopted. A comprehensive sample of 42 children aged 24 - 48 months for experimental group and 46 for control group was used. A maize-amaranth blend porridge (85:15%) which provided at least 100% of the RDAs for vitamin A was used among the experimental group while pure fermented maize flour was used among the control group for six months. Serum levels for β-carotene, retinol, ferritin and zinc were done at baseline and after six months. Serum level analysis was done by use of AAS (MINI VIDAS) for ferritin and Shimadzu AA-680 for zinc levels. HPLC was used to for serum β– carotene and retinol. Data were analyzed using SPSS computer software.

Results: Majority of the children from both groups had low mean serum levels for retinol, β- carotene, ferittin and zinc at baseline showing deficiency. This significantly increased ($p<0.05$) by 25.6%, 232.7%, 28.0% and 28.9% for serum retinol, β- carotene, ferittin and zinc, respectively among the experimental group by the sixth month. The change among the control group was not significant ($p>0.05$).

Conclusions: Results suggest the role of DAL in improving micronutrients. Use of DAL incorporated into cereals can significantly increase micronutrients intake. This study recommends the use of DAL as part of diet for children.

Key words: Dried amaranth leaves, retinol, β-carotene, ferritin, zinc

O077

FIRST TRIMESTER FOLIC ACID SUPPLEMENTATION ENHANCES FOLATE STATUS THROUGHOUT PREGNANCY AND REDUCES THE EFFECT OF THE MTHFR 677C>T POLYMORPHISM.

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Background and objectives: We investigated whether high first trimester plasma folate (PF) status modulates the effect of the MTHFR 677C>T polymorphism on red cell folate (RCF) during pregnancy.

Methods: 443 women from the Reus-Tarragona Birth Cohort (NUTCIR phase; University hospitals Sant Joan, Reus, Joan XXIII, Tarragona) were prescribed a first trimester daily supplement containing 400 µg of folic acid and 2 µg of cyanocobalamin. The MTHFR 677C>T polymorphism was determined and also PF and RCF at <12, 15, 24-27 and 34 gestational weeks (GW), and labor (PF). PF tertiles were used as an indicator of folic acid supplement use. We investigated how they affected the association between the MTHFR 677C>T polymorphism and RCF.

Results: 47.9% of the participants adhered strictly to, 16.5% sporadically to and 31.2% exceeded the recommended supplement regime. We excluded non-users (4.5%). Between 15 and 24-27GW, PF was reduced between 35%-46% in all supplement groups, and then no further. At labor, it was highest (15 [12.6-17.8] nmol/L) in the "excess" group ($p<0.001$). No differences in RCF were observed between MTHFR 677C>T homozygotes (18.3%) and wild types (34.5%) at any time of pregnancy in participants that had high tertile >32.5 nmol/L) first trimester PF. However, RCF (nmol/L) [mean (95%CI),*$p<0.05$] was lower in homozygotes compared to wild types with low tertile PF <19.9 nmol/L) at 15GW: 721 (603,864) versus 968

(818,1146)*, low <8.6 nmol/L) or mid (>8.6-<16.2 nmol/L) tertiles at 24-27 GW: 646 (540-774) vs 830 (750,919)* and 959 (844,1090) versus 1118 (1035,1207)* respectively; low (<6.9 nmol/L) or mid (>6.9-<13.2 nmol/L) tertiles at 34GW: 521 (454,597) versus 634 (575,699)* and 697 (550,882) versus 850 (765,944), (p=0.066).

Conclusions: High first trimester folate status is associated with higher RCF and no effect of the MTHFR 677C>T polymorphism on RCF, for the duration of pregnancy.

Key words: folic acid, pregnancy, MTHFR 677C>T, supplementation

O078

THE DIETARY PATTERNS OF MOTHERS DURING PREGNANCY, THEIR CHILD AT AGE FIVE YEARS AND CHILD WEIGHT STATUS.

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Background and Objectives: Children's diet patterns are likely to be influenced by their mothers' diet pattern. The aim of this study was to examine whether diet patterns of mothers during pregnancy and diet patterns of their children can predict child obesity.

Methods: Food frequency methods were used to assess the food intake of children and mothers in the Lifeways Cross-Generation cohort study. Dietary patterns for each group were identified by principal components analysis.

Results: The child's diet pattern at age five was significantly associated with some of the maternal patterns during pregnancy (n=437). The mother's 'health conscious' pattern was correlated with the child's 'healthy' pattern (r=0.195, P<0.001) and 'pasta and vegetable' pattern (r=0.181, P<0.001). The strongest relationship was found between the mother's 'processed' pattern and the child's 'junk' pattern (r=0.246, P<0.001). Furthermore the maternal 'processed' pattern was significantly negatively correlated with the 'pasta and veg' pattern. In multivariate logistic regression analysis the upper tertile of child 'cereal and juice' (OR 0.44, 95%CI 0.21-0.91) and the middle tertile of the 'pasta and veg' patterns (0.37, 95%CI 0.18-0.75) were negatively associated with overweight and obesity. Maternal processed pattern during pregnancy was positively associated with offspring overweight and obesity. These diet pattern associations remained significantly associated in the model when adjusted for other known risk factors including birthweight, maternal prepregnancy BMI, smoking, education and parity.

Conclusion: Analysis of dietary food patterns amongst families may help to develop dietary interventions that may be more effective at different stages during the Lifecourse.

Key words: dietary patterns mothers children obesity

O079

CELL PHONE BASED PEER COUNSELING TO SUPPORT EXCLUSIVE BREASTFEEDING IS ASSOCIATED WITH MORE FREQUENT HELP AND DECREASED BREASTFEEDING PROBLEMS

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Background and objectives: In Kenya cell phone use is high and presents opportunities to support breastfeeding with lower cost and wider reach as an mHealth innovation. Data from a randomized intervention trial showing cell phone based support (CPS) increases the prevalence of exclusive breastfeeding (EBF) were used to investigate pathways through which such support may strengthen maternal efforts to meet breastfeeding national recommendations.

Methods: Trained peer leaders (TPL=12) completed national training to support EBF and supported both pregnant and post-partum women randomized to CPS and monthly peer support group (PSG) from late pregnancy (32-26 weeks) to 3 months postpartum. We analyzed maternal reports on breastfeeding support and problems at home visits conducted at 3 months postpartum with women who had been randomly allocated to CPS (153), PSG (173) or existing facility-based standard of care (SOC=control; 179).

Results: Mothers allocated to CPS were more likely to report receiving postpartum help with breastfeeding (88.8% vs 62.4% and 41.4% for PSG, SOC; p<0.0001) but not infant feeding advice from health care workers or others. Fewer reported any breast pain (2.6% vs 8.7% and 8.4% for PSG, SOC; p=0.0513). Other indicators did not differ significantly, e.g. engorgement (9.8% vs 12.1% and 14.5% for PSG, SOC; p=0.425).

Conclusions: Cell phone based peer support is associated with maternal reports of more frequent help with breastfeeding between 1 week and 3 months postpartum. More frequent help may mediate a relationship between cell phone based support and increased EBF.

Key words: Exclusive breastfeeding, peer support, Health

Acknowledgements: We thank the participants and hospital staff. Kenya National Council on Science and Technology and University of Toronto provided ethical oversight. Bill & Melinda Gates Foundation to FHI 360, through the Alive & Thrive Small Grants Program managed by UC Davis; Global Alliance for Improved Nutrition (GAIN); Canada Research Chair program.

O080

EFFECT OF BREASTFEEDING PATTERN ON GROWTH AND MOTOR MILESTONE DEVELOPMENT OF INFANTS ATTENDING BABY CLINIC IN A NIGERIAN TEACHING HOSPITAL

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Background and objectives: The first two years of life is a "critical window" for the promotion of optimal growth and development. This study examined the effect of breastfeeding pattern on the growth and motor milestone development of infants.

Methods: A longitudinal survey involving 130 mother-infant pairs randomly selected during clinic days was conducted. Mothers' background data and infant feeding practices were collected using validated, pre-tested questionnaires. Duplicate measurements of infants' weights and heights were taken for 12months using standard procedures. Information on gross motor milestones development were obtained from mothers and confirmed using standard testing procedures. Data obtained were analyzed using descriptive statistics and analysis of variance.

Results: Majority (75%) of mothers initiated breastfeeding within 24hours. On enrollment, 60.8% practiced exclusive breastfeeding (EBF), 23.8% predominant breastfeeding, and 15.6% partial breastfeeding. Only 30% of the population practiced EBF up to 6months; 86.2% were still breastfeeding at one year. Exclusively breastfed infants had higher ($p<0.05$) weight velocity in the first three months; that of partially breastfed infants was higher from the 6th to the 10th month. Weight velocity of predominantly breastfed infants was lower ($p<0.05$) than that of the exclusively and partially breastfed infants especially from the 7th month. All nutritional indices were lower for predominantly breastfed infants. Possible risk of obesity was higher among exclusively and partially breastfed infants. The mean ages for development of all the milestones were lower than the mean ages recommended by the World Health Organization, except for standing with assistance (8.18months), which was still within the range of values recommended. Exclusively breastfed infants walked with assistance and walked alone earlier than predominantly breastfed infants

Conclusion: Concerted and deliberate efforts must be continued in order to improve and promote appropriate infant feeding practices in baby clinics

Key words: Breastfeeding pattern, growth, motor milestone development

O081

THE DIETARY EFFECT OF SERVING SCHOOL MEALS BASED ON THE NEW NORDIC DIET – A RANDOMISED CONTROLLED TRIAL IN DANISH CHILDREN

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Background and objectives: The OPUS study is a school-based intervention study testing selected health effects of New Nordic Diet (NND). Children are served lunch and snacks based on NND. The hypothesis is that Danish school children eat a healthier diet when receiving NND school meals as compared with packed lunch brought from home. To investigate the effects on intake of selected macronutrients in Danish school children when served school meals based on NND compared with packed lunch.

Methods: In a cluster-randomized controlled unblinded cross-over study children received school meals based on NND for 3 months and their usual packed lunch for 3 months. The daily intake of food and beverages was recorded 3 times during 7 consecutive days using a validated self-administered web-

based dietary assessment software tool for children. Statistical analysis was performed by hierarchical mixed models.

Results: 834 children from 9 schools were included and 96%, 89% and 80% filled out the first, second and third dietary assessment sufficiently (4-7 days), respectively. The preliminary results showed that the effect of serving NND resulted in a reduction in fat E% (P<0.0001), total fat (P=0.0007) and saturated fat (P<0.0001) intake for the NND compared to packed lunch; and an increase in protein E% (P<0.0001), and a borderline significant increase in dietary fiber intake (P=0.0471). There was no effect for energy intake, carbohydrate E% and added sugar E% (P>0.05). Effects are adjusted for BMI, season and household education.

Conclusions: Danish school children's dietary intake of total and saturated fat decreased, fat E% decreased and protein E% increased when eating NND lunch and snacks compared to packed lunch brought from home. The OPUS project (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet) is supported by the Nordea Foundation.

Key words: Web-based-dietary-assessment, school-meals, children, new-Nordic-diet

O082

PRESCHOOL FOOD AND DRINK PROVISION AND CONSUMPTION IN EARLY YEARS EDUCATION AND CARE SETTINGS IN ENGLAND

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Background and objectives: New voluntary guidelines for healthy food and drink provision for early years settings in England were published by the Children's Food Trust in collaboration with national early years providers. Because the guidelines were due for implementation in September 2012, the survey, conducted between April and July 2012, provided baseline information on food and drink provision in early years settings in England in order to subsequently evaluate the guidelines' impact; to assess the extent to which current provision met the guidelines; and to determine factors associated with healthier provision and consumption.

Methods: 67 settings (childminders, Children's Centres, sessional and full day care providers, nursery classes in primary schools) were recruited in three local authorities in England. 57 returned usable data. Over five days in each setting, trained observers measured food and drink provision, consumption, and wastage; provision by parents/carers; and setting characteristics.

Results: Data were collected in 794 sessions from 1312 children eating food provided by settings and 132 by parents. The food provided reflected societal norms for specific meals (e.g. breakfast cereal and milk at breakfast; main dishes plus vegetables, salad, fruit and dessert at lunch). Food provided by settings at lunch was typically healthier than parent-provided: more protein, fibre, vitamin A and folate, less sodium (279mg and 431mg, respectively) and less sugar (10% and 15% of total energy, respectively). Mean fruit and vegetable consumption was 1.2 portions per session). Compared with the guidelines, lunch provided less energy, carbohydrate, iron and zinc than recommended, enough protein, vitamin A, vitamin C and calcium, and too much salt. Provision at teatime met most of the standards apart from iron, zinc, and sodium.

Conclusions: The guidelines provide a useful framework for improving food and drink provision in early years education and care settings.

Key words: preschool, food, drink, England

O083

INTAKE OF WHOLE GRAINS AND INCIDENCE OF GASTRIC AND OESOPHAGEAL CANCER IN THE HELGA COHORT

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Background and objectives: Whole grains are a good source of dietary fibre, but beneficial effects might also stem from other components of the grain. Very few studies exist on intake of whole grains and incidence of stomach and oesophageal cancer, but studies on dietary fibre and these cancers suggest a protective effect. The objective of this work was to study the association between intake of whole grains and incidence of oesophageal and gastric cancer.

Methods: The Helga cohort has 120 000 participants from the Norwegian Women and Cancer study, The Northern Sweden Health and Disease study and the Danish Diet, Cancer and Health study, recruited in 1992-1999. After exclusions, 112 cases of oesophageal cancer, 185 cases of gastric cancer and 113 700 other cohort members were included in the analyses. They provided dietary information in semi-quantitative FFQs at baseline, and also information about other risk factors. Cancer

information was obtained by linkage to the respective cancer registries. The association between whole grain intake and cancer was analysed with Cox proportional hazards models.

Results: The median whole-grain intake was 47.4 g/day (5th-95th percentile: 13.3-101.1) in the non-cases, 37.5 g/day (10.8-87.2) in oesophageal cancer cases, and 45.1 g/day (8.1-99.1) in gastric cancer cases. A decreased risk of oesophageal cancer was observed, HR=0.83 (CI 0.69-0.99) p=0.04 per 20 g of whole grains. The HR for highest compared with lowest tertile of intake was 0.56 (0.32-0.97) p=0.03. The analyses were adjusted for country, smoking status, age at baseline, sex, processed meat, alcohol and vitamin C. No association was found for whole grains and gastric cancer.

Conclusion: In this study, higher intake of whole grains was associated with lower risk of oesophageal cancer.

Acknowledgements: This work was supported by NordForsk – Centre of excellence programme HELGA (070015).

Key words: Whole grains, gastric cancer, oesophageal cancer, cohort, epidemiology

O084

PHYSICAL ACTIVITY LEVELS AMONG COLOMBIAN ADULTS: INEQUALITIES BY SEX AND SOCIOECONOMIC STATUS

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Background and objectives: Worldwide studies show inequalities in physical activity(PA) levels related to socio-demographic characteristics. In Colombia, the most unequal country in Latin America, assessing PA inequalities is imperative. The objective was to evaluate sex and socioeconomic status(SES) inequalities on meeting PA recommendations among Colombian adults.

Methods: A secondary analysis of data from 2010 National Surveys was conducted. The sample included 14465 adults (18-64 years). The International Physical Activity Questionnaire was used to measure leisure time and transport domains. SES was measured by Sisben level (life standard measure in Colombia). Data analysis was performed using a Poisson regression.

Results: Overall, prevalence of meeting PA recommendations was 53.5%. Compared to men, women were less likely to meet PA recommendations (leisure time, women 13.8% vs.men 28.2%, p=<0.0001, walking for transport 31.2% vs.37.4%, p=<0.0001 and biking for transport 1.6% vs. 11.0%, p=<0.0001). Compared to adults from high SES households, low SES had lower prevalence of meeting PA recommendations during leisure time (22.5% vs. 16.1%, p=<0.0001). In contrast, biking for transport was lower in high SES, compared to low SES (4.5% vs. 7.4%, p=<0.0001). Meeting PA recommendations associated factors differed by sex and PA domain. Among women, leisure time PA was positively associated with high SES, higher education and study as occupation, while age<49 years and underweight were negatively associated. In transport domain, age<29 years or being head of household were positively associated, while middle SES, retirement and household chores were negatively associated. Among men, leisure time PA was positively associated with age<29 years, higher education and retirement. Transport domain PA was negatively associated with age<29 years, higher education, higher SES, retirement and overweight.

Conclusions: Future interventions to increase PA levels in Colombia must consider inequalities by sex and SES. Of special concern are the low prevalences of meeting PA recommendations during leisure time among women and low SES population.

Key words: Inequality, physical activity, socioeconomic factors

O085

CONSUMPTION OF ULTRA-PROCESSED PRODUCTS IS ASSOCIATED WITH OBESITY IN ADOLESCENTS AND ADULTS IN BRAZIL

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Background and objectives: Although it is generally considered that increased consumption of industrially processed foods is an important cause of the current pandemic of obesity, the evidence linking their intake to obesity is restricted to a few items such as soft drinks. A reason for this is that the role of processing as such is largely overlooked. The objective of this study was to assess the association between the consumption of ultra-processed food products and the occurrence ofobesity in Brazil in 2008-2009.

Methods: Data analyzed refer to a national representative sample of 34,003 Brazilians aged 10 and older studied in 2008-2009.Dietary data were obtained through two 24-hour food records. Body mass index (BMI) was calculated from directly

measured weight and height. Obesity was defined as BMI-for-age z-score>2 for adolescents (based on WHO standards) and BMI >30 kg/m^2 for adults. Foodstuffs were classified based on the nature, extent and purpose of food processing. Ultra-processed products were defined as formulations made mainly from substances extracted from foods (such as oils and fats, starches, and sugars) and containing little or no whole foods. Logistic regression was used to assess the independent association between quintiles of consumption of ultra-processed products and obesity. Confounders included income and other socio-demographic variables and also calories other than from ultra-processed products.

Results: The more that people consumed ultra-processed products, the more likely it was that they would be obese. There was a direct, dose-responsive, independent relationship between dietary energy intake from ultra-processed products and rates of obesity (P<0.01 for linear trend). The odds of being obese in the upper quintile of the energy intake from ultra-processed products, compared with the lower quintile, was 1.23 (95% CI 1.04-1.44).

Conclusions: The greater the consumption of ultra-processed products, the more likely it is that consumers will be obese.

Key words: Industrialized foods;food processing,obesity

O086

COMPARISON OF MUAC AND PERCENT WEIGHT GAIN AS DISCHARGE CRITERION IN A LARGE TFP PROGRAM IN BURKINA FASO - 2007-2011

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Background and objectives: The World Health Organization [WHO] has endorsed mid-upper arm circumference [MUAC] as an independent admission criterion to therapeutic feeding programs [TFP] for children 6-59 months old with severe acute malnutrition. However, WHO still recommends weight gain to assess nutritional recovery due to lack of evidence. Here we report on nutritional recovery as assessed by weight gain and MUAC for a large TFP using MUAC < 120 mm as the admission criterion and compare program outcomes for both discharge criteria.

Methods: We analyzed data of patients admitted in a TFP in Burkina Faso between 2007 and 2011. From September 2007 ¨C March 2009 [Period A] recovery was defined by 15% weight gain based on admission weight. From April 2009 ¨C December 2011 [Period B] recovery was achieved at MUAC > 124 mm, with a 4 week minimum stay.

Results: 50,841 children were admitted with MUAC < 120 mm. Median age was 13 months. Ninety percent of all admissions recovered: 22,094 (89.1%) during period A and 23,865 (91.6%) during period B. Average length of stay [ALS] for children recovered during period A was 53.9 days compared to 37.0 for those recovered over period B. During period A, ALS was paradoxically shorter for the most malnourished. During period B, ALS was inversely related to MUAC at admission and anthropometry upon discharge was similar across all MUAC admission categories for both MUAC and weight-for-height Z score.

Conclusion: MUAC> 124 mm is a superior criterion to assess nutritional recovery in this cohort. Its use allocates program resources more efficiently.

Key words: severe acute malnutrition, mid-upper arm circumference, therapeutic feeding programme

O087

DAILY SODIUM CONSUMPTION AND CARDIOVASCULAR MORTALITY IN GENERAL POPULATION. SYSTEMATIC REVIEW AND META-ANALYSIS OF PROSPECTIVE STUDIES

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Background and objectives: Sodium intake and blood pressure levels have a well-established causal relationship but the evidence regarding sodium intake and cardiovascular (CV) mortality is still controversial. The important heterogeneity between studies and target populations makes difficult to combine data for evidence synthesis. Therefore, we aimed to determine whether elevated dietary salt intake is associated with CV mortality in a general population with no previous cardiovascular events.

Methods: Systematic review and meta-analysis of prospective studies representing general population without previous cardiovascular events assessing the relationship between daily salt intake and CV mortality.

Results: 13 studies met the criteria to be included in the analysis. The final population was 259.213 participants with a mean follow-up period of 13.2 years (range 5-20), contributing to 10.967 cardiovascular deaths. Higher sodium intake was significantly associated with higher cardiovascular mortality (RR= 1.12 - CI 95% 1.07-1.17). However, we also found a significant heterogeneity among the studies included (chi2=39.34 [d.f.=17] p 0.002 and I2=56.8%). The most relevant source of heterogeneity was related to the sodium intake assessment. Only when sodium was assessed by urinary sodium excretion

the association was not significant (RR= 1.05-CI 95% 0.95-1.16). Variance-weighted least-squares regression showed that for every 50 mmol/day increase in sodium intake, the rate of CV mortality would increases 4.3 %; however, that trend was not significant.

Conclusions: Higher sodium intake would be associated with higher cardiovascular mortality in general population although this should be taken with caution due to the observation of a significant heterogeneity among studies. Some harmonization efforts to assess sodium intake should be implemented in future observational studies in order to reduce the sources of heterogeneity and make data more comparable for evidence synthesis.

Key words: cardiovascular mortality; meta-analysis; sodium intake

O088

DIETARY PROTEIN INTAKE AND THE INCIDENCE OF TYPE 2 DIABETES IN EUROPE: THE EPIC-INTERACT CASE-COHORT STUDY

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Background and objectives: Short-term studies have shown beneficial effects of dieta ry protein on weight loss, satiety and glycaemic control. However, the long-term association between dietary protein and type 2 diabetes incidence is uncertain. The objective of this present study was to investigate the association between total, animal and plant protein intake and the incidence of type 2 diabetes in the EPIC-InterAct Case-Cohort Study, a prospective study in 8 countries from the European Investigation into Cancer and Nutrition (EPIC).

Methods: Among 340,234 participants contributing 3.99 million person-years of follow-up 12,403 incident cases of type 2 diabetes were identified and a stratified subcohort of 16,835 participants was selected. Type 2 diabetes was based on multiple sources, where self-report was verified against medical information. Habitual protein intake was assessed using validated dietary questionnaires. Prentice-weighted Cox regression analyses were used to estimate HR and 95% CI for type 2 diabetes incidence according to protein intake.

Results: After adjustment for major diabetes risk factors and dietary factors the incidence of type 2 diabetes was higher in those with high intake of total protein (per 10g: HR 1.06; 95% CI 1.02-1.09, P-trend <0.0001) and animal protein (HR 1.05; 95% CI 1.02-1.08, P-trend 0.001). Effect modification by sex (p<0.001) and BMI among women (p<0.001) was observed. Compared to the overall analyses, associations were stronger in women, more specifically obese women with a BMI>30 kg/m2 (HR 1.19; 95% CI 1.09-1.32 for animal protein), and non-significant in men. Plant protein intake was not associated with type 2 diabetes (HR 1.04; 95% CI 0.93-1.16, P-trend 0.098).

Conclusions: High total and animal protein intake was associated with a modest elevated risk of type 2 diabetes in a large cohort of European adults.

Key words: Dietary protein, type 2 diabetes, nutritional epidemiology, case-cohort, prospective study.

O089

LOW DIETARY DIVERSITY IS ASSOCIATED WITH CHILD STUNTING IN RURAL ETHIOPIA

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Background and objectives: Diet diversity is related to overall quality and nutrient adequacy of the diet in low-income countries. The aim of this study was to determine the level of dietary diversity in school-aged children of a rural area in Ethiopia, and assess its association with their nutritional status.

Methods: We conducted a cross-sectional study, using multistaged cluster survey methodology, in rural villages of Libo Kemkem and Fogera districts in Amhara Regional State, Ethiopia. Food intake was assessed by a 24 hour recall. A Diet Diversity Score (DDS) was created by summing the number of unique food groups consumed during last 24 hours. The Minimum Dietary Diversity Intake (MDDI) was defined as DDS > 4. Stunting and wasting were defined as Height-for-Age and Body-Mass Index-for-Age Z scores < -2 standard deviations in relation to WHO 2007 Reference. Descriptive and univariate analyses were carried out.

Results: A total of 711 children were surveyed; 43% were stunted and 22% were wasted. Overall, 83.6% of the children did not reach a MDDI and this proportion was higher among stunted children (86.4%) than among non-stunted (81.5%), p=0.05. Also, a lower proportion of stunted children reported

consuming food products from the meat/poultry/fish group compared to the non-stunted (8.3% and 13.3% respectively, p=0.023) and from the Vitamin A-rich-fruits-and-vegetables group (1.7% among non-stunted versus 4.7% among stunted, p=0.021). On the other hand, stunted children reported an increased consumption of legumes (92.7%) compared to non-stunted children (88.7%), p=0.045. No association was found between DDS or food groups and wasting.

Conclusions: Child stunting and reduced dietary diversity intake are highly prevalent in this area, and seem to be related. The inclusion of a variety of vitamin A rich foods and animal-source-food products may be essential for improving child growth and nutritional status.

Key words: diet diversity, Ethiopia, malnutrition

O090

DNA DAMAGE AND CHROMOSOMAL STABILITY IN HEALTHY AND DIABETIC INDIVIDUALS AND THE IMPACT OF VEGETABLES AND WALNUT OIL

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Background and objectives: Diabetes mellitus is a metabolic disorder characterized by high blood glucose levels which are a consequence of impaired insulin secretion and insulin function. Recent studies suggest that people with type 2 diabetes are more likely to die from cancer than people without diabetes. Reasons for the increased cancer risk involve obesity, hyperglycaemia and hyperinsulinaemia. the objective was to investigate the amount of DNA and chromosomal damage in T2DM subjects and the impact of a dietary intervention rich in vegetables and polyunsaturated fatty acids on biomarkers for oxidative DNA damage and cancer risk.

Methods: An intervention study with 76 diabetic and 21 non-diabetic subjects was performed. Subjects were randomly assigned to the information or intervention group. All subjects received information about the beneficial effects of a healthy diet and subjects randomised to the intervention group additionally received 300 g of vegetables and 25 ml of walnut oil rich daily for 8 weeks. DNA damage was measured with Comet Assay, levels of chromosomal damage were evaluated with Micronucleus Assay.

Results: The intervention led to a significant reduction in DNA damage in diabetic subjects after 4 and 8 weeks of intervention. Levels of DNA damage did not change in non-diabetic subjects of the intervention group and in subjects of the information group. Biomarkers for cancer risk evaluated by Micronucleus Assay remained constant during the intervention with vegetables and oil, however associations with glucose metabolism were observed.

Conclusions: The results of our study suggest that a healthy diet can reduce levels of oxidative DNA damage in diabetic individuals. Levels of chromosomal damage were not changed; however, results suggest a strong relation to glycemic control.

Key words: Diabetes mellitus, cancer risk, DNA damage

O091

IMPACT OF RELATIVE PROTEIN INTAKE DURING SEVERE ENERGY RESTRICTION ON BODY COMPOSITON AND RESTING ENERGY EXPENDITURE IN OBESE ADULTS

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Background and objectives: When body weight is lost rapidly, there is some concern that a greater proportion of the tissue lost is fat-free mass (FFM) and that this can adversely impact on resting energy expenditure (REE). Both exercise training and higher relative protein intakes are reported to be effective in preserving FFM during weight loss. Therefore we examined: [1] the extent of FFM loss when a very low energy diet (VLED) was used in combination with exercise training; and [2] the association between relative protein intake and changes in FFM and REE.

Methods: Sixteen sedentary obese but otherwise healthy men and women (40.5±9.0 y; 39.3±6.3 kg/m2) were measured in energy balance before and after a 12-week VLED plus exercise training intervention. Exercise training involved 4 aerobic and 2 resistance sessions/wk. The relative energy deficit was severe (from 75-89%). Body composition was measured by DXA and REE by indirect calorimetry.

Results: Change in weight (-18.6±5.0 kg), FM (-15.5±4.3 kg), and FFM (-3.1±1.9 kg) did not differ between genders. FFM represented 16±8% (range:4-29%) of the weight loss. The ratio of FM:FFM loss was not related to the weight loss, nor to baseline body composition. Protein intake (g/kg/d) was negatively correlated with FFM loss expressed in absolute (kg; R=0.55, P<0.01) and relative (%; R=0.44, P<0.05) terms. Further, protein intake was negatively correlated with the reduction in REE (R=0.46, P<0.05).

Conclusions: Loss of FFM was modest, suggesting that exercise training may have an important effect on body composition during severe energy restriction. However, lower relative protein intake was associated with greater FFM loss, and greater reductions in REE. Higher protein intakes combined with the anabolic stimulus of exercise training may be warranted during severe energy restriction to limit negative effects on body composition and metabolism.

Key words: Weight loss, protein intake, exercise, obesity, body composition

O092

NUTRITIONAL STUDY WITH FUNCTIONAL OMEGA-3 ENRICHED MILK IN CELIAC DISEASE PATIENTS. THE CIBOM STUDY.

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Background and objectives: Celiac disease is caused by an abnormal sensitivity to cereal gluten and courses with increased pro-inflammatory to anti-inflammatory interleukins ratio and elevated antibodies levels to gliadin. Scientific evidence is available on the role of omega-3 fatty acids as anti-inflammatory agentsThe Celiac, Inflammatory Biomarkers Omega Milk study (CIBOM study) was designed with the aim to test the possible protective effects of omega-3 fatty acids enriched-milk in celiac patients.

Methods: The design consisted in a doble-blind, randomized, in parallel, controlled study of 6 months duration. Omega-3 enriched milk (500 mg/lEPA+DHA) was tested vs a control semi-skimmed milk. Informed consent was obtained from participants. Patients were instructed to drink 500ml/day of milk in 2 doses and to maintain a mixed diet (with avoidance of food containing real or potential gluten). Blood samples were taken at 0, 1 and 6 months. Serum fatty acid profile, lipids, lipoproteins, interleukins and other markers were analyzed. A triple 72h food register questionnaire and FFQ were performed.

Results: Celiac disease diagnosis was performed by intestinal biopsies. Fifty-five volunteers were enrolled in the study. Thirty eight completed the 6 month treatment. Information on factors at gestation, food introduction calendar and diet is available and being to study. In general terms volunteers have appreciated or considered adequate both assayed milks. Fatty acid profile would permit to assure omega-3 consumption, as high bioavailability has been already found in other studies.

Conclusion: Results from this on-going pilot study would permit to evaluate the potential benefits of omega-3 enriched milk in celiac patients and to perform a high-scale project in those patients.

Key words: Celiac disease, omega-3, milk, inflammation, markers

O093

EFFECTS OF TWO ENERGY-RESTRICTED DIETS DIFFERING ON PROTEIN CONTENT ON THE INFLAMMATION STATE OF OBESE SUBJECTS WITH METABOLIC SYNDROME FEATURES

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Background and objectives: Metabolic syndrome (MetS) traits encompass the main cardiovascular risk factors. Inflammation has been proposed as a potential link between obesity and related vascular comorbidities. Therefore, adequate dietary strategies to fight against MetS must target on the improvement on the inflammatory status, in addition to weight/fat loss. Some beneficial effects of increasing protein of the diet on weight loss/maintenance have been reported but the role on inflammation still being controversial. This study aimed at comparing the effect of two energy-restricted diets with different protein content on the inflammation state of obese subjects presenting MetS features.

Methods: Ninety-six obese (BMI= 35.85±4.,67 kg/m^2) participants with MetS symptoms completed an 8-week randomized intervention trial to compare the RESMENA diet (-30% Energy, 30% protein, 40% carbohydrates, 30% lipids) with a Control diet based on the American Heart Association guidelines (-30% Energy, 15% protein, 55% carbohydrates, 30% lipids). Four inflammation markers (hsCRP, TNFα, IL-6, PAI-I) were measured at baseline and at the end of the intervention and considered as a score in order to assess the inflammation condition.

Results: Control and RESMENA groups significantly reduced body weight (6.73±0.71 kg vs. 7.09±0.82 kg) without differences between groups. The inflammation score was significantly lower (p=0.012) in the low-protein group (6.81±2.32 vs. 7.94±1.94) at the end of the intervention. Total protein intake was positively associated with inflammation (p=0.007), as well as animal protein (p=0.025) and meat derived protein

(p=0.015). Nonetheless, neither vegetal origin protein nor fish derived one were found to influence the inflammation state.

Conclusion: The type of protein more than the total amount consumed within an energy-restricted diet influence the inflammation status associated to obesity-related vascular damage. www.clinicaltrials.gov; NCT01087086/March 2010

Key words: inflammation markers, weight loss, macronutrient distribution, type of protein.

O094

INCREASING ENERGY AND ZINC INTAKES TO LEVEL RECOMMENDED BY WHO IMPROVE FAT-FREE MASS BUT NOT ZINC STATUS IN HIV/AIDS PEOPLE

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Background and objectives: Malnutrition is common complications of HIV. The aim of this study was to assess individual dietary intakes and the impact of high energy fortified food (HEFF) on body composition and zinc status of hospitalized people living with HIV (PLWH) in Senegal.

Methods: A clinical trial was conducted in 65 PLWH randomly allocated to receive during 3 months the standard hospital diet alone (Control group; n=33), or the diet with 100 g/day of HEFF mixed with rice porridge (HEFF group; n=32). Individual dietary intakes were measured during hospitalization and compared to the Recommended Dietary Allowances (RDA) for PLWH. Body composition was determined by BIA. Plasma zinc concentration was assessed by atomic absorption and adjusted to inflammation/infection (CRP and α1-AGP). All measures were conducted on admission, discharge and after 9 weeks follow up at home.

Results: In both groups, 30% were severely malnourished (BMI <16 kg/m²) and 50% were zinc deficient. Compared to RDA, energy and zinc intakes from the standard diet alone were low in the Control group (1178±708 Kcal, 3.3±09 mg), and in the HEFF group (1558±692 Kcal, 3.4±0.7 mg). Zinc and energy requirements of the PLWH (as recommended by WHO) were covered when 100 g HEFF (543 kcal, 7 mg zinc) is added to the standard diet. After 3 months of supplementation, weight (+11%) and fat-free mass (+11.8%) significantly increased (P=0.033), while body fat percentage decreased (-0.3%; P=0.018) in the HEFF group compared to the Control group. However, the zinc status of the patients remained unchanged.

Conclusion: The standard hospital diet did not provided adequate amount of energy and zinc for PLWH. When the diet was improved with HEFF, intakes reached the RDA and the body composition of the patients improved after 3 months but not their zinc status.

Key words: food supplementation, PLWH, BIA, Senegal

O095

LIFESTYLE RECOMMENDATIONS FOR CANCER PREVENTION AND SURVIVAL AFTER DIAGNOSIS OF COLORECTAL CANCER: RESULTS FROM THE EPIC STUDY

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Background and objectives: A score reflecting lifestyle recommendations on diet, nutrition, physical activity and weight management for cancer prevention proposed by the World Cancer Research Fund/American Institute of Cancer Research (WCRF/AICR score) has been associated with a lower incidence of colorectal cancer (CRC) in participants of the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort, but the influence of this score on mortality after CRC diagnosis is unknown.

Methods: The association between the WCRF/AICR score (including the recommendations on weight management, physical activity, foods and drinks that promote weight gain, plant foods, animal foods, alcoholic drinks, and breastfeeding for women; score range was 0–6 in men and 0–7 in women) and CRC-specific (n=929) and overall mortality (n=1,113) was prospectively examined among 3,292 participants diagnosed with CRC between 1992-1999 in the EPIC cohort (mean follow-up time 4.2 years). Multivariable Cox proportional hazard models were used to calculate hazard ratios (HRs) and 95% confidence intervals (CIs) according to four pre-determined categories of the score.

Results: The HRs (95% CIs) for CRC-specific mortality among participants in the 2nd (score range in men/women: >2-<3/>3-<4), 3rd (3-<4/4-<5) and 4th (4-6/5-7) category of the score were 0.91 (0.75-1.09), 0.76 (0.63-0.93) and 0.74 (0.58-0.95) respectively (p for trend 0.003), compared to participants with the lowest adherence to the recommendations (category

1 of the score: 0-2/0-3). Similar HRs for overall mortality were observed (p for trend 0.006).

Conclusions: Higher pre-diagnostic adherence to the WCRF/AICR recommendations on diet, nutrition, physical activity and weight management are associated with improved survival among patients with CRC.

Key words: healthy lifestyle, diet, physical activity, weight, colorectal cancer, survival.

O096

DID THE CYCLONE "SENDONG" IN PHILIPPINES AFFECT MALNUTRITION LEVELS OF CHILDREN IN THE PHILIPPINES?

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Background and objectives: Few controlled and geographically restricted epidemiological studies are available on the nutritional impact of floods on children. The hypothesis that households affected by the cyclone Sendong are at higher risk of having children undernourished was tested to improve the understanding of the relationship between exposure to floods and malnutrition in Philippines.

Methods: Datasets from two cross sectional studies done by ACF in the affected area after the floods were merged and analysed after attributing specific weightings to each of the surveys. ENA software was used to generate anthropometric scores and STATA was used to analyse the information. The association between malnutrition indicators (wasting, stunting and underweight) and the level of exposure that households had to floods was assessed by using univariate and multivariate logistic regression. Adjustment for confounding was carried out using a forward fitting approach model.

Results: The overall prevalence of wasting, stunting and underweight in children aged 6-59 months was 4.6%, 42.8% and 24.7%. Adjusted analysis for potential confounders revealed that within four months of the cyclone, wasting and stunting did not differ among children living in totally affected houses and those living in partially and non-affected houses. However, the risk of being underweight was lower in those children living in the most heavily affected houses (crude OR: 0.40, 95%:0.19-0.83).

Conclusions: Prevalence of malnutrition did not raise emergency thresholds. Household which were highly affected tended to have less children suffering from being underweight, as opposed those living in partially and non-affected households, likely because the majority of those more heavily affected were moved to evacuation centres where humanitarian aid was more efficiently distributed. A better understanding of the mechanisms and impact that natural disasters have on the nutritional status of children is required to devise more effective interventions to reduce malnutrition.

Key words: floods, malnutrition, children

O097

DIETARY CAROTENOIDS AND BREAST CANCER RISK AMONG CHINESE WOMEN

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Background and objectives: Although vegetables and fruits have been implicated in the etiology of breast cancer, the role of carotenoids in these food groups has received little attention in Chinese populations. And the protective effect of carotenoids on breast cancer has been inconclusive. The present study aimed to assess the association of dietary carotenoids with breast cancer risk among Chinese women.

Methods: A case–control study was conducted between September 2011 and December 2012 in Guangzhou, China. Five hundred and twenty-three breast cancer cases were matched in frequency to 523 controls by age (5-year interval) and residence (urban/rural). Dietary intake was assessed by face-to-face interviews using a validated food frequency questionnaire. The US Department of Agriculture-Nutrition Coordinating Center Carotenoid Database was used to calculate the specific carotenoids intake. The logistic regression models were used to estimate multivariate-adjusted odds ratios (ORs) and 95% confidence intervals (CIs).

Results: A significant inverse association was found between specific carotenoids intakes and breast cancer risk. The adjusted ORs for the highest quartile versus the lowest quartile were 0.33 (95% CI: 0.21-0.51, trend test P<0.01) for α-carotene, 0.29 (95% CI: 0.18-0.44, trend test P<0.01) for β-carotene, 0.44 (95%CI 0.28-0.68, trend test P<0.01) for β-cryptoxanthin, and 0.38 (95% CI: 0.25-0.58, trend test P<0.01) for lutein+zeaxanthin, respectively. Lycopene intake was not found to be associated with breast cancer risk. The protective effect of the specific carotenoids on breast cancer risk was more evident among premenopausal women but not among postmenopausal women.

Conclusions: This study indicated that higher intakes of specific carotenoids were associated with a lower risk of breast cancer among Chinese women.

Key words: carotenoids, breast cancer, Chinese women

O098

ZINC ABSORPTION FROM RICE IS SIMILAR WHEN ZINC IS INTRINSICALLY INCREASED THROUGH BIOFORTIFICATION OR EXTRINSICALLY ADDED AS ZNSO4

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Background and objectives: Increasing zinc content of a staple food crop through biofortification is a promising strategy to prevent and reduce zinc deficiency and is particularly interesting for rice and crops that are not consumed as flours and are thus not a good vehicle for post-harvest fortification. The efficacy of biofortification depends on the bioavailability of zinc from the improved crop, as the native phytic acid content and the interaction of the native zinc with the grain matrix may strongly influence zinc absorption. The aim of this study was to evaluate zinc absorption from a biofortified rice and to compare it to a rice fortified with ZnSO4 before consumption to the same total zinc content (1.12 mg/meal).

Methods: Fractional absorption of zinc (FAZ) was measured using the double isotopic tracer ratio method. 70Zn label was present intrinsically in the biofortified rice, and it was added before consumption to the extrinsically fortified rice. Sixteen young healthy adults consumed the two single meals in a crossover design.

Results: The geomean FAZ (-SD; +SD) from the biofortified rice was 23.7 % (16.4; 34.2), similar to the 19.5 % FAZ (13.4; 28.5) measured in the extrinsically fortified rice ($p = 0.06$).

Conclusions: The results suggest that the zinc intrinsically present in the biofortified rice is released from the rice matrix in the gastrointestinal tract and its absorption is influenced by phytic acid and other food components similarly to that of the extrinsically added zinc.

Key words: zinc absorption, biofortification, rice Funding: The INSTAPA project receives funding from the European Union's Seventh Framework Programme [FP7/2007-2013] under grant agreement no 211484.

O099

SEX DIFFERENCES OF VITAMIN E METABOLISM IN RATS

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Background and objectives: Alpha-tocopherol, a form of vitamin E, is preferentially accumulated in human and rodents by means of alpha-tocopherol transfer protein. It has been reported that plasma and tissue concentrations of alpha-tocopherol are higher in females than in males that may be related to the sex difference of antioxidative activity. In order to clarify the mechanism of this difference, we investigated the sex differences of alpha-tocopherol metabolism in rats.

Methods: Urinary excretion of alpha-carboxyethyl-hydroxychromans (CEHC), a major alpha-tocopherol metabolite, was measured and compared between 1) male and female rats of 9 weeks old, 2) male and female rats of 3 weeks old, 3) ovariectomized and sham-operated female rats, 4) castrated and sham-operated male rats, 5) castrated male rats with or without testosterone propionate injection (8 mg / kg body weight). Plasma and liver alpha-tocopherol concentrations and lipid concentrations were also measured.

Results: Urinary alpha-CEHC excretion was significantly higher in female than male rats of 9 weeks old, but the difference was not observed in rats of 3 weeks old. Castration increased urinary CEHC concentration while ovariectomy did not have any effect. Teststerone injection to castrated rats reduced urinary CEHC excretion. Testosterone decreased plasma and liver alpha-tocopherol concentrations and liver triglyceride concentrations.

Conclusions: Urinary excretion of alpha-tocopherol metabolite was higher in female rats than in males, and this difference was caused by the effect of testosterone. The results that testosterone decreased both alpha-tocopherol metabolism and accumulation in body indicated that testosterone reduced lipid and tocopherol accumulation that cause the reduced tocopherol metabolism in male rats. To clarify the mechanism of low tocopherol accumulation in male rats needs further investigation.

Key words: alpha-carboxyethyl-hydroxychroman, alpha-tocopherol, ovariectomy, vitamin E

O100

IODINE EXCRETION HAS DECREASED IN DENMARK DURING THE LAST 5-6 YEARS

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Background and objectives: Before 1998 mild to moderate iodine deficiency existed in Denmark. A voluntary iodine fortification program was introduced in Denmark in 1998, and changed to a mandatory fortification of household salt and bread salt in 2000. The objective of this study was to compare iodine excretion and iodine intake in 2004-2005 and 2008-2010.

Methods: Two population based studies were carried out after fortification in 2004-2005 and in 2008-2010 in two cities in Denmark. The first study included 3579 randomly recruited adult participants (participation rate 46.6 %). The second study included 2465 adult participants (59.1 %), recruited among participants in a cross-sectional study carried out in 1997-1998. Iodine in casual urine samples was measured by the Ce-As method. Creatinine was measured on a Vitros 250 chemistry system. Intake of iodine rich food was assessed by food frequency questionnaire. To calculate estimated 24-h iodine excretion the iodine/creatinine ratio was multiplied by expected daily creatinine excretion for the given individual.

Results: Median (25-75 percentiles) iodine excretion was 101 (57-151) µg/l in 2004-2005 and 83 (47-133) µg/l in 2008-2010, P<0.001. A higher estimated fluid intake (½ glass) in 2008-2010 compared with 2004-2005 might partly explain this decrease. However, median estimated 24 h iodine excretion decreased from 150 (101-235) µg/day to 134 (93-206) µg/day, respectively (P<0.001). This measure takes the dilution of the urine into account. Dietary intake of iodine rich food did not change significantly but percent who used dietary supplements with iodine increased from 30 % and 36 % (P<0.01).

Conclusion: Iodine excretion in Denmark has decreased significantly between 2004-2005 and 2008-2010 to a level indicating mild iodine deficiency in the population, despite an unchanged fortification program. These results suggest that the iodine content in food, e.g. milk, may have changed.

Key words: iodine fortification, iodine intake, Denmark

O101

EVALUATION OF ZINC STATUS AND COMMUNITY PERCEPTIONS IN PAKISTAN: THE NATIONAL NUTRITION SURVEY 2011

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Background and objectives: Over a third of the global population is at risk of zinc deficiency. Zinc deficiency is the fifth leading risk factor for childhood illnesses in the developing world. Several systematic reviews of preventive and therapeutic strategies have highlighted potential benefits of zinc. Pakistan is recognized as a country with a significant proportion of its population at risk of zinc deficiency. Previous National Nutrition Survey in 2001 identified over a third of the women and children as zinc deficient on the basis of plasma zinc estimation. In the last decade, other than the introduction of zinc for the management of diarrhea, no large scale preventive interventions have been evaluated. In order to understand the population prevalence of zinc, we evaluated the zinc status as part of the recently concluded National Nutrition Survey 2011.

Methods: The survey was conducted on a national and provincial sampling frame weighted for urban and rural populations and targeted women of reproductive age (WRA) 15-49 years and children under 5 (U5C) 0-59 months. All seven provinces of the country were included and in a two stage stratified survey. Altogether 30,000 households were surveyed and 12,000 blood specimens each from WRA and U5C analysed for a range of micronutrients using standard procedures in a CDC certified central micronutrient laboratory.

Results: Preliminary findings from the survey indicate that overall nutritional status of children in Pakistan have not improved since 2001. Stunting rates range from 37-54% and between 5-9% of children severely wasted. Among WRA 5-18% BMI < 18.5. Preliminary findings of the overall prevalence of zinc deficiency suggest that 38% of U5C and 48% of WRA have serum zinc concentrations < 60 µg/dL).

Conclusion: To reduce the burden of zinc deficiency in low resource countries, fortification of food may be the only solution at a population level.

Key words: Zn deficiency, urban, rural, Pakistan

O102

DEFINING OBESITY USING BIOLOGICAL END POINT IN CHILDREN

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Background and objective: Obesity is defined as presence of excessive body fat mass(FM) associated with morbidity. FM associated with morbidity in children is debatable and only few studies have tried to identify the critical FM which varies between 20%-25 % in boys and 25%-32% in girls. This study attempts to identify the %FM that would define obesity among Sri Lankan children.

Methods: A cross sectional descriptive study conducted among 5-15year old children in Colombo district. FM was assessed using InBody-230 BIA machine (Boispace Co Ltd, South Korea) and validated against Sri Lanka body composition equations. Waist circumference (WC) was measured. After a 12 hour fast, blood was drawn for fasting blood glucose (FBS) and lipid profile. OGTT was done with anhydrous glucose 1.75 g/kg body weight and random blood sugar (RBS) done 2hours later. Metabolic derangements were defined as: WC for age >90th centile (UK standards); FBS>100 mg/dl or RBS>140 mg/dl; HDL-C<40 mg/dl; triglyceride>150 mg/dl; and SBP/DBP >+2SD for age (UK standards). Metabolic syndrome (MetS) was diagnosed by a high WC with ≥2 metabolic derangements. ROC were drawn to determine best %FM that predicts MetS as well as ≥2 metabolic derangements.

Results: 920 children were studied (boys 547). 15 (1.6%) had MetS. 95 (10.3%) had two and 16 (1.7%) had ≥3 metabolic derangements. MetS in boys was associated with a %FM of 28.6 (sensitivity 0.857; specificity 0.870) and in girls 32.6 (sensitivity 0.833; specificity 0.789). ≥2 metabolic abnormalities were associated with a %FM of 17.1 in boys and 25.7 in girls.

Conclusion: FM associated with adverse health outcomes in this population is comparable to other available data. A %FM 28% for boys and 32% for girls would be an acceptable cutoff limit.

Acknowledgements: Study carried out through an educational grant from Anchor institute, to University of Colombo.

Key words: Fat mass, Obesity, metabolic derangement, Sri Lankan children

O103

RIBOFLAVIN STATUS IS INVERSELY ASSOCIATED WITH HOMOCYSTEINE AND DETERMINES THE EFFECT OF THE MTHFR 677C>T POLYMORPHISM ON HOMOCYSTEINE DURING PREGNANCY

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Background and objectives: The function of FAD-dependent methylenetetrahydrofolate reductase (MTHFR) may be affected by riboflavin status. We investigated the effect of riboflavin status during pregnancy on homocysteine (tHcy) and on the relationship between the MTHFR 677C>T polymorphism and tHcy.

Methods: 400 women from the Reus-Tarragona Birth Cohort (NUTCIR phase; University hospitals Sant Joan, Reus and Joan XXIII, Tarragona) were studied. Erythrocyte glutathione reductase activation coefficient (EGRAC, functional riboflavin status indicator), red cell folate (RCF), plasma cobalamin and tHcy at <12, 24-27 and 34 gestational weeks (GW), and the MTHFR 677C>T polymorphism were determined. The association between EGRAC and tHcy and how EGRAC status affected the association between the polymorphism and tHcy were investigated using multiple linear regression analysis (MLRA) at each of the studied time points. The models were adjusted for RCF, cobalamin, creatinine, smoking, caffeine, study centre, maternal age and GW at the moment of the extraction.

Results: EGRAC increased as pregnancy progressed indicating worsening status (12GW vs 34GW, mean[SD]) (1.15[0.17] vs 1.19[0.18] p<0.05). tHcy [μmol/L, geometric mean(SD)] was higher at 24-27GW in participants with riboflavin deficiency (EGRAC >1.4) (5.13[1.07]) compared to those with optimal riboflavin status (EGRAC < 1.2) (4.51[1.02],p<0.05) and at 34GW in those with deficient (6.21[1.07] vs 5.00[1.02],

p<0.001) or borderline (EGRAC >1.2-<1.4) riboflavin status (5.73[1.02], p<0.01). MLRA showed that tHcy was 18% higher in MTHFR 677C>T homozygotes in the highest EGRAC tertile >1.17) at <12GW compared to the reference group (heterozygotes and wild types combined) and 18.8% higher at 34GW (high EGRAC tertile: >; 1.22). The respective interaction terms (EGRAC * MTHFR 677C>T genotype) were significant: p= 0.002 and p<0.001.

Conclusion: Riboflavin status worsened as pregnancy progressed, was inversely associated with tHcy in mid-late pregnancy and determined the effect of the MTHFR 677C>T polymorphism on tHcy.

Key words: Riboflavin, homocysteine, MTHFR 677C>T, pregnancy.

O104

AN INADEQUATE FRUIT AND VEGETABLE INTAKE HAS ONLY A SMALL EFFECT ON VITAMIN STATUS IN EUROPEAN ADOLESCENTS- THE HELENA STUDY

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Background and objectives: Fruit and vegetables intake is recommended as high intakes are associated with a reduced outcome of chronic disease and positive health status. Especially adolescents often have an inadequate intake of fruit and vegetables, and this could be linked to an undersupply of nutrients, and specifically, vitamins. The association between fruit and vegetable consumption (FVC) and vitamin status in European adolescents participating in the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) cross-sectional study is examined.

Methods: In 1089 adolescents (580 females), FVC were assessed by means of a validated questionnaire and blood vitamin concentrations [plasma folate (PF), red blood cell folate (RBC folate), whole blood folate (WBF), cobalamin, holotranscobalamin, total-homocystein, vitamin B6, vitamin C, ß-carotene, αtocopherol, retinol, and 25-OH-vitamin D]. The fruit and vegetable intake was classified into 3 groups: A: intake less or equal to once a week; B: 2-6 times per week, C: at least once per day. Vitamin status was assessed by chromatography (RP-HPLC) or immunoassays. Statistical differences were assessed by ANOVA analysis (p<0.05, SPSS).

Results: Group C with regular fruit and vegetable consumption included the lowest percentage of adolescents (for fruits: boys = 14.6%, girls 21.4%, for vegetables: boys =10.3%, girls = 16.5%). In both gender, significantly higher PF levels were observed with higher FVC. In boys, FVC was positively correlated to WPF and RBC-folate (p<0.05). Only in girls, a higher vegetable intake was also associated with significantly higher cobalamin, vitamin C and ß-carotene levels. Fruit intake in boys was inversely associated with α-tocopherol concentrations (p<0.05).

Conclusions: Less than 20% of adolescents consumed fruit and vegetables at least once per day. Only folate was positively influenced by FVC and in addition in girls, cobalamin, vitamin C, and ß-carotene concentrations were related to vegetable intake.

Key words: vitamin status, fruit and vegetable intake, adolescents

O105

CLASSIFICATION OF BODY MASS INDEX OF RURAL AND PERI-URBAN SCHOOL CHILDREN AND ADOLESCENTS IN NIGERIA USING TWO INTERNATIONAL STANDARDS

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Background and objectives: Body mass index (BMI) has been identified as a useful tool for defining overweight/obesity in children and adolescents. Age- and sex- specific cut-off points have been developed by the International Obesity Task Force (IOTF) and World Health Organization (WHO) and recommended for international comparison of the prevalence. The aim of this paper is to compare the sensitivity of two international standards in defining body mass index (BMI) status of rural and peri-urban populations of school children and adolescents.

Methods: Cross-sectional studies were conducted involving 360 and 410 randomly selected school children and adolescents in Ebonyi State (rural communities) and Cross River State (peri-urban communities). Weights and heights of the subjects were measured using standard procedures. Age was obtained from school records/birth certificates. BMI was calculated using the formula: Weight (kg)/Height (m2). Overweight, obesity, thinness/underweight were defined using the IOTF cut-off points for children 2-18 years and the WHO BMI-for-age Z-scores for 2-5 year and 5-19 year olds. Descriptive statistics was used to analyze data.

Results: Using the WHO classification, the prevalence of underweight/thinness, overweight and obesity in the rural area were 30%, 4.7% and 0%, while the IOTF classified them as: thinness grade I (68%), grade II (15%) and grade III (11.7%). For the peri-urban population, using the WHO reference standard, the prevalence of underweight, overweight, and obesity were 7.9%, 7.1%, and 0.2%, while the IOTF cut-off classified the same population as: underweight, 21.9%; overweight, 4.4%; obesity, 0.2%.

Conclusions: There are considerable differences using these standards; while the WHO standard magnifies the prevalence of overweight, the IOTF cut-offs appears to exaggerate the prevalence of underweight/thinness. This calls for caution in the interpretation of results obtained using these standards and the need for national/regional standards.

Key words: Body mass index, sensitivity, international standards, children, adolescents

O106

FRUIT MACROANTIOXIDANTS, A NEW TYPE OF MAJOR PLANT FOOD CONSTITUENTS, SIGNIFICANTLY CONTRIBUTE TO THE INTAKE OF ANTIOXIDANTS IN THE DIET

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Background and objectives: The association between antioxidants intake and a decrease in the risk to develop certain chronic diseases is commonly attributed to low molecular weight antioxidants (vitamin C, vitamin E, carotenoids, certain polyphenols, etc.). These compounds provide a daily antioxidant intake of 3,300 antioxidant units (umol Trolox equivalents) in the Spanish diet. However, recent works have reported the existence of macroantioxidants, high-molecular weight antioxidants that reach nearly intact the colon and that may have specific health-related properties (Arranz et al., Molec. Nutr. Food Res., 54, 2010, 1646-58; Hamauzu et al. Plant Foods Human Nutr., 66, 2011, 70-77). In this work, macroantioxidants and associated antioxidant capacity in the most consumed fruits in Europe were evaluated, aiming to elucidate the contribution that they may have to total antioxidant intake.

Methods: Eight fruits were selected, corresponding to the 75-80% of the consumption in Spain, Holland, France and Germany. Macroantioxidants and low molecular weight antioxidants were evaluated by different methodologies, including HPLC-MS analysis. Associated antioxidant capacity was evaluated by three complimentary methods.

Results: Macroantioxidants content in fruits commonly consumed in Europe ranges from 212 to 3560 mg/100 g dry matter in melon and in banana, respectively. In the Spanish diet, macroantioxidants from fruits provide a daily intake of 458 antioxidant units (umol Trolox equivalents determined by ABTS, 2,2α;-Azino-bis-3-ethylbenzothiazoline-6-sulfonic acid assay). Some individual macroantioxidants were identified, such as quercetin or vanillic acid.

Conclusions: Macroantioxidants, usually ignored, provide similar antioxidant units intake than low molecular weight antioxidants in fruits (458 vs 430). Further research is needed, including all plant foods, to elucidate the contribution of macroantioxidants to the reported health-effects of diets rich in antioxidants.

Key words: macroantioxidants, dietary antioxidants, fruits

O107

EFFECT OF A DIETARY SUPPLEMENT IN BODY COMPOSITION IN PERIMENOPAUSAL WOMEN

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Background and objectives: Recent studies have highlighted the effectiveness of the drugs combination with a modification of lifestyle therefore relates to the reduction of body weight. In this paper we analyze the effect of a dietary supplement, not yet available in the European market, on body composition, lipid profile and blood count.

Methods: The used sample was 92 perimenopausal women with a mean age of 48.1 ± 7.4 years. A randomized double-blind protocol tocompare the group A (product) and the group B (placebo) was designed. For inclusion in the study women should submit a BMI within categories of overweight or obesity grade I, not have hepatic or renal disease, not have gastric reduction surgery, no pregnant or following any diet atthe moment of the study. The treatment period was two months with somatic, physiological and hematic controls, at the beginning, at the end of the treatment product/placebo and 2,5 months following the finish. The women were informed and advised on lifestyle and nutrition but not imposed any diet or exercise during the months of study.

Results: The most relevant results found indicate that while weight loss has been discreet in women who have taken the food supplement, however, have experienced a significant increase in muscle mass ($p<0.03$) and tissue hydration ($p<0.01$), not altering bone mass values. In both groups there has been a significant reduction of about 1% in the fat component. Finally, in postmenopausal women showed a decrease in the percentage of total fat only in those who consumed the food supplement and not the placebo group.

Conclusion: The administration of a supplement to perimenopausal women can lead to specific changes in body composition.

Key words: body composition, climacteric women, food supplement, antioxidant.

O108

EFFECTS OF SEAWEED-RESTRUCTURED PORK DIETS ENRICHED WITH CHOLESTEROL ON RAT LIVER HISTOLOGICAL PARAMETERS

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Background and objectives: Seaweeds, being prolific sources of bioactive components have gained interest in recent years. Diets prepared from seaweeds can be given as supplements. The aim of this investigation was to identify whether the liver damage markers of normal or hypercholesterolaemic rats was affected by dietary supplementing diets with restructured meat (RM) containing Wakame (W), Nori (N) and Sea Spaghetti (S).

Methods: Eight rat groups were fed a mix of 85% AIN-93M rodent-diet plus 15% freeze-dried RM for 35 days. The control group (C) consumed control RM, the algae groups, RM with 5% Wakame, 5% Sea spaghetti and 5% Nori, respectively. Animals on added cholesterol diets (CC, CW, and CN) consumed their corresponding basal diets added with cholesterol (2%) and cholic acid (0.4%). The histology technique was used to evaluate liver injuries.

Results: CN and CS diet induced significantly lower plasma cholesterol levels ($P<0.001$) than the CW diet. Only partial injury could be observed by histology in the liver of rats receiving CC as compared with the C group. Histological analyses did not demonstrate any remarkable changes in the liver with respect to CC groups. However, the incidence of non-dense glycogen-like vacuole presence observed in livers of the Nori rats was significantly higher ($P<0.05$) than in Wakame and control rat livers.

Conclusions:N and S blocked the hypercholesterolaemic effects of the dietary cholesterol but were unable to reduce the incidence of several liver alterations. Effects of some seaweed seem to be a two-edged sword as they increased liver damage or plays a role in detoxification. More studies are needed to ascertain the utility of consuming algae as part of very cholesterol-rich diets.

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Key words: Liver, histology, restructured-meat, seaweeds, cholesterol

O109

PRECLINICAL EVALUATION OF THE IMMUNOMODULATORY EFFECT OF Lactobacillus plantarum 3547 ON HUMAN MACROPHAGES AND OBESE WISTAR RATS.

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Background and objectives: Among physiological changes associated to obesity it has been reported alterations in the intestinal microbiota which may contribute to a systemic proinflammatory status. It was aimed to evaluate the interaction of Lactobacillus plantarum 3547 (Lp3547) with innate immune system and its ability to counteract inflammation by diet induced obesity in animal model.

Methods: Human monocytes isolated from healthy volunteers were used to obtain macrophages (MØ) which were pretreated with Lp3547 for 6 hours. After washed MØ were kept in medium for 1, 2, 4, 7 and 10 prior to a second stimulation with Escherichia coli, Staphylococcus aureus or LPS. Levels of cytokines were analyzed by CBA and membrane proteins by Western blot. In addition, male Wistar rats were supplemented with control (n=16) or hipercaloric diet (n=16) for 22 weeks followed by 2 weeks of Lp3547 supplementation (2x109 cfu/kg). Cytokine profile was quantified in plasma, intestine, liver and adipose tissue.

Results: MØ improved its reprogramming ability in response to pathogen bacteria when were exposed to Lp3547. Moreover, the elevated expression of CD64, HLA-DR and TREM1 suggested a high phagocytic ability. Plasma and ileal IL10 concentrations were higher in obese and control animals when supplemented with Lp3547. Also, probiotic treated obese animals showed lower TNFα; concentrations in plasma and adipose tissue than obese control, presenting values similar to the observed in control lean animals.

Conclusions: Lp3547 seems to have an immunomodulatory effect in MØ and it points a putative protective role in the inflammatory process associated to obesity.

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Key words: Lactobacillus plantarum, immunomodulation, obesity

O110

LACTOBACILLUS REUTERI DSM 17938 AND LACTOBACILLUS CASEICRL 431 MODESTLY INCREASE GROWTH, NOT IRON AND ZINC STATUS, AMONG INDONESIAN CHILDREN

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Background and objectives: Probiotics and milk calcium may increase resistance to intestinal infection, but their effect on growth, iron and zinc status of Indonesian children is uncertain. We investigated the hypotheses that cow's milk added with probiotics would improve growth, and iron and zinc status of Indonesian children, whereas milk calcium alone would improve growth, but reduce iron and zinc status.

Methods: A six-month randomized trial was conducted in low-socioeconomic urban communities of Jakarta. Healthy children (n=494) were randomly assigned to receive low-lactose milk: with low-calcium content ~50 mg/d (LC; n=124), regular-calcium content ~440 mg/d (RC; n=126), RC with

5x10^8 colony-forming unit/d Lactobacillus casei CRL 431 (casei; n=120); or RC with 5x10^8 colony-forming unit/d Lactobacillus reuteri DSM 17938 (reuteri; n=124). Growth, anemia, iron and zinc status were assessed before and after the intervention.

Results: Compared to RC, the reuteri group had significantly greater weight gain [0.22 (95% CI: 0.02, 0.42) kg], weight-for-age Z-score (WAZ) changes [0.09 (95% CI: 0.01, 0.17)], and monthly weight [0.03 (95% CI: 0.002, 0.05) kg/mo] and height [0.03 (95% CI: 0.01, 0.05) cm/mo] velocities. Casei significantly increased monthly weight velocity [0.03 (95% CI: 0.001, 0.05) kg], but not height. However, the changes in underweight, stunting and anemia prevalence, and iron and zinc status were similar between groups.

Conclusions: L. reuteri DSM 17938 modestly improved growth, by increasing weight gain, WAZ changes, and weight and height velocity, while L. casei CRL 431 modestly improved weight velocity. Independent from probiotics supplementation, regular milk calcium neither affected growth, nor iron and zinc status.

Key words: probiotics, calcium, growth, iron and zinc status, Indonesian children

O111

CONSUMPTION OF A POLYPHENOL-RICH ORANGE JUICE IMPROVES ENDOTHELIAL BIOMARKERS IN OVERWEIGHT AND OBESE ADULTS(BIONAOS STUDY)

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Background and objectives: Several studies in animals and humans have demonstrated that citrus flavanones as hesperidin and naringin have a cardiovascular protector effect. The aim of the study was to evaluate the influence of a dietary intervention including a polyphenol-rich orange juice (OJ) on endothelial function markers in overweight and obese adults.

Methods: 151 volunteers (18-65y) included in a randomized, placebo-controlled, double-blind, crossover trial. 45 were overweight (25-30kg/m2) and 106 obese (30-40kg/m2) and were randomly assigned into two groups. One group consumed two daily doses (250ml each) of a polyphenol-rich OJ (582.5mg of hesperidin, 125mg of narirutin and 34mg of didymin, daily) during 12 weeks, and after a 4-8 week wash-out period, they consumed an OJ with lower levels of polyphenol (237mg of hesperidin, 45mg of narirutin and 17mg of didymin, daily) during 12 weeks. The second group followed up the order conversely. Resistin and soluble forms of intercellular adhesion molecule (sICAM-1) and vascular cell adhesion molecule (sVCAM) were analysed using xMap technology. Flavanones excretion in urine was measured using UPLC-MS/MS. A linear mixed model was used to evaluate differences between groups. Correlations between parameters were estimated by computing Pearson's correlation coefficient. All statistical analyses were performed with the SPSS 20.

Results: Hesperidin and naringin excretion increased significantly in both groups after 12-wk consumption, but being considerably higher in the polyphenol-rich OJ group ($p<0.001$). Moreover, plasma concentration of resistin and sICAM-1 significantly decreased after polyphenol-rich OJ consumption (p-values<0.001). However, no changes were observed in sVCAM concentration. Nevertheless, sICAM decreases were negatively correlated with hesperidin in urine (p-value<0.05).

Conclusions: Consumption of a polyphenol-rich OJ for 12 weeks improves condition of cardiovascular risk biomarkers as resistin and sICAM-1 in overweight and obese adults.

Key words: Polyphenols, orange juice, obesity, cardiovascular disease biomarkers.

O112

TEMPE AND TOFU FLOUR MAY HAVE POSITIVE EFFECT ON COGNITIVE FUNCTION

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Background and objectives: Previous observational work in humans suggested that phytoestrogens may have a time li-

mited, dose dependent, and age dependent effects on cognition in postmenopausal women. Indonesia is a country where people commonly consume large amounts of tempe and tofu – soy products rich in phytoestrogens.Where tofu had positive associations with memory in middle-aged women, negative associations were found in older women. The objective of this stufy was to asses effects of tempe and tofu on memory in elderly female rates.

Methods: Ninety white female Sprague Dawley strain rats aged 12 months were randomly assigned to three intervention groups (tempe, tofu, and estradiol) after ovariectomy and two control groups (casein ovariectomy and casein-non ovariectomy). Memory was assessed by a modified T maze test before and after ovariectomy and after 2, 5 and 8 weeks of treatment. Isoflavone content of tofu and tempe was assessed using HPLC assays.

Results: The content of isoflavones in tempe flour was twice that of tofu flour. The group of rats fed with tempe showed better cognitive function (faster times to maze completion and longer distance covered within the first five minutes) than tofu, estradiol and casein non ovariectomy, but then a reversal was seen at 8 weeks, similar with tofu, estradiol, and casein non ovariectomy. The casein group showed no change in learning time, although distance covered was seen to drop after week 2. For both products tempe and tofu efficacy increased with consumption over time and after 8 weeks a reversal of effects was seen.

Conclusion: Regular high intake of phytoestrogens derived from tempe may have short term positive effects on memory in older female subjects. Future studies should include older and young rats to identify mechanisms and be followed by a clinical trial.

Key words: tempe flour, tofu flour, cognitive, elderly female rats.

O113

EFFCET OF ADMINISTRATION OF CARNITINE ON THE CARDIAC AND ERYTHROPOIETIC FUNCTION OF CARNITINE DEFICIENT PATIENTS

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Background and objectives: Various amounts of carnitine were administered to hemodialytic patients to evaluate changes of both cardiac and erythropietic function in them.

Methods: Patients receiving hemodialytic therapy (26 patients) were employed in the study. Every patient receiving hemodialysis showed extremely low carnitine concentration in plasma, because carnitine is easily removed through dialysis membrane and generation of carnitine in the kidney is extremely low in the atrophic kidney with decreased oral intake of it. Administration of carnitine (2.4g/day) to patients receiving hemodialysis increased its level in plasma above normal levels in two weeks. Plasma carnitine concentration was measured by determining the amount of CoA released from the reaction between carnitine and acetyl-CoA.

Results: Doses of erythropoietin required for maintaining hemoglobin levels in peripheral blood between 10 and 11g/dl decreased about 55% of the doses initially required. Therefore, carnitine is considered to increase erythropoiesis by the mechanism other than the increase in the oxidation of fatty acids in mitochondria. Effect of administration of carnitine on cardiac function of hemodialysis patients was also examined by measuring the ejection fraction in echo cardiography It increased significantly ($p<0.05$) after carnitine therapy. Both human atrial naturetic peptides in plasma and cardiothoratic ratio decreased after carnitine therapy significantly ($p<0.05$).

Conclusions: These results indicate that administration of carnitine to hemodialytic patients improved cardiac function, because carnitine enhanced the entry of fatty acids into mitochondrial matrix to increase their oxidation to produce ATP.

Key words: Carnitine, hemodialysis, erythropoietin, ejection fraction.

O114

SOCIAL REPRESENTATION OF OBESITY IN A RURAL COMMUNITY OF MEXICO

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Backgorund and objectives: Obesity is generally conceived as a disease and therefore is undesirable for individuals. Different conceptions of the biological-medical model are present in the ideology and way of living in different cultures so it is important to recognize and understand social representations of obesity to implement rational programs in societies in nutritional transition to prevent and reduce obesity. The aim of the study was to identify the social representations of obesity in a rural community: San Jeronimo Amanalco located two hours distance from Mexico City.

Methods: The ethnographic method was used and the researcher lived for five summers in the community from 2006 to 2010. Depth interviews and informal conversations were conducted to general population of the community (about 3000 interviews in total).

Results: People of the community recognize two types of obesity: obese persons and inflated individuals. Obesity is caused by overeating. An inflated person results by consuming

large quantities of sodas, beer and junk food. From a nutritional and medical standpoint both categories fall within the overweight or obese, but for the people an inflated person is not obese. The inflated category arises in the community about 50 years ago, coinciding with the entry process industrialized food to the community. On the other hand, an obese person is considered as a sign of health and wellness and thinness is synonymous with anemic person. The ideal of the married woman's body is being obese as it is a sign that your husband is a good provider in the home.

Conclusion: In San Jerónimo Amanalco, people see obesity as normal. Understanding the social representations of obesity is an essential element for the implementation of health programs in nutrition transition societies. Unfortunately, currently used strategies in Mexico are not considering these cultural aspects about obesity.

Key words: social representation of obesity, culture, Mexico

O115

MAJOR DIETARY PATTERNS OF IRANIAN WOMEN AND THEIR RELATION WITH ETHNICITY AND DURATION OF RESIDENCE IN THE CAPITAL CITY(TEHRAN).

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Background and objectives: Tehran, capital of Iran, is a multi ethnic city. Various ethnic groups may follow different eating pattern. Also, living in a Metropolis may change the habits to heather or unhealthier patterns due to acculturation. The aim of this study was to detect major dietary patterns and their relation with ethnicity and duration of residency in Tehran(DRT).

Methods: In a cross-sectional study,460 women aged20-50 years old living in Tehran, were selected by stratified random sampling method. Dietary information was collected by a valid and reliable semi-quantitative F.F.Q. Ethnicity and DRT was asked by interview. Belonging to an ethnicity(Fars, Turk, Northern[Tabari&Gilaki], Kurd, Lor, Balouch, Turkmen, Arab) was decided based on ethnicity of three generations behind a person and speaking language and dialect. Dietary patterns were defined by factor analysis method. To compare ethnicities and DRT, across quartiles of dietary pattern, chi-square and ANOVA tests were used, respectively. Relationship between ethnicity, DRT and adherence to the dietary patterns was assessed by ANCOVA test (adjustment of age and socioeconomic status).

Results: Two major dietary patterns were extracted: 'Healthy'(high in vegetables, fruits, yogurt drink, low fat dairies, poultry, olive, nuts, fruit juice, potato, garlic, coffee, dried fruits, legumes) and 'Unhealthy'(high in processed meat, mayonnaise, soft drinks, sweets, refined grains, snacks, industrial juice, red meat, nuts, French fries, hydrogenated fats, egg, butter, high fat dairies, sugars and organ meats). Higher percents of Turks were at the highest and greater percent of Northern group were at the lowest quartile of 'Unhealthy' scores ($p<0.05$). Turks in comparison with Fars (reference group) ethnicity ($B=0.44;p<0.01$) had positive associations with 'Unhealthy';and, DRT had negative associations with healthy pattern ($B=0.01;p<0.01$).Other associations weren`t significant.

Conclusions: Our findings showed being Turkish and higher DRT was associated with tendency toward an unhealthier pattern in the studied women.

Key words: Dietary patterns, ethnicity, duration of residence, women, Tehran.

O116

CONTRIBUTION OF SORGHUM TO ENERGY, IRON AND ZINC INTAKES OF MOTHERS AND PRESCHOOL CHILDREN IN RURAL BURKINA FASO

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Background and objectives: People in Burkina Faso, particularly women and young children, are still suffering from under-nutrition including micronutrient deficiencies. Sorghum is their primary source of food in most rural areas. A strategy to alleviate malnutrition in such a context is to develop new varieties of sorghum that contain higher levels of micronutrients. In order to determine target levels, the present study aimed at providing information about current contribution of sorghum to energy, iron and zinc intakes of mothers and preschool children.

Methods: In 2010, a dietary survey was carried out in two rural provinces on a representative sample of 240 mothers and their 36-47 months old children in each province. The survey comprised two rounds of data collection, in the lean and post-

harvest season respectively. Women and children were administered multiple pass 24H recalls at each round. CS dietary software was used to compute daily energy, iron and zinc intakes and contribution of sorghum to these intakes was analyzed.

Results: In the lean season, mean daily intakes of sorghum were of 357 g of dry matter for mothers and 195 g for children; corresponding figures in post-harvest season were 237 and 114 g, respectively. Sorghum contributed 60.9%, 51.1% and 68.5% of mothers' energy, iron and zinc intakes, respectively, and 58.1%, 46.8% and 43.5% in those of children, in the lean season. In post-harvest season, corresponding figures were 40.7%, 26.6% and 45.2% for mothers; and 34.4%, 20.7% and 39.1% for children.

Conclusions: Sorghum was the main contributor to energy, iron and zinc intakes of both mothers and preschool children in rural Burkina Faso. Intakes were higher in the lean than in the post-harvest season. Sorghum contribution to intakes was slightly higher in mothers than in children.

Key words: Sorghum, micronutrient deficiencies, Africa

O117

HYDRATION STATUS AND ITS RISK FACTORS AMONG INDONESIAN ADOLESCENTS AND ADULTS

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Background and objectives: No study had been done in Indonesia on hydration status and its risk factors. The objective of this study was to analyzed dehydration problem and its risk factors among adolescents and adults in Indonesia.

Methods: This study called the THIRST (The Indonesian Regional Hydration Study) was carried out among 606 adolescent males and females aged 15-18 yrs and 594 adult males females aged 25-55 yrs in lowland (North Jakarta, surabaya and Makasar) and highland (West Bandung, Malang and Malino) areas of Indonesia. Urine specific gravity was used to determine hydration status; and a 6x24 hours record of food and beveragse intake was used to estimate total fluid intake.

Results: The results shows that the mean fluid intake subjects is 2750 ± 753 ml/d. Based on the urine specific gravity, 46,29 % of the subjects categorized as dehydration. The results of logistic regression analysis showed the dehydration risk factors were ecological areas, body temperature, fluid intake, hydration knowledge, and overweight. Subjects who live in the lowlands had a risk of dehydration 2,75 times more compared to those live in the highlands. Subjects who had body temperature outside the normal range had a risk of dehydration 1,54 times compared to those had a normal body temperature. Subjects that consumed less fluid has a risk of dehydration 1,30 times more compared to those consumed adequate fluid. Subjects with less hydration knowledge had a risk of dehydration 1,33 times more compared to subjects with better hydration knowledge. Overweight subjects had a risk of dehydration 1,35 times more compared to those who had a normal or underweight body mass index.

Conclusions: This study reveales almost half of Indonesian adolescent and adults suffering from dehydration; and the main risk factors are ecology, body temperature and fluid intake

Key words: dehydration, risk factors, ecology

O118

SODIUM AND NUTRIENT DENSITY OF SOME TRADITIONAL DISHES AS CONSUMED IN NIGERIAN URBAN POPULATION IN RELATION TO CARDIOVASCULAR DISEASE (CVD)

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Background and objectives: In the 2011 and 2012 international African nutrition conferences, high sodium intake and the risk of developing CVD was one of the topical issues linked with nutrition transition. Any impact-oriented action should be evidence-based in order to key into strategies to scale-up nutrition. Sodium and nutrient density of some traditional dishes as consumed in Nigerian urban population in relation to cardiovascular disease (CVD) was evaluated. Specific objectives were to collate recipes of dishes documented from a previously conducted household survey, determine their proximate composition and some CVD-related nutrient content (sodium, calcium, potassium, magnesium, folate, selenium and anti-oxidants vitamins (A, E, C) and elucidate their nutrient density relative to FAO/WHO/UNU standard values.

Methods: Recipes of various traditional dishes consumed by 300 households were recorded. A 3-day nutrient intake study was conducted on 10% of the population. Frequency distribution was used to identify the most widely consumed dishes. Twenty-six dishes, which were used by 30-80% of the study population, were selected, prepared and analyzed chemically, using standard methods. Nutrient density of the dishes was determined using FAO/WHO/UNU food-based dietary guidelines.

Results: Only 20% of the dishes had moderate protein density (54.43 and 57.76%); 10% had high fat density (84.45% versus 10.04-31.43% for other dishes); 60% had moderate to high vitamin A density (60-345%). Only 20% were sodium dense

(73.93 and 85.23% versus 20.37- 48.57% for others). All the analyzed dishes were carbohydrate, vitamin E, folate and selenium dense (≥ 70%) but had low calcium density ≤29.95%).

Conclusion: The traditional diets have potential for control and prevention of CVD if traditional dietary habits are maintained, with improvement in protein, calcium, vitamin C and Mg content of diets as consumed to alleviate these nutrient deficiencies.

Key words: Traditional diets, nutrient density, CVD.

O119

IDENTIFICATION OF TRADITIONAL FOOD RESOURCES AND THEIR IMPORTANCE IN A RURAL FARMING COMMUNITY IN SOUTHWESTERN NIGERIA

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Background and objectives: In recent times, the use of traditional foods is decreasing and they have been labeled poverty foods. However, these food resources are still important for the subsistence of many rural and indigenous communities around the world. The aim of this study was to identify available traditional foods, their current level of consumption, and their importance to a rural farming community in Southwest Nigeria.

Methods: Data was collected using three focus group discussions (FGDs) by gender groups. Discussions included: foods available in the community – traditional and introduced; those commonly consumed and not commonly consumed; changes in their level of consumption; their preferred choice between traditional and introduced foods; reasons for these preferences; benefits of their traditional foods. Thematic analysis was used to analyse the FGDs.

Results: The following themes were identified:1) list of foods; 21 staples, 28 soups (mostly vegetables) and 13 fruits; 2) preference between traditional versus foreign foods- majority of focus group participants showed more preference for traditional foods because of their importance to their livelihoods, nutrition and health; 3) cultivated foods versus wild foods; 4) benefits of traditional foods; 5) changes in consumption pattern of traditional foods – identified decline more among the youths, and was mostly attributed to modernization and migration from the rural areas; suggested solutions- make traditional diets more attractive, government's intervention especially to plight of rural farmers; 6) the seasonality of the foods especially vegetables.

Conclusions: The study showed that although there was a reduction in consumption of traditional foods, there was still preference for their consumption because of their importance in the subsistence, livelihood, nutrition and health of this rural community. There is need for researchers and government to pay attention to the traditional food resources of indigenous peoples through research and policy.

Key words: Traditional foods, rural communities, importance.

O120

ECONOMIC INEQUALITY AND OBESITY: MULTILEVEL ANALYSIS OF INDONESIAN COMMUNITIES

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Background and objectives: Obesity rate has increased and been considered as a threat and a challenge for the public health sector for develop as well as developing countries. On the other hand inequality has risen in line with economic growth. Inequality was proven in studies in the western countries. The purpose of this study was to examine the association of economic inequality and obesity in Indonesia that is still rarely studied in Asia (Southeast Asia) in particular.

Methods: The data were obtained from a cross-sectional Indonesian Basic Health Research (Riskesdas) year 2010. The subjects consisted of 125563 respondents ages 19-55 years old that derived from 251388 household members nested within 69300 households nested within 2798 communities nested within 33 regions. Obese was categorized as body mass index more than 25. Community level exposures included economic inequality that based on Gini coefficient. The data were analyzed with multilevel logistic regression.

Results: The prevalence of obesity in Indonesia was 22.96%. The obesity prevalence of the 20% poorest and 20% richest were 14.4% and 32.2%, respectively. The economic inequality was ranged from 0.18-0.69 across 33 provinces in Indonesia. Controlling for individual factors, a significant gradient was observed between income and obesity, with very high income most likely to be obese (OR=2.03) followed by high (OR=1.68), middle (OR=1.41), low (OR=1.22), and very low as reference. Controlling for community effects of income, the results indicated that economic inequality has significant positive effect on obesity (OR=1.33).

Conclusions: The findings of this study show another new evidence for the effects of economic inequality on obesity. More unequal communities associated with greater probability of obesity.

Key words: economic inequaity, inequality, obesity.

O121

INADEQUATE ENERGY AND PROTEIN INTAKES HAVE CONTRIBUTED TO THE HIGH PREVALENCE OF STUNTING IN INDONESIAN YOUNG CHILDREN

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Background and objectives: About 58% of preschool children in East Nusa Tenggara, Indonesia are stunted. This study was conducted to assess whether inadequate food and nutrient intakes are associated with an increased risk of being stunted among Indonesian young children.

Methods: A cross-sectional study was conducted in Timor Tengah Selatan District. The study subjects were 408 children aged 6-24 months and their mothers. Energy and protein intakes were collected using a 24-hour recall questionnaires, weight of the children was measured using a calibrated digital weighing scale (SECA) with precision of 0.1 kg, while recumbent length was measured using a portable recumbent length board with precision of 0,1 cm by trained nutritionists. Data on breastfeeding history, demographic and socio-economic factors were collected using structured questionnaires. Height for Age and Weight for Height Z-Scores were computed using WHO Anthro2005 software.

Results: Energy and protein intakes in children aged 6-24 mo, on average, were 641 kcal/ day and 16.5 gram/ day respectively. These intakes represented to 76% and 77.4% of Indonesian Nutrient Requirements. The deficit of energy intake was 11.8% higher in males than in females and 20.7% higher in older (13-24 mo) than in younger (6-12 mo) children. Likewise, the deficit of protein intake was 22.4% higher in males than in females and 11.4% higher in older than in younger children. The odds of being stunted were 1.4 times (OR=1.45: 95% CI=0.97 – 2.27) higher in males than in females, and 4.6 times (OR=4.6: 95% CI=2.94 – 7.34) higher in older than in younger children adjusting for breastfeeding history and the remaining demographic and socio-economic factors.

Conclusions: Inadequate energy and protein intakes might have contributed to the high prevalence of stunting in young children of East Nusa Tenggara, Indonesia.

Key words: energy intake, stunting, children, Indonesia.

O122

CONFLICTING INDICATORS OF FOOD INSECURITY FROM A PILOT STUDY OF WATER, SANITATION, HYGIENE AND NUTRITION INTERVENTIONS IN RURAL WESTERN KENYA

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Background and objectives: Standard measures of food security are under scrutiny for cross-cultural competence and validity.

Methods: During a pilot RCT of water, sanitation, hygiene, and nutrition interventions for households with children <2 years old in rural Western Kenya (n=156), cross-sectional data were collected on food security using the household food insecurity access scale (HFIAS) and household hunger score (HHS); food intake using 24-hour and 7-day food frequency questionnaire (FFQ); and anthropometric data, in July 2012. Diet diversity (DD) was calculated based on WHO infant young child feeding (IYCF) food group categories, and 7 day FFQ was summarized to represent single days' worth of intake.

Results: Severe food insecurity prevalence was 64.7% by HFIAS and moderate hunger was 36.5% by HHS. Mean(SD) child age was 16.2(3.9)mo; z-score weight-for-length (WLZ) was 0.3(1.1); length-for-age (LAZ) was -1.2(1.3); weight-for-age (WAZ) was-0.4(1.1); maternal BMI was 21.6(3.1) kg/m2. Prevalence of wasting (WLZ < -2SD), stunting (LAZ < -2SD) and underweight (WAZ < -2SD) were 2.2%, 30.9% and 9.4%, respectively. There were no significant differences in child anthropometrics by HFIAS/HHS (p>0.1). Mean maternal BMI did not differ by HFIAS (p=0.82), but did by HHS (p=0.04): 22.0(3.3) for little/no hunger and 20.9(2.5) for moderate hunger. There were no significant associations between maternal DD, measured by 7 day FFQ, and HHS (p=0.11) or HFIAS (p=0.84). Similarly, child DD was not associated with HFIAS or HHS. The proportion of children receiving >4 food groups/ day was 85%.

Conclusions: Despite high self-reported prevalence of food insecurity, there appeared to be good evidence of DD and no significant association between food insecurity and child WLZ, WAZ, and LAZ. The HHS indicator may be more sensitive to detecting under-nutrition among women.

Acknowledgements: Funded by a grant to UC Berkeley from the Bill & Melinda Gates Foundation.

Key words: Food security, dietary diversity, Kenya.

O123

AVAILABILITY OF NUTRITION SERVICES IN MATERNAL, NEONATAL AND CHILD HEALTH (MNCH) FACILITIES IN BANGLADESH

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Background and objectives: In 2011, the Government of Bangladesh started to mainstream nutrition services through its health system. This study was aimed at reporting the availability of nutrition services in maternal, neonatal and child health facilities in public, not-for-profit (NGO) and for-profit private (Private) sectors before the commencement of the mainstreaming nutrition initiative.

Methods: The study was part of a national health facility assessment (HFA) in Bangladesh. The HFA covered almost all public and private facilities (n=7680) that provide any MNCH care. During the HFA, the data collection team used a checklist to collect data on location, human resources, service provisions, equipment and drugs, and performance and cost of key services from the MNCH facilities. Availability of 12 (7 maternal, 3 neonatal and 2 child) nutrition services is reported in this paper.

Results: Routine iron and folic acid supplementation during pregnancy was available in 73.7% public, 88.6% NGO and 69.0% private facilities. Routine calcium supplementation during pregnancy was available in 47.9% public, 63.4% NGO and 60.0% private facilities. Fifty four percent public (53.6%), 70.3% NGO and 66.9% private facilities provide vitamin A supplementation to postpartum women. Fifty two percent (51.7%) public, 29.8% NGO and 90.8% private facilities provide advice for initiation of breastfeeding within 1 hour of childbirth. Fifty six (56.0%) public, 46.4% NGO and 87.8% private facilities provide routine health education on exclusive breastfeeding. Use of Zinc for treating diarrhea was available in 67.9% public, 56.5% NGO and 58.5% private facilities.

Conclusions: Key maternal, neonatal and child nutrition services are not available in all public, NGO and private facilities in Bangladesh. The government of Bangladesh should emphasize scaling up key maternal, neonatal and child nutrition services in all health facilities for further improving the mainstreaming nutrition initiative.

Acknowledgements: The study was funded and supported by UKAID and USAID.

Key words: Breast feeding, child nutrition, health

O124

COMBATING VITAMIN A DEFICIENCY DISEASES: BUILDING THE EVIDENCE BASE AND PARTNERSHIPS FOR FOOD BASED APPROACHES

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Background and objectives: It is often stated that there is a lack of convincing evidence to show that food based approaches to address micro-nutrient deficiencies are successful. The objectives of the paper are firstly to trace how the evidence base was built for a specific food-based approach; and secondly, the implications for policy and intervention strategies.

Methods: Through a review of key research projects the paper assesses how the evidence base for the efficacy and effectiveness of using pro-vitamin A rich orange-fleshed sweetpotato (OFSP) for combatting Vitamin A Deficiency Diseases (VADD) was built over 17 years, and the most effective ways to integrate nutritional concerns into agricultural and health projects using OFSP as a key entry point.

Results: The results show how several questions which are relevant not only for the example of OFSP were addressed: 1) Will the OFSP varieties be competitive with existing local varieties? 2) Are producers and consumers willing to accept a sweetpotato variety with a distinct color difference? 3) How can we ensure that OFSP will be consumed by those target groups most at risk of VAD, and 4) Will donors and governments support OFSP-based interventions? The results show how different types of partnerships arrangements have been used to deliver OFSP interventions including delivery systems based on agricultural, market, health and educational entry points.

Conclusions: Efforts to support behaviour change towards the consumption of novel crops and new foods need to be based on an understanding of current dietary patterns and practices, local food and agricultural systems, and the policy context. Approaches need to balance local specificity, flexibility, with the pressures to rapidly expand geographical and population coverage. Thus food-based approaches need to be framed as complementary and contributory to sustainable development goals and rights based approaches for nutrition.

Key words: Vitamin A, food-based approaches.

O125

DELIVERY OF MICRONUTRIENT POWDER SACHETS THROUGH SALES BY FRONTLINE HEALTH WORKERS ENABLES HIGH REACH, BUT HOUSEHOLD POVERTY CONSTRAINS UPTAKE

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Background and objectives: Micronutrient powders (MNP) are effective at reducing infant anemia, but little is known about how different delivery platforms can be used to effectively reach at-risk populations. One innovative delivery platform in Bangladesh utilizes a market-based approach, wherein MNPs are sold by BRAC frontline health workers (FHW), at home visits. We conducted a program-theory driven process evaluation, within the context of a cluster-randomized impact evaluation, examining the determinants of MNP awareness and purchase, and adherence to recommended dosage.

Methods: Mid-term surveys were conducted in 10 of 20 evaluation sub-districts. Two samples of households with at least one child aged 6-23 months were drawn: 1) a random sample (n=462), and 2) a purposive sample of MNP-purchaser households (n=338).

Results: At this 18-month assessment, reach of the FHW network was high (73%), but awareness of MNPs was low in the random sample (38%). FHWs were the primary source of information for 75% of households. Awareness of MNPs in the random sample was greater among households with greater socio-economic status (SES) (p=0.104), any reported exposure to FHWs (p=0.036), and greater total exposure to FHWs (p<0.001). MNP purchase in the random sample was low (17%), but with greater likelihood of MNP purchase among households with any exposure to FHW (p<0.001), and with greater total exposure to FHWs (p=0.006). There was no association between household SES and ever purchasing MNPs, but the total number of sachet purchases was higher in the highest, compared to lowest SES households in both the random (p=0.037) and MNP-purchaser households (p=0.006).

Conclusions: Although overall MNP purchase was low, these results highlight the potential for this delivery model to succeed, given the reach of FHWs and their influence on MNP awareness. However, different distribution channels might be more effective for lower SES households.

Key words: Micronutrient powders, Bangladesh, delivery platforms.

O126

UPDATED NUTRIENT DATA ON DANISH BEEF AND VEAL

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Background and objectives: The forthcoming EU nutrition labelling rules valid from 2014/2016 require a mandatory declaration of energy, fat, saturated fat, carbohydrates, sugars, protein and salt on packed food. In the Danish Food Composition database, nutrient data on fat and saturated fat for beef and veal are based on 30-40 years old data sources and are therefore outdated regarding modern production, commercial cuts and more extensive trimming. The objective of this study was to document up-to-date nutrient data on total and saturated fat as well as protein and salt content in Danish veal and beef cuts.

Methods: Based on Danish slaughter statistics, representative and average veal (n=8) and beef (n=8) carcasses were selected to generate a complete set of commercial cuts. Mean values of total fat, saturated fat, protein and sodium were determined by accredited analyses.

Results: A clear linear relationship between total and saturated fat was established on subsamples of veal and beef cuts as well as ground beef. Based on this relationship, the saturated fat content in veal and beef products can be easily calculated from the equation: 0.42 x total fat (g per 100 g) - 0.19. For total fat, the levels differed between veal and beef as veal has a lower fat content, nevertheless, the majority of Danish red meat cuts contained less than 10 g fat per 100 g. The updated nutrient data can be used as documentation for nutrition labelling at cut level.

Conclusions: Updated nutrient data on Danish veal and beef offer numerous products with ≤10 g fat per 100 g. The low levels of fat reflect the changes in animal production and product trimming that have occurred during the last 20-30 years. These updated data will benefit consumers, health professionals and scientists to make appropriate dietary decisions.

Key words: Beef, labelling, nutrient composition

O127

CHARACTERIZATION OF OATS SAFETY IN CELIAC DISEASE IN RELATION TO THE CULTIVAR

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Background and objectives: Celiac disease (CD) is a permanent autoimmune enteropathy, triggered in genetically predisposed individuals, by dietary gluten. The only therapy is a strict gluten-free diet (GFD). The inclusion of oats in GFD could be of great value for its nutritional and health benefits. The safety of oats in CD is still matter of debate. However, most studies performed to evaluate the suitability in CD have not considered the oats variety. Our aims were to study the toxicity of different oats cultivars in some in vitro and ex vivo models of celiac epithelial activation and to correlate the ability in activating this pathway with oats protein profile.

Methods: The electrophoretic pattern of oats peptic-tryptic (PT) digests and the corresponding reactivity versus anti-gliadin antibodies was evaluated. Oats PT digests were evaluated in some in vitro models of celiac inflammation: K562(S) cells, human intestinal epithelial cells and celiac bowel mucosa.

Results: Our results showed that the Nave cultivar and its digests agglutinated the K562(S) cells, affected the transepithelial electrical resistance (TEER) of T84 cell monolayers, significantly increased the Tumor Necrosis Factor (TNF) - alpha concentration in T84 cell culture and increased the levels of transglutaminase 2 and pospho 42-44 in a similar way to wheat. However, Irina and Potenza varieties did not exert any effect on these in vitro models. Moreover, a straight correlation of the toxicity of oats cultivar with the electrophoretic pattern and the reactivity to anti-gliadin antibodies was found.

Conclusions: There is a significant difference among oats cultivars in eliciting the very precocious events occurring at the cell surface that are responsible for the mucosa inflammation in CD. The inclusion of oats in GFD might be valuable, but a suitable evaluation on their safety by means of biochemical/biological models of CD is recommended.

Key words: Oats, gluten-free, celiac disease.

O128

HOUSEHOLD WATER ACCESS AND SANITATION AS INDICATORS OF VITAMIN A AND ZINC EFFICACY ON GUT PARASITE RESOLUTION

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Background and objectives: Vitamin A and zinc supplementation can reduce childhood intestinal parasite burden but household characteristics involved in parasite transmission may modify efficacy. We evaluated supplementation efficacy on Ascaris lumbricoides, Entamoeba histolytica and Giardia lamblia infection resolution among children from households differing in water access, sanitation and hygiene.

Methods: A randomized, double-blind, placebo-controlled trial carried out in Mexico City assigned children 6-15 mo of age to receive vitamin A every 2 months, a daily zinc supplement, a combined vitamin A - zinc supplement or a placebo and followed them for 1 year. Parasite infection durations among children in the different treatment arms determined in monthly collected stools were compared using hazard analyses stratified by personal and household factors.

Results: Vitamin A + zinc supplemented children from households with no piped water had reduced G. lamblia infection resolution compared to children from households with piped water. Children in all three treatment arms from households with dirt floors had reduced A. lumbricoides resolution compared to children from households with concrete floors (P for interaction=0.06, 0.01 and 0.07, respectively). Increased E. histolytica infection resolution was found among vitamin A supplemented children from households with dirt floors and no indoor bathrooms.

Conclusions: The contrasting outcomes of supplementation found in the stratified analyses suggest that children enrolled in mass chemoprophylaxis programs may be targeted for specific supplementation regimens using household characteristics as indictors.

Key words: Vitamin A, zinc, gastro-intestinal parasites, children

O129

DETERMINATION OF TOTAL PHENOLICS, ANTHOCYANINS AND ANTIOXIDANT ACTIVITY OF AN ALGERIAN DATE FRUIT VARIETY (DEGLET –NOUR)

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Background and objectives: Deglet – Nour is a variety of dates largely consumed in Algeria and the most requested in the world. The objective of this study was to determine in this variety of dates the total phenolics using Folin –Ciocalteu reagent and the anthocyanins by the pH differential method. The oxygen radical absorbance capacity (ORAC- FL) was used to determine the antioxidant activity of the sample. The results obtained were expressed as means ± standard deviation (n = 3) on a fresh weight basis.

Results: In this work, total polyphenolics values were about 240,854 ± 7,31 and 245,32 ±13,12 mg/ 100 g gallic acid equivalent (GAE). Anthocyanins determination have shown a good results 0,853 ± 0,040 and 0,916± 0,045 mg of cyanidin 3-glucoside equivalent/100 g of sample in comparaison to those reported by AL-Farsi et al (2005). Deglet-Nour was found as a good source of antioxidants (4352, 333 ± 19,56 and 4817, 666 ±32,14 micromoles of Trolox equivalent/ 100 g) of sample.

Conclusion: Dates fruit presents a good antioxidant property despite its low phenolics content level, as it was reported in literature for other dates varieties, this may be due to a combined activity of different compounds such as free phenolics, peptides and organic acids.

Key words: Dates, Deglet–Noor, phenolics,anthocyanins, ORAC-FL.

O130

LONG-TERM HEALTH CONSEQUENCES OF EARLY-LIFE STARVATION: EVIDENCE FROM FAMINE-BORN COHORTS IN UKRAINE

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Background and objectives: There is increasing evidence that malnutrition in early life affects long-term health outcomes including metabolic and cardiovascular disorders. To examine whether a link exists between exposure to starvation in early life and health status in adulthood, we determine the risk of developing type 2 diabetes (T2D) in cohorts born before, during, and after the Ukraine famine of 1933.

Methods: The sample studied consisted of 28,358 T2D patients born in the period of 1930-1938 and living in four Ukraine regions that suffered significant demographic losses due to famine: Chernihiv, Vinnitsa, Kharkiv and Kherson. Reference populations were based on the Ukraine census 2001 (total n = 2,153,335).

Results: It was approximate 1.5-fold increase in the risk of developing T2D during adulthood in both men and women who were born in the first half of the 1934 year as compared to the individuals who were born in the pre-famine and post-famine cohorts. These differences are highly significant compared to the appropriate reference cohorts born in 1938 [odds ratios are 1,48 (95%CI: 1,29-1,69) and 1,52 (95%CI: 1,40-1,66) for men and women, respectively]. For the second half year-born individuals in all cohorts studied, no significant difference was found compared to the corresponding reference cohorts. Remarkably, those individuals who were born in the first half of the 1934 and who have higher risk of developing T2D were exposed to the famine periconceptionally suggesting an epigenetic basis for risk and resilience across the lifespan.

Conclusions: These results support the view that periconceptual exposure to starvation may lead to persistent epigenetic changes that have adaptive significance during early postnatal development but predispose to metabolic disorders in adult life.

Key words: malnutrition in early life, Ukraine famine of 1933, persistent epigenetic changes, type 2 diabetes.

O132

CHANGES IN IRON METABOLISM, HAEMATOLOGICAL AND INFLAMMATORY PARAMETERS OF DIABETIC RATS TREATED WITH VANADIUM AS AN ANTIDIABETIC AGENT

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Background and objectives: The increasing use of nutritional supplements of vanadium as an anabolic agent by the healthy population jointly with the increasing study of V as an hypoglycaemic agent in diabetes, justify the investigation of the interactions of V with the metabolism of other metals in the vanadium exposed organisms. Several studies reveal that the metabolism and distribution of V and Fe are related. The objective was to analyze the changes in the metabolism of iron and in the inflammatory status of diabetic streptozotocin rats following treatment with vanadium as an antidiabetic agent.

Methods: Four study groups were examined: Control; Diabetic; Diabetic treated with 1mgV/day (DMV); and Diabetic treated with 3mgV/day (DMVH). The Vwas supplied in drinking water as bis(maltolato) oxovanadium (IV)(BMOV). The experiment had a duration of five weeks. Iron was measured in food, faeces, urine, serum, muscle, kidney, liver, spleen and femur. Transferrin, ferritin, C-reactive protein (CRP), number of red (RBC) and white (WBC) blood cells and haemoglobin (Hb) were determined in samples of serum or whole blood.

Results: In the diabetic animals, we recorded higher levels of Fe absorbed, Fe content in kidney, muscle and femur. In DMVH, there was a significant decrease in fasting glycaemia, transferrin, Hb and increased serum CRP, Fe content in the liver, spleen and heart, in comparison with the diabetic rats.

Conclusion: BMOV is a dose-dependent hypoglycaemic agent. Treatment with 3 mgV/day provokes a inflammatory syndrome that produces an anaemic state together with increased iron deposits in the tissues.

Key words: Pathology, metabolism, inflammation, vanadium

O133

PUFA AND OXIDATIVE STRESS. FROM CYTOTOXIC EFFECT TOWARD ANTIOXIDANT DEFENCES

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Background and objectives: Despite their important role in the nutritional prevention of many diseases, polyunsaturated fatty acids (PUFA) might be dangerous since they are particularly susceptible to free radical attack by reactive oxygen species, and might undergo oxidation in the body. On the other side diets enriched with n-3 PUFA have been shown to up-regulate antioxidant systems [1] and it has been speculated that this could be related to a sub-toxic stress imposed by PUFA peroxidation [2]. PUFA oxidation byproducts may activate nuclear factors such as erythroid 2–related factor 2 (Nrf2), which is associated to transcriptional activation of antioxidant response defences. In the current investigation we addressed the question of whether n-6 and n-3 PUFA protect or sensitize liver cells from oxidative damage.

Methods: HepG2 cells were supplemented with different PUFA at physiological concentration, and then exposed to an oxidative stress (0.2mM H_2O_2).

Results: All PUFA but docosahexaenoic acid enhanced cell susceptibility to H_2O_2 –induced cytotoxicity and lipid oxidation. Furthermore, cell antioxidant defenses were differently modulated by the individual PUFA.

Conclusions: Our results highlight deep differences in the cell response to the individual fatty acids, stressing that PUFA cannot be considered as a unique category. Dietary recommendation on PUFA should not be generalized but must address the specific fatty acid. This work was partially supported by a grant of Italian MIUR (RFO A.B.) and of Italian Ministry of Economic Development (Industria 2015 – MIAOVER50 project). [1] Wang H et al. Cardiovasc Res. 2004;61:169-76. [2] Uchida K. Prog Lipid Res. 2003;42:318-43.

Key words: PUFA, HepG2, oxidative stress

O134

DIETARY COFFEE POLYPHENOLS DON'T ATTENUATE FEATURES OF THE METABOLIC SYNDROME AND ENDOTHELIAL DYSFUNCTION IN MICE FED A HIGH-FAT DIET

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Background and objectives: Coffee is a popular beverage in western society. There is a growing interest in the potential health benefits of dietary polyphenols as recent epidemiological studies have demonstrated associations with reduced risk of type 2 diabetes. Endothelial dysfunction, obesity, type 2 diabetes and the metabolic syndrome are all major risk factor associated with CVD, and are thought to involve oxidative stress. The aim of this study was to investigate the effects of chlorogenic acid (CGA), a major coffee polyphenol on obesity, glucose and insulin resistance, oxidative stress and endothelial function in a mouse model of the metabolic syndrome.

Methods: Thirty 6-8 weeks old male C57BL6 mice were randomly divided into one of three groups (i) normal diet, (ii) high fat diet (HFD), and (iii) HFD supplemented with 0.5% w/w CGA isolated from green coffee beans.

Results: Following 12 weeks of feeding, both the HFD and HFD + CGA fed mice demonstrated features of the metabolic syndrome, including; increased weight gain, increased oxidative stress (F2-isoprostanes), impaired glucose tolerance and insulin resistance. There was no indication of endothelial dysfunction in isolated aortic rings of any of the mice. CGA also failed to protect aorta which were subject to oxidative stress-induced endothelial dysfunction by external application of hypochlorous acid.

Conclusions: This study suggests that CGA, a major coffee polyphenolic does not protect against features of the metabolic syndrome.

Key words: chlorogenic acid, metabolic syndrome, endothelial function.

O135

THE INFLUENCE OF BLOOD SELENIUM STATUS AND SELENOPROTEIN GENE VARIATION ON COLORECTAL CANCER RISK

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Background and objectives: Suboptimal intakes of the essential micronutrient selenium (Se), as in many parts of Europe, may contribute to colorectal cancer (CRC). Se exerts its biological roles through 25 selenoproteins involved in cell protection from oxidative stress, redox control and inflammatory response. Variants in several selenoprotein genes have been reported to affect CRC risk. We are currently using the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort to assess both the association of selenoprotein genotype and Se status with CRC risk, and their interaction in disease risk modification.

Methods: We are using a case-control study of 1500 CRCs and 1500 matched healthy controls nested within the EPIC cohort. Se concentration was measured by Total Reflection X-ray Fluorescence in serum available from 1000 of these cases and 1000 controls. Multivariable conditional logistic regression was used to assess the influence of Se levels on CRC risk. Selenoprotein genotypes are currently being assayed by Illumina Goldengate.

Results: Analyses conditioned on the matching factors show a borderline non-significant 9% decrease per 25 ug/ L increase in Se concentration (HR = 0.91; 95% CI = 0.82-1.02). However, for females only a significant 18% decreased CRC risk was observed per 25 μg/ L Se increase (HR = 0.82; 95% CI = 0.70-0.95) and a 39% significant decrease when comparing the lowest to the highest quartile of Se concentration (HR = 0.61; 95% CI = 0.41-0.91; P trend =0.030).

Conclusions: This study should contribute to our understanding of the role that Se status and selenoprotein gene variation play in CRC development. The serum Se results indicate a suboptimal Se status in many Europeans and suggest that European women with suboptimal Se status may especially benefit from an increased dietary Se intake for CRC prevention.

Key words: Selenium status, selenoprotein gene variation, colorectal cancer risk, EPIC

O136

RELATIONSHIP BETWEEN METHIONINE METABOLISM PATHWAY GENES WITH PLASMA HOMOCYSTEINE AND RISK OF TYPE 2 DIABETES IN CHINESE

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Background and Objectives: There is no data on the associations of genetic variants of homocysteine (Hcy) metabolic genes with type 2 diabetes (T2DM) in Chinese. The objective of the present study was to investigate the relationship between the gene mutations in Hcy metabolism related enzymes and plasma Hcy levels and T2DM susceptibility in Chinese.

Methods: Seven hundred and seventy-four T2DM patients and 500 healthy subjects were recruited from 30 Hospitals of 20 provinces in China. The plasma Hcy concentration was determined, 13 polymorphisms of 6 genes involved in homocysteine/folate pathway were genotyped. Genetic and haplotype analysis and the associations with plasma Hcy and T2DM were also evaluated.

Results: The prevalence of Hyperhomocysteinemia (HHcy) in T2DM was significantly lower (20.35%) than in healthy subjects (26.97%) (p=0.023). MTHFR (rs1801131, rs1801133), MTR (rs1805087, rs16834521), MAT1A (rs3851059, rs4933327), PEMT (rs4646406) was significantly associated with plasma Hcy in T2DM. MTHFR (rs1801133), MTRR (rs162036, rs1532268), MTR (rs16834521), MAT1A (rs3851059, rs4933327) was significantly associated with plasma Hcy in healthy subjects. MTHFR (rs1801131) showed a significant association with increased risk of T2DM (OR=1.93 for CC vs AA, P=0.041; OR=3.13 for CC vs AA+AC, P=0.017, respectively). The variant MTHFD (rs2236225) also showed significant association with decreased risk of T2DM (OR=0.36, for AA vs GG, P=0.027; OR=0.36 for AA vs GG+GA, P=0.017, respectively). In addition, PEMT (rs4646356) variants displayed a significant association with increased risk of T2DM (OR=1.52 for CT+TT vs CC, P=0.042). However, PEMT (rs4646406) variants was significantly associated with decreased risk of T2DM (OR=0.48 for TT vs AA, P=0.048).

Conclusions: MTHFR, MTR, MAT1A, PEMT, and MTRR variants are associated with alterations in plasma Hcy. MTHFR, MTHFD, and PEMT genetic variants associate with the susceptibility to T2DM in Chinese.

Key words: homocysteine, type 2 diabetes mellitus, genetic variants, methionine metabolism: Chinese

O137

IMPACT OF BREAST-FEEDING COMPARED TO FORMULA-FEEDING ON BLOOD-CELL TRANSCRIPT-BASED POTENTIAL BIOMARKERS OF HEALTH IN CHILDREN

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Background and objectives: Blood-cell transcripts have showed to be good biomarkers of metabolic alterations and their use in early detection and prevention of future disorders is promising. The beneficial effect of breast-feeding in protecting against later obesity and its metabolic-associated problems is well-established. The aim of this study was to examine whether there is a relationship between the protective effects of breast-feeding on later metabolic alterations and blood-cell expression levels of selected genes (CPT1A, SLC27A2, INSR, FASN, UCP2, LEPR and PPARα), previously proposed as biomarkers of metabolic status, in a subset of children from the baseline survey of the IDEFICS project.

Methods: 237 children aged 2-9 years from 8 different European countries were included in the study. Blood-cell transcript levels of selected genes, characteristics of subjects and the type of infant feeding were considered.

Results: breast-fed children showed higher expression levels of SLC27A2, FASN, PPARαand INSR, and lower risk of being overweight and of having high plasma triglyceride levels compared with formula-fed children. Besides, overweight formula-fed children presented higher HOMA-index than overweight breast-fed children, however this negative effect was absent in formula-fed children with high transcript levels of SLC27A2. Moreover, subjects with low expression levels of SLC27A2, FASN, PPARα or INSR showed high levels of triglycerides but, among these, being breast-fed resulted in lower levels of triglycerides, similar to children with high expression levels of these genes.

Conclusions: The protective effects of breast-feeding on later metabolic alterations is reflected in higher expression levels of the above blood-cell transcript-based biomarkers, which may also serve to discriminate the formula-fed children that are at higher risk of later metabolic alterations.

Key words: Formula-feeding, gene expression, IDEFICS project, lactation, metabolic programming

Acknowledgements: IDEFICS Study (www.idefics.eu) and Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y Nutrición, CIBERobn.

O138

ANTENATAL MULTIPLE MICRONUTRIENTS COMPARED TO IRON-FOLIC ACID LENGTHENS GESTATION, INCREASES BIRTH SIZE AND REDUCES RISK OF LBW IN RURAL BANGLADESH

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Background and objectives: Micronutrient deficiencies during pregnancy may adversely affect fetal growth but the extent and mechanisms of this effect remain poorly understood.

Methods: A cluster-randomized, double-masked trial in rural Bangladesh evaluated in 44,567 pregnant women the efficacy of a daily multiple micronutrient (MM, with 15 vitamins and minerals) vs iron folic acid (IFA) in improving gestational health and fetal growth. Mothers were supplemented from the 1st trimester to 12 wk postpartum. Sample size (Nmm=22,162, NIFA=22,405), SES and maternal diet, morbidity and gestational (GA) age at enrollment, and intake of intended supplements [median: 94 (IQR: 84-100) %] were similar across groups.

Results: There were 28,516 live born infants, equally divided by allocation. Compared to IFA supplementation, MM supplementation increased the length of gestation by mean of 0.3 weeks ($p<0.0001$), leading to an increase in mean birth weight, length, and arm, chest and head circumference of 55 g, 0.21 cm, 0.11 cm, 0.25 cm and 0.21 cm, respectively (all $p<0.001$), a 13% lower risk in preterm birth (relative risk (RR); 95% CI: 0.87; 0.82-0.92) and 12% decreased risk of low birth weight (0.88; 0.85-0.91). Effects were comparable by sex. There was no detectable difference in size for GA.

Conclusion: Daily antenatal MM supplementation lengthened gestation, thereby increasing birth size and reducing risks of preterm birth and low birth weight in rural Bangladesh.

Key words: preterm, low birth weight, microunutrient, iron, Bangladesh Supported by The Bill and Melinda Gates Foundation (Grant GH614).

O139

GLOBAL PROGRESS ON REDUCING ANEMIA IN PREGNANT WOMEN AND YOUNG CHILDREN

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Background and objectives: Anemia is a prevalent public health problem (PHP) globally. Demographic and Health Surveys (DHS), which provide information on anemia prevalence (AP) and programs, were examined to determine progress in reducing anemia.

Methods: Ninety DHS reports were reviewed for anemia information in pregnant women (PW) and children 6-59 months, including AP, reduction, and control program coverage.

Results: Twenty-two countries had two anemia surveys for PW; 24 countries for children (14 for PW and 16 for children in Africa and for both: 2 in the Middle East; 1 in Europe; 3 in Asia; 2 in Latin America/ Caribbean). AP was <40% in 10/22 and 3/24 countries for PW and children, respectively. Three African countries had relatively low AP in PW--Ethiopia (31%), Lesotho (25%), and Rwanda (29%), but AP in children was 1.5-2.0-fold higher than in PW. While 14/22 and 16/24 countries showed decreasing AP in PW and children, respectively, the decline was >20% in only in 7 and 4 countries for PW and children, respectively. Severe anemia continues to be a PHP (>=2%) in 11/22 and 12/24 countries for PW and children, respectively. Increased coverage for bed nets may be why AP has decreased in some African countries. Few countries showed significant increases in coverage for iron-folic acid (IFA) supplements in PW and deworming in PW and children. Malaria in pregnancy coverage is limited and there is no information on or poor coverage of IFA for children. Consumption of iron-rich foods continues to be poor except possibly in Ethiopia, Lesotho, and Rwanda where PW but not children may consume more iron-rich foods but his requires further investigation.

Conclusions: While anemia has decreased in some countries, progress remains slow and coverage of an integrated package to control anemia remains low.

Key words: Anemia, malaria, deworming

O140

INCREASED N-3 PUFA STATUS IS ASSOCIATED WITH IMPROVED MATH AND READING PERFORMANCE IN THE OPUS SCHOOL MEAL STUDY

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Background and objectives: n-3 polyunsaturated fatty acids (PUFA) have been hypothesised to influence cognitive function, but few studies have focused on their effect in school aged children. This study investigates if school meals with fish twice a week increased n-3 PUFA-status and if this increase correlated with an improved cognitive performance in 3rd and 4th grade children. The OPUS project 'Optimal well-being, development and health for Danish children through a healthy New Nordic Diet' was supported by a grant from the Nordea Foundation.

Methods: OPUS School Meal Study was a cluster-randomized, cross-over intervention comparing packed lunch with school meals based on the New Nordic Diet (NND) for 3 months each. n-3 PUFA-status was determined as percentage of total fatty acids in whole-blood (w%). The statistical analyses using linear mixed models included 713 children.

Results: Baseline total n-3 PUFA-status was 5.09±1.07 (mean±SD) w%; 2.96±0.74 for docosahexaenoic acid (DHA) and 0.56 [0.42;0.73] (median[IQR]) for eicosapentaenoic acid (EPA). NND increased total n-3 PUFA-status 0.33 w% in 4th grade ($p<0.001$) and 0.12 w% in 3rd grade ($p=0.024$). With regards to DHA-status, NND increased DHA 0.22 w% in 4th grade ($p<0.001$) and 0.07 w% in 3rd grade ($p=0.027$). However, EPA-status increased equally in both grades (0.05 w%, $p<0.001$). A 1-w% increase in total n-3 PUFA and DHA was associated with increased number of correct answers in math test, but only in 4th grade (0.8, $p=0.011$ and 1.2, $p=0.008$, respectively). A 1-w% increase in EPA was associated with improved reading performance (3.6 more correct sentences, $p=0.004$). There were no associations between markers of n-3 PUFA-status and concentration performance.

Conclusions: School meals based on NND increased markers of n-3 PUFA-status in Danish school-children. Results indicate that math and reading skills are positively associated with levels of n-3 PUFA.

Key words: Child, school, omega-3 fatty acids, cognition

O141

MOTHER'S POSITIVE ATTITUDE AND FAMILIARITY TOWARDS FORMULA MILK MAY CONTRIBUTE TO LOW DIETARY DIVERSITY AMONGST INDONESIAN URBAN YOUNG CHILDREN

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Background and Objectives: Indonesia is one of the countries facing nutrition transition with an increased proportion of the middle-class population. Few studies explored young child feeding practice amongst middle class families in developing countries. This study aims to assess child feeding practices and their associations with child nutritional status in urban area of Indonesia.

Methods: The study was designed as a mixed-method study in an urban middle-class community, comprising of a qualitative study amongst 26 families of young children and a case-control study involving 288 (109 cases and 179 controls) children aged 12-36 months. Cases were mild to moderately underweight children, while controls were normal weight children. The data collection methods consisted of in-depth interview for the qualitative phase and anthropometry measurements, structured interviews pertaining to child feeding practices and 24-hours recall for the quantitative phase.

Results: The qualitative study suggested that mothers appeared to have positive attitute and were familiar with many brands of toddler formula milk. Mothers reported challenges in encouraging their children to eat and relied on formula milk to increase child's food intake.The results of the case-control study showed that only 10.4% children received six-month exclusive breastfeeding and there was a significantly higher proportion of control than case children who were offered formula milk within their first month of life. Almost all children (91.7%, CI = 87.7 – 94.5) had low dietary diversity (consumed 1-3 food groups) in the last 24 hours. Formula milk was the largest contributor to child's energy intake amongst the control children.

Conclusions: The low dietary diversity warn potential problems for the health of Indonesian children. A large government strategy on complementary feeding practices including controlling the marketing activities of formula milk need to be enhanced.

Key words: Child feeding practices, child nutritional status, Indonesia.

O142

LONG-CHAIN POLYUNSATURATED FATTY ACIDS IN THE DIET AND MILK OF CROATIAN MOTHERS AT THREE MONTHS POSTPARTUM

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Background and objectives: Long-chain polyunsaturated fatty acids (LCPUFA), especially docosahexaenoic (DHA, C22:6n-3) and arachidonic (AA, C20:4n-6) are essential for prenatal and postanal neural development. In breast milk they originate from a maternal diet and their supply to breastfeeding infants is an important issue. Since no data have been reported in Croatia or neighbouring countries, this research aimed to determine the fatty acid composition, including LCPUFA, of Croatian women's breast milk and correlate these data with their fatty acids intake.

Methods: The study enrolled 83 women (average age of 31.8 years), lactating for 3 months. Dietary evaluation involved two consecutive 24-hour dietary recalls. Fatty acid composition of milk was determined by gas chromatography.

Results: Dietary evaluation has shown that in total fat intake, which makes on average 35.10% of daily energy intake, the share of saturated, monounsaturated and polyunsaturated fatty acid was 13.88%, 14.46% and 6.76%, respectively. The total dietary n-6:n-3 fatty acids ratio was 14.57. The average daily intake of DHA and AA was 110 and 54 mg, respectively. Milk samples contained 32.63% of saturated, 43.42% of monounsaturated and 18.87% of polyunsaturated fatty acids. The content of DHA and AA were 0.21% and 0.39%, respectively. The significant influence of mothers´ DHA intake on its content in milk was confirmed ($r=0.477$; $P<0.001$). Significant correlation was also confirmed between concentrations of DHA and AA in milk fat.

Conclusion: Since dietary intake of LCPUFA is sub-optimal, of concern is its low level in breast milk, especially that of DHA. Infants being breastfed were receiving only half of the recommended amounts of DHA. Croatian breastfeeding women should be educated about the importance of LCPUFA for infants´ development and about food sources which could ensure their adequate supply.

Key words: arachidonic acid, breast milk, docosahexaenoic acid, dietary intake, long-chain polyunsaturated fatty acids.

O143

ASSOCIATION BETWEEN DIETARY CALCIUM INTAKE AND BLOOD PRESSURE AMONG PORTUGUESE CHILDREN

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Background and objectives: Higher blood pressure (BP) in childhood is associated with cardiovascular risk. It has been described that dietary calcium intake may affect BP regulation. The objective of this study was to analyze the association between dietary calcium intake and BP in children.

Methods: A cross-sectional study was conducted with 128 Portuguese children (47.7% of boys) aged 6-8. Anthropometric measurements were recorded (weight, height, biceps, triceps, subscapular and suprailiac skinfolds) and physical activity was assessed during 7 consecutive days by accelerometry. Dietary intake was assessed using a 3-day food record completed by parents. Dietary calcium intake was expressed as the calcium-to-protein ratio. BP was measured using an electronic sphygmomanometer (COLIN DP 8800). Two measurements were taken and the mean of these was considered. Data was analyzed separately for girls and boys, and linear regression analysis was used to estimate the association between calcium intake and systolic and diastolic BP (SBP and DBP, respectively) adjusting for age, height, sum of skinfolds, physical activity, energy intake, magnesium, potassium and sodium intake.

Results: For girls and boys, respectively, SBP mean was 95.4±7.6 and 97.5±6.5mmHg (P=0.101), DBP mean was 56.3±6.5 and 57.6±5.9mmHg (P=0.220). No significant difference was seen in the calcium intake and calcium-to-protein ratio of girls compared to boys (P>0.05, for all). After adjusting for confounders, calcium-to-protein ratio was significantly inversely associated with SBP in girls (girls: r= -0.685, P=0.034 and boys: r= -0.010, P=0.979). No association was found with DBP in both genders.

Conclusions: In our sample, calcium intake seems to be inversely related to SBP in girls. Further studies are needed to test the effects of dietary calcium intake on BP in children.

Acknowledgments: This study was supported by PEst-OE/SAU/UI0617/2011, SFRH/BPD/81566/2011 and PTDC/DES/116586/2010.

Key words: children; dietary calcium intake; blood pressure.

O144

FREQUENCY AND DETERMINANTS OF DHA SUPPLEMENT USAGE IN PREGNANCY AND LACTATION IN GERMANY

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Background and objectives: Docosahexaenoic acid (DHA) supply in pregnancy via placenta and in infancy via breast milk depends on mother's food intake. Beside fish as a natural source, DHA supplements might be an alternative approach to ensure an adequate supply. Major aim was to describe frequencies and determinants of DHA supplementation in pregnancy (DHA-P) and during lactation (DHA-L) in a nationwide survey of mothers in Germany.

Methods: The survey was nested in the randomized controlled trial PINGU on fatty acid status optimization in infancy. From an existing panel for consumer surveys (Kantar Health GmbH) mothers with children up to 36 months of age were selected for an online interview on mother's and children's intake of polyunsaturated fatty acid-rich foods (field period: December 2010). Data of 985 mothers were weighted to ensure representativeness for mothers in Germany.

Results: 27.8% of mothers in Germany used DHA supplements during pregnancy, 16.8% during lactation. DHA-P and DHA-L was higher in mothers with first children compared with later children (DHA-P: 31.5% vs. 24.6%, p=0.015; DHA-L: 19.2% vs. 14.7%, p=0.06) and in high compared with low social classes (DHA-P: 35.8% vs. 23.6%, p=0.001; DHA-L: 24.4% vs. 14.4%, p=0.0001), but did not differ between younger and older mothers. The proportion of mothers eating fish at least one time per week was higher among supplement users compared with non-users (pregnancy: 53.8% vs. 36.3, p=0.0001; lactation: 62.9% vs. 36.8%, p=0.0001).

Conclusion: DHA supplementation is common in German mothers especially in pregnancy, but also during lactation. However, the benefit of supplementation was questionable in the majority of supplementing mothers since fish was already part of the usual diet. DHA supplements might be promoted especially in lower social classes, if fish is disliked.

Key words: DHA, supplements, pregnancy, lactation. Funded by the German Federal Ministry of Education and Research

O145

MOST EFFECTIVE PERIOD TO CONTROL ANAEMIA IN PREGNANCY: ADOLESCENCE OR PRE-PREGNANCY?

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Background and objetctives: In 2002 the prevalence of anaemia among school going adolescents' aged 10-15 years were assessed as a baseline and it was 11.1%. Highest prevalence was recorded among grade 7 children and the prevalence was varied from 11% to 30% within districts. As a result, it was decided to address anaemia in school adolescents aged 10-15 years by giving a high priority through schools. In 2002–2003, a study was carried out in 5 districts to assess the impact of anaemia in schoolchildren with weekly iron supplementation for a period of 6 months. It revealed when the supplementation coverage is more than 30%, the reduction of anaemia was 50%. As a result weekly iron supplementation was initiated in all schools in the country annually for a period of 6 months among adolescents aged 11-15 years of age since 2004. This study was conducted to assess the impact of iron supplementation programme after 5 years.

Methods: A household survey was carried out using a multistage cluster sampling method to draw nationally representative sample. Haemoglobin was assessed using haemocue among non-pregnant and non-lactating women aged 15-20 years to represent the previously iron supplemented adolescents.

Results: The prevalence of anaemia was 13.3%, 26.7% and 23.5% among pregnant, lactating and non pregnant and non lactating women in the study population.

Conclusion: Iron supplementation during the early adolescent period was not sufficient to maintain iron levels for a long period of time as a strategy to control anaemia in pre pregnanat women. It is recommended to initiate a sustainable cost effective solution to control anaemia in adolescents and pre pregnant women such as fortification.

Key words: Anaemia, adolescents, prepregnancy

O146

DIETARY PATTERNS ASSOCIATED WITH METABOLIC SYNDROME: THE KHORRAMABAD STUDY

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Background and objectives: Metabolic syndrome (MetS)is a complex disorder with high socioeconomic cost that is considered a worldwide epidemic. The aim of this study was characterize the dietary patterns of Iranian adults and to examine association with metabolic syndrome.

Methods: In this descriptive, cross-sectional, correlation design 1980 persons aged >= 18 y were selected by using multistage cluster, random sampling method in Khorramabad city, located in west of Iran. Dietary intake was assessed with the use of a validated, 168 food- item, self-administrated, semi-quantitative food-frequency questionnaire.Factor analysis, linear regressions and ANCOVA were used to data analysis.

Results: Three major dietary patterns were identified: the western dietary pattern (WDP), the healthy dietary pattern (HDP), and the traditional dietary pattern (TDP). Subjects in the highest quintile of the HDP had lower odds of the metabolic syndrome (OR: 0.45; 95% CI: 0.27-0.77) than did those in the lowest quintile, whereas those in the highest quintile of the WDP score had greater odds of the MetS (OR: 3.44; 95% CI: 2.08-5.70) than did those in the lowest quintile. Multi linear regression showed that the WDP score was associated negatively with serum HDL cholesterol and positively with other components of MetS.

Conclusions: In conclusion, a dietary pattern characterized by high consumption of poultry, dairy products, vegetables, fruits, legumes, whole grains, fish, and olives are associated with reduced risk of the metabolic syndrome in both male and female. In contrast, a dietary pattern with high amounts of red meats, organs meat, processed meats, soft drinks, snacks, sweet and deserts, condiments, margarine, and coffee is associated with a greater risk of the metabolic syndrome.

Key words: Metabolic Syndrome, factor analysis, obesity, dietary pattern, BMI

O147

BIOMARKERS OF CARDIOMETABOLIC RISK ARE ASSOCIATED WITH POOR LIFESTYLE PRACTICES IN URBAN SRI LANKAN WOMEN

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Background and objectives: In the context of rising prevalence of non communicable diseases in Asia, assessing healthy lifestyle practices and their influence on biochemical and anthropometric parameters is of importance. However, evidence for links between food habits, physical activity and cardiometabolic risk markers are limited. Our objective was to assess the relationship between lifestyle practices related to diet and cardiometabolic risk parameters among urban Sri Lankan women.

Methods: 2800 urban women (30 - 45 years) were selected by random cluster sampling and screened for dysglycaemia for a final sample of 272 newly diagnosed, drug naive dysglycaemic and 345 normoglycaemic women. Glycaemic status was confirmed by HbA1c. An interviewer administered questionnaire was used to obtain data on lifestyle practices. Anthropometry and blood pressure were recorded using standard protocols. FBS, HbA1c, serum insulin, serum cholesterol and serum triglycerides were measured. % fat mass was determined by bioelectrical impedance analysis. Chi square test was used to assess statistical significance.

Results: 95.6% of newly diagnosed dysglycaemic women did not engage in at least 30 minutes of exercise. A higher proportion of newly diagnosed dysglycaemics demonstrated undesirable food habits ($p < 0.001$) compared to normoglycemic women [inability to resist fatty food; dysglycaemics (65 %), normoglycaemics (18 %), inability to resist sugary food; dysglycaemics (61.4 %), normoglycaemics (14.5 %), snacking while watching TV; dysglycaemics (66.2 %), normoglycaemics (25.8 %)] Waist circumference, % Fat Mass, Body Mass Index, HbA1c, serum insulin, serum cholesterol and serum triglycerides were significantly higher among those who had poor practices, and did not achieve recommended levels of exercise.

Conclusions: Our study demonstrates a link between negative eating behaviors and cardiometabolic risk with implications for intervention strategies relevant to women in similar urban environments in South Asia. (Funding IAEA-15920)

Key words: Diabetes, Lifestyle practices, Asia

O148

THE ECONOMIC IMPACT OF ANAEMIA IN PERU

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Background and objectives: Anaemia in Peru is a severe public health problem that affects more than 50% of preschool children and more than 20% of women of reproductive age. It affects society socially and economically, as well as the lives of those who suffer from it. This study aims to estimate the economic costs for the Peruvian economy caused by the prevalence of iron-deficiency anaemia, and to show the importance and implications of the problem and the possible savings of a stronger, more systematic and effective policy for fighting anaemia.

Methods: The methodology, mainly based on Ross & Horton (1998) as part of the Micronutrient Initiative, estimates the economic impact of iron-deficiency anaemia based on: loss of future work productivity of children who currently suffer from anaemia, loss of work productivity of adults who currently suffer from anaemia and cost associated with caring for women who gave birth prematurely due to anaemia. The methodology also considers costs the state would incur to prevent anaemia among children and pregnant women.

Results: The study finds that anaemia costs Peru S./ 2.777 billion, or 0.62% of GDP. The most important element is that associated with the effects in adulthood of the cognitive impairment generated by anaemia in childhood, at approximately S/. 1.285 billion. The costs faced by the state stand at S/. 623 million and the cost incurred for treating anaemia is S/. 22 million. In contrast, the cost of prevention would be S/. 18 million.

Conclusions: Anaemia represents a major burden for the Peruvian economy, a total cost equivalent to almost 38% of the national health budget for a year. The cost of preventing anaemia represents just 2.8% of the total cost that anaemia generates for the state, indicating that an anaemia prevention programme would be highly cost effective.

Key words: anaemia, Peru, cost effectiveness

O149

MICRONUTRIENT DEFICIENCY: A PUBLIC HEALTH PROBLEM IN HO CHI MINH CITY, VIETNAM

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Background and objectives: Children and women are vulnerable to micronutrient deficiency. This research determines

the magnitude of this public health problem in relation to vitamin A deficiency, and iron deficiency anemia among children and women in HCMC, and iodine deficiency among women.

Methods: Data were collected from epidemiological cross-sectional surveysof 644 children under 5 years, 776 pregnant women, and 718 breast-feeding women in 2007-2008 in HCMC. Serum retinol concentration <0.7 mol/L and breast-milk retinol concentration <1.05 mol/L were classified as subclinical vitamin A deficiency (VAD) in children under 5years and breastfeeding women, respectively. Hemoglobin <11g/dl (for children under 5 years) and Hb<10g/dl (for women) were classified as anemic. Iodine deficiency (ID) was determined by spot urinary iodine as <10 g/dl.

Results: The prevalence of VAD of children under 5was 4.2% and is highest in children under 6 months of age (21.7%). Multivariant analysis shows that not taking vitamin A supplement 6 months before the survey (OR=3.99, 95% CI 1.79 - 8.92, p<0.005) was associated with VAD.The prevalence of VAD in breastfeeding women was 28.0%. The prevalence of anemia in pregnant women and children under 5 was 17.5% and 14.0%, respectively. Based on a single 24h recall women in their last two trimesters were only consuming 40% of the RDA for iron. The prevalence of ID in pregnant women was 72.8%, of which, 27.3% moderately deficient, and 11.9% severe. The prevalence of pregnant women using iodized salt was 56.8% and its use decreased risk of ID by 45.0%.

Conclusions: Despite recent economic gains in VietNam,micronutrient deficiencies continue to be a significant public health problem in HCMC. In particular, according to WHO, iodine deficiency in pregnant women and vitamin A deficiency in breastfeeding women can be considered severe. There is a need for continued focus to improve the micronutrient status of these groups.

Key words: micronutrient deficiency, HCMC.

O150

THE PARADOXAL LINK BETWEEN FOOD INSECURITY AND OBESITY IN PORTUGUESE ADULTS

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Background and objectives: The coexistence of obesity and food insecurity (FI) sounds contradictory. Although the literature suggests that the obesity rates, as other chronic diseases rates, follow a socioeconomic gradient. Over 20% of the male obesity and over 40% of the female obesity across Europe, could be attributable to social inequalities. The prevalence of FI is growing faster over the world, including Portugal, as a result of the economic crisis, which had leaded to the increasing of health inequalities, namely by an inequal distribution of obesity and other diet-related chronic diseases through the most vulnerable groups. We aim to analyze the coexistence of FI and overweight/obesity in a sample of Portuguese households.

Methods: Cross-sectional study, conducted in 1187 Portuguese households. Data were collected by face-to-face interviews and FI was evaluated using a psychometric scale adapted from the Brazilian Food Insecurity Scale. Logistic regression models adjusted for socioeconomic variables, were used to identify the associatiation between FI and body mass index (BMI) in Portuguese adults.

Results: We found a higher prevalence of FI (for all FI levels – low, moderate, severe) in overweight (OR=1.635; CI95% 1.202-2.224) and obesity individuals (OR=1.657; CI95% 1.140-2.409). When we analysed just the moderate and severe levels of FI, underweight individuals were at higher risk for FI (OR=6.591; CI95% 1.956-22.214) than the overweight, obese and normal subjects.

Conclusions: A significant association between the BMI and FI was found. FI was more prevalent among overweight/obese Portuguese adults´ families. When FI was analyzed by levels, we observed that low and moderate FI was associated with higher risk of obesity and severe FI was associated with a higher risk of underweight. These findings could be helpful for health authorities in planning strategies to prevent obesity and other chronic diseases, addressing FI as an influencing factor.

Key words: food insecurity, obesity, Portugal.

O151

STUDY TIME IS ASSOCIATED WITH DIETARY PATTERNS IN EUROPEAN ADOLESCENTS PARTICIPATING IN THE HELENA STUDY

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Background and objectives: Dietary pattern (DP) analysis has emerged as an alternative and complementary approach to addressing diet-diseases associations. The aim of the present study is to examine DP in European adolescents and their relationship with the time that adolescents spent studying.

Methods: A multinational cross-sectional study was carried out in 2,202 adolescents (45.4% boys) aged 12.5 to 17.5 years. A self-reported questionnaire with information on sedentary behaviours, separately for weekdays and weekend days, and two non-consecutive 24 hour-recalls were used. Principal component analysis (PCA) was used to obtain DP, and linear regression examined the association between DP scores and sedentary behaviour indicators.

Results: Four DPs for boys ("plant based", "snacking", "breakfast" and "health conscious") and five DPs for girls ("confectionary and snacking", "plant based", "breakfast", "animal protein" and "health conscious") were obtained. Boys who study between 2 to 4 hours and more than 4 hours during weekdays had higher adherence to the "breakfast" DP ((β0.11, CI: 0.01, 0.20) and β=0.19, CI: 0.08, 0.29), respectively). In girls, studying between 2-4 hours during weekend days were associated with lower adherence to the "snacking" DP β=0.06, CI: 0.01, 0.12) and with higher adherence to the "plant based" β=-0.06, CI: -0.11, -0.01) and "breakfast" DP β=0.07, CI: 0.01, 0.13).

Conclusions: Study time is related positively with healthy DP and negatively with unhealthy DP. Such findings may help to generate interventions focusing on increasing the time that adolescents spent studying.

Key words: Dietary patterns, study time, adolescents

O152

THE ASSOCIATION OF METABOLIC SYNDROME AND FOOD PATTERNS IN NON-MENOPAUSE WOMEN

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Background and objectives: The metabolic syndrome (MetS) is a cluster of metabolic disorders most likely to be recognized in midlife and includes high fasting blood glucose levels, hypertension, dyslipidemia, and abdominal obesity. In this study the relationship of dietary pattern analysis with among non- menopausal women was studied.

Methods: A Nested case- control was conducted on 920 non- menopausal women 18-50 yrs old. Mets was defined according to IDF guideline. Dietary intakes were assessed via 168 item semi- quantitative FFQ, in 26 food groups. Using factor analysis, the predominant food patterns were drawn. 135 subjects with MetS were matched to 137 controls for age, and odds ratio of MetS and its components in dietary pattern scores, was assessed using logistic regression, adjusting confounding variables.

Results: Two dietary patterns were identified based on desirable food pattern was characterized by the consumption of raw vegetables, fruits, starchy vegetables, olive, oiled vegetables, low fat dairy, legumes, nuts, egg, oil, whole grains, fish, high fat dairy and chicken, and undesirable food by cola and commercial fruit juice, cookies and sugar, ready foods, mayonnaise, snacks (chips and puffed corn), fat, pickle, organ meats, refined grains, meat and salt. Adjusting for various confounding variables, the desirable food pattern was inversely associa-

ted with MetS (OR: 0.87, 95% CI: 0.16-0.73, P-value < 0.001), and hyperglycemia (OR: 0.34, 95% CI: 0.13-0.87, P-value < 0.05). No associations were observed between MetS and undesirable food pattern, and among components of MetS, only triglycerideswereassociated with this food pattern (OR: 2.17, 95% CI: 1.09-4.32, P-value < 0.001).

Conclusion: Desirable food pattern was significantly associated with reduced MetS, whereas undesirable food pattern has no association.

Key words: metabolic syndrome, food pattern analysis, non- menopause women, factor analysis

O153

ASSOCIATION BETWEEN A HEALTHY DIET ACCORDING TO WHO GUIDELINES AND ALL-CAUSE MORTALITY IN EUROPEAN AND AMERICAN ELDERLY, THE CHANCES PROJECT

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Background and objectives: The Healthy Diet Indicator (HDI) measures adherence to the WHO guidelines for preventing diet related chronic diseases, and can be applied to assess associations of diet with health across populations. We examined the association between the HDI and all-cause mortality in European and American elderly people aged 60 years and above.

Methods: We analysed data on 395,863 men and women from 11 prospective cohort studies from the Consortium on Health and Ageing: Network of Cohorts In Europe And The United States (CHANCES). Across cohorts, the follow-up periods ranged from 10 to 20 yrs. Diet was assessed through validated methods. For the translation of foods to nutrients, country specific food composition tables were used. The continuously scored HDI (range mean and SD HDI score 45±9 to 54±7 across cohorts) was based on intakes of saturated and polyunsaturated fatty acids, mono-and disaccharides, protein, cholesterol, dietary fibre and fruits and vegetables. The association between the HDI and all-cause mortality was evaluated in each cohort separately, by multiple Cox proportional hazards regression. A pooled hazard ratio (HR) was subsequently estimated using a random-effects model.

Results: Across all cohorts, 84,863 people died during 4,492,298 person-years of follow-up. Adjusted HR of death, for a 10 point increment in HDI score, ranged between 0.81 (95% CI 0.77-0.86) in Denmark and 0.99 (95% CI, 0.84-1.16) in Poland. The pooled adjusted HR estimate showed a significant inverse association of 0.90 (95% CI 0.87-0.93) but there was a significant heterogeneity between studies (p=0.001, I2=66%).

Conclusion: Our results show that higher dietary quality is inversely associated with all- cause mortality but the heterogeneity between studies warrants further research.

Key words: CHANCES, Ageing, Cohort, diet, mortality

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O154

CHARACTERIZATION OF BIOLOGICAL BARRIERS THAT IMPACT NUTRITIONAL STATUS AMONG HIV-POSTIVE AND HIV-NEGATIVE WOMEN AND THEIR INFANTS IN SEMI-RURAL TANZANIA

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Background and objectives:HIV-infected women are at increased risk for malnutrition; however, the relative contributions of food insecurity in resource-constrained regions that have high generalized infectious disease burdens versus HIV infection-induced changes in appetite regulation, metabolism and body composition are unknown. The objective of this study was to characterize maternal cachectic cytokine and appetite-regulation hormone profiles during pregnancy and relate these to maternal HIV-status and therapy, nutritional status, self-reported appetite and birth outcomes.

Methods: Forty-three HIV-infected and 70 HIV-uninfected pregnant women attending a semi-rural health facility in northwest Tanzania were recruited at their first antenatal visit. Maternal nutritional status was assessed twice during pregnancy, and birth outcome data was obtained at delivery. Baseline plasma cytokines and leptin concentrations were multiplexed. This study was powered to detect significant differences in tumor necrosis factor (TNF)-α concentration.

Results:TNF-α, a pro-inflammatory cytokine implicated in cachexia-related appetite suppression, showed an inverse dose-response relationship with ART (antiretroviral therapy) (p=0.001) (baseline TNF-α concentrations: ART-naïve 88.8; ART <4 weeks 79.3; ART >4 weeks 56.6; HIV-negative 63.2 pg/mL). Similar patterns were observed for interleukin (IL)-10, an indicator of immune activation, and the pro-inflammatory hormone and appetite-suppressant leptin, however, group numbers were small and differences not significant. There was a non-significant dose-response relationship with ART corresponding to maternal gestational weight gain (median: ART-naïve 1.4; ART <4 weeks 1.5, ART >4 weeks 3.2; HIV-negative 2.7 kg/month). All HIV-exposed infants had reduced birth weight (2.9 vs. 3.2 kg; p=0.006) and length (45.3 vs. 47.0 cm; p<0.001) compared to all HIV-unexposed infants.

Conclusions: Findings suggest that appetite-regulating factors are different based on HIV status in pregnant women, and among HIV-positive women according to ART duration. Biological barriers may contribute to a reduced ability to respond to nutritional interventions that alleviate maternal malnutrition, with further consequences for the health of HIV-exposed infants.

Key words:HIV, inflammation, pregnancy, malnutrition, antiretroviral

O155

MALNUTRITION AMONG EGYPTIAN CHILDREN

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Background and objectives: Malnutrition constitutes varying proportions in developing countries, and anthropometry is a simple tool to assess its magnitude in children. The objective is to identify the prevalence of malnutrition (under and over) among Egyptian children and to test various anthropometric indicators for classification of malnutrition.

Methods: The study included 1365 children, their age ranged from 6 -11 years (1 year ± 6 months). They were collected from two public schools in Giza governorate. Height, weight and mid upper-arm circumference were recorded and children were classified by WHO criterion (Z-score) using different nutritional indices i.e. weight for age, height for age, weight for height, and mid upper-arm circumference for age, and percentiles of BMI for the reference population. Egyptian growth curves (2008) data were used as reference population.

Results: The prevalence of stunting (Z-scores for height-for-age [HAZ] <-2), wasting (Z-scores for weight-for-height [WHZ] <-2) and being underweight (Z-scores for weight-for-age [WAZ] <-2) was 3.7%, 0.7 %and 0.0%, while that of at risk of stunting, wasting and underweight (Z-score<-1 SD) was18.2%, 13.4% and 8.1% respectively. On the other hand, the prevalence of overweight identified by WHZ (>1 SD) was 10.8% and obesity (>2 SD) was 5.3%., while that by BMI (< 85th and 95th percentiles) were 10.9% and 5.6% respectively. Mid-upper arm circumference (MUAC), needed to be used with caution since they are not sensitive enough to detect all cases of overweight. However, BMI had more specificity and less sensitivity than the MUAC in identification of underweight, but its specificity and sensitivity were nearly similar to that of WAZ.

Conclusions: MUAC for identification of overweight in this age is impractical. Further investigations are needed for the use of BMI with different cutoff points in identification of underweight children.

Key words: Under nutrition, overweight, obesity, children

O156

PROCOLLAGEN III N-TERMINAL PROPEPTIDE BEYOND A FIBROSIS BIOMARKER IN NON-ALCOHOLIC FATTY LIVER DISEASE ASSOCIATED WITH OBESITY IN CHILDREN

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Background and objectives: Procollagen III N-Terminal Propeptide (PIIINP) is a product of the proteolytic cleavage during collagen synthesis in connective tissue. It has been proposed as a biomarker of fibrosis in nonalcoholic fatty liver disease (NAFLD) discriminating between simple steatosis and steatohepatitis or advanced fibrosis. The objective of this study was to determine serum PIIINP concentration in obese children with and without NAFLD and its relationship with obesity.

Methods: 158 Caucasian children aged5-16 years were recruited, including 52 with normal weight without NAFLD (determined by abdominal ultrasonography), 55 obese without NAFLD and 47 obese with NAFLD. Anthropometric, clinical and metabolic markers as well as adipokines, inflammatory biomarkers as C reactive protein, Interleukin 1 (IL1), IL-6, IL-8 and tumour necrosis factor-alpha and cardiovascular disease risk biomarkers as monocyte chemoattractant protein 1 and plasminogen activator inhibitor 1(tPAI1) were analyzed. PIIINP was determined using a commercial ELISA kit. One-way ANOVA test were used to compare means among groups. A posterior Bonferroni tests were performed to evaluate specific differences between groups. A backward-step multiple linear regression analysis to evaluate the independent risk factors for PIIINP (SPSS 20 software).

Results: Mean serum levels of PIIINP were different between normal weight children (53±8 ng/ml) versus obese without NAFLD (150±10) and with NAFLD (160±11) ($p<0.001$), but none differences were observed between the two obese groups. Correlation analysis revealed that weight, BMI, BMI zscore, waist circumference, body fat percentage, insulin, HOMA, uric acid, leptin, tPAI1 and resistin were significantly associated with serum levels of PIIINP ($r>0.4$, $P<10\text{-}9$).BMI z-score (β;=0.307 $p<0.002$), tPAI1 (β;=0.247 $p<0.016$), and resistin (β;=0.207 $p<0.029$) were independent predictors of serum PIIINP. Conclusions Serum PIIINP did not discriminate NAFLD presence in obese children, but it is an early biomarker of metabolic derangement and CVD risk in childhood obesity.

Key words: Procollagen III, obesity, cardiovascular, children.

O157

POST-PRANDIAL APPETITIVE AND GLYCEMIA-REGULATING EFFECTS OF ALMONDS CONSUMED WITH MEALS OR AS SNACKS

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Background and objectives: Snacking is prevalent and contributes to daily consumption of essential nutrients, but may also increase the risk for weight gain. Almonds, which are commonly consumed as a meal accompaniment or snack, have been previously shown to modulate postprandial glycemia and appetite. These effects were examined when almonds were consumed only with meals or alone as snacks.

Methods: Acute appetitive and glycemic responses were measured over a four-week randomized, controlled trial. Participants were randomized into the Control (CL), Meal groups receiving almonds (43g) with breakfast (BF) or lunch (LN), or Snack groups receiving almonds as morning (MS) or afternoon (AS) snacks during a 490-minute clinical session. Breakfast (0 min) and lunch (240 min) were provided to participants under all conditions. Post-prandial serum glucose and appetite (hunger, fullness, desire-to-eat) were measured at fixed intervals and compared between study arms and between the combined Meal and Snack groups.

Results: The post-prandial glucose response was significantly reduced by almond consumption in the BF, LN, MS, and AS groups compared to the CL group (interaction effects, $p<0.001$). When combined into Meal or Snack groups, the effects just failed to reach statistically significance ($p=0.078$) ($S<M$). All appetite ratings also showed significant interaction effects between all groups, but only hunger ratings remained statistically significant when compared across Control, Meal, and Snack groups ($p=0.022$). When calculated as the area-under-the-curve (AUC), post-prandial hunger and desire-to-eat AUC followed the order Snack < Meal < Control ($p=0.026$ & $p=0.023$ respectively). Glucose and fullness AUCs were not significantly different between Control, Meal, or Snack groups.

Conclusions: The inclusion of almonds modulated post-prandial glycemia regardless of timing of consumption, but suppressed hunger and desire-to-eat more when consumed as snacks.

Key words: almonds, appetite, glycemia

O158

CARDIOVASCULAR PREVENTIVE EFFECT OF FRUITS AND VEGETABLES: IS IT MODIFIED BY OLIVE OIL CONSUMPTION?

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Background and objectives: In the context of the Mediterranean diet, a selective beneficial effect of fruits and vegetables (F&V) on prevalent and incident hypertension only among participants with lower olive oil (OO) consumption has been reported. As hypertension is one of the most important risk factors for CVD, our objective was to prospectively evaluate the association between F&V intake and incident CVD, and the potential effect modification by OO consumption.

Methods: We followed-up 16,042 participants (60.3 percent women, mean age: 37.7 years) initially free of CVD during a median of 8.1 years. Participants were part of a prospective cohort study of university graduates from all regions of Spain (The SUN Project). Baseline diet was assessed using a validated 136-item food-frequency questionnaire. A CVD event was defined as the combined outcome measure of incident acute coronary syndromes (myocardial infarction), revascularization procedures or stroke.

Results: We observed 126 incident cases of CVD (82 acute coronary syndromes or revascularization procedures and 44 non-fatal strokes). Multivariate Cox regression analyses showed a significant inverse association between F&V consumption and the risk of CVD only among participants with low OO consumption (<15.5 grams/day); hazard ratios and 95% confidence intervals [HR (95%CI)] for 3 to 4 servings/day and for 5 or more were 0.45 (0.23-0.86) and 0.64 (95%CI: 0.35-1.17), respectively, compared with those who consumed <3 servings/day. Among those with high OO consumption (15.5 or more grams/day), HR (95%CI) for 3 to 4 servings/day and for 5 or more were 0.64 (0.24-1.72) and 1.11 (0.45-2.75), respectively, compared with the reference category. The interaction between OO and F&V was not statistically significant (P=0.262).

Conclusions: The preventive effect of F&V intake on the risk of CVD appears to be restricted to participants with lower OO consumption, although the effect modification was not statistically significant.

Key words: Fruit, vegetable, olive oil, cardiovascular.

O159

THE ROLE OF NUT CONSUMPTION IN MAINTAINING CARDIOVASCULAR HEALTH AND COGNITIVE FUNCTION

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Background and objectives: The purpose of this review was to examine the association between nut consumption, cardiovascular health and cognitive function. Nuts contain many bioactive ingredients including polyphenols, amino acids and fatty acids that have the potential to deliver benefits for both vascular and cognitive health. Increased cerebrovascular perfusion has been hypothesised to underpin improvements in cognitive function.

Methods: A systematic search of epidemiological and intervention studies examining the effect of nut consumption on blood pressure, endothelial vasodilator function, arterial compliance, inflammation and cognitive performance was performed in November 2012. A wide variety of intakes, length of supplementation and comparator foods made data difficult to interpret. Hence where data were available, weighted mean effects and 95% CI were calculated for changes in blood pressure, inflammatory markers and endothelial function.

Results: Of the 61 articles included, data were available to calculate weighted mean changes for 36 of 49 intervention studies. Nut consumption was associated with reductions in systolic and diastolic blood pressure of 1.3% (95% CI -2.3 to -0.3) and 0.7% (95% CI -1.4 to 0.04) respectively and reductions in ICAM-1, VCAM -1 and CRP of 8.6% (95% CI -23.6 to 3.3), 5.8% (95% CI -14.1 to 2.5) and 12% (95% CI -23.6 to -0.3) respectively, whilst endothelial function improved by 19.7% (95% CI 4.3 to 35.0). Individual studies suggest nut consumption may also have potential to improve cognitive performance but data were limited.

Conclusions: Current evidence indicates that nut consumption can significantly reduce some components of inflammation and blood pressure and improve endothelial function which may be a mechanism for improving cognitive performance.

Key words: Nuts, cardiovascular, endothelium, inflammation, cognitive function

O160

EFFECTS OF PARENTERAL NUTRITION FORMULAS ON PLASMA LIPID PROFILE IN CHILDREN WITH BONE MARROW TRANSPLANTATION

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Background and objectives: In children undergoing bone marrow transplantation (BMT) it is often required parenteral nutrition (PN). This study compares plasma lipid and fatty acids profiles after a fish oil or soybean PN in BMT children.

Methods: 14 children with BMT and requiring PN for at least 10 days were selected. They were randomized to use a lipid emulsion with fish oil, or soybean oil. Blood samples before starting and at the end of the PN were taken to analyze lipids.

Results: Similar changes in plasma levels of cHDL, cLDL, triglycerides (TG) and apolipoprotein A were detected with both formulas. TG levels increased more after the administration of the emulsion of fish oil although levels of cHDL, and apo A decreased more after administration of soybean oil. There were no differences by groups in plasma linolenic acid levels although in both formulas, levels increased after 10 days of PN. Eicosapentaenoic acid increased in fish oil formula group respect to soybean fed; their levels were higher at the end of the supplementation compared with the basal levels. Linoleic acid did not differ between the two groups. Also, arachidonic acid levels in fish oil formula were reduced at 10 days respect to baseline and when PN last 21 days, this acid decreased in patients with both formulas.

Conclusions: PN for 10 days are effective and safe in children. There are initial changes in plasma lipid profile more dependent on the duration of PN, than the type of lipid formula itself. However, plasma fatty acid profile changes are related with the omega fatty acid composition of the formulas. Other paediatric studies are necessary in order to establish the importance of the duration of interventions and the use of non-traditional lipid composition of PN formulas.

Key words: bone marrow transplant, parenteral nutrition, fatty acids.

O161

ABUNDANCE AND DIVERSITY OF MICROBIOTA IN METABOLIC SYNDROME

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Background and objectives: Inflammatory reactions leading to the progression of metabolic syndrome contribute to changes in composition of the GIT microbiota. The objective of this study was to investigate differences of gut microbiota in obese and type 2 diabetics, and the response to intervention for estimating its potential role in controlling metabolic syndrome.

Methods: We analyzed fecal microbiota at three time points in fourteen obese participants, nineteen lean controls and twenty-four type 2 diabetes patients. Obese and type 2 diabetics received an intervention of nutritional counseling, type 2 diabetics an additional therapy with Victoza®. The microbiota composition was analyzed for abundance and diversity by quantitative real-time polymerase chain reaction, denaturing gradient gel electrophoresis and high throughput sequencing.

Results: In type 2 diabetics an increase of diversity was observed with intervention whereas the values of lean controls remained unaffected. In the lean and obesity groups, a lower Firmicutes: Bacteroidetes ratio correlated with lower BMI. In type 2 diabetics the ratio of Firmicutes to Bacteroidetes increased throughout the intervention period. Type 2 diabetics showed a significantly enhanced proportion of lactic acid bacteria before and after intervention, also Akkermansia and Enterobacteria showed a higher abundance in type 2 diabetics, increasing throughout the study period. Archaea were significantly more frequent in type 2 diabetics. Whether differences seen in abundance of certain groups and diversity of microbiota reflect different underlying inflammatory mechanisms of type 2 diabetes and obesity or rather the progression of the metabolic disease remains unclear and needs long-term investigation.

Key words: metabolic syndrome, ratio Firmicutes: Bacteroidetes, lactic acid bacteria, Akkermansia.

O162

INTELLIGENCE AND ITS ASSOCATION WITH NUTRITIONAL STATUS IN PRIMARY SCHOOL PUPILS IN LAFIA, NIGERIA.

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Background and objectives: Acute effects of malnutrition underlie 50% of the causes of mortality in developing countries. Long term effects have resulted in altering brain growth and development. However, there has been inadequate research into the relationship between nutritional status and intelligence performance among children in these regions. This study assessed the nutritional status and intelligence among primary school pupils using Non-verbal intelligence tools.

Methods: A cross-sectional study among school pupils in Nasarawa state, Nigeria was done. Information on socio-demographic characteristics was obtained. Intelligence assessed with group administration of Raven Standard Progressive matrices (RSPM) consisting of 60 questions and Draw –a-Person test (DAP). Nutritional status Z scores were determined for height, weight, and BMI using WHO Antroplus.

Results: The mean age of 342 pupils was 9 ±1.9 years with more females (54.1%) and M:F ratio 1:1.1. Mean weight, height and BMI were 27.45± 7.1 kg, 132.4± 10.8 cm and 15± 2.4kg/m2 respectively. More wasted (p=0.016) and stunted (p=.00) children seen in public schools. Performance of the pupils using RSPM showed that 2%, 4.1%, 31.9%, 37.1%, and 24.9% were intellectually superior, above average, average, dull, and deficit respectively; while using DAP, 0.2% were intellectually superior, 3.8% above average, 40.9% average, 33.3% dull and 21.5% intellectually deficit. Both tests strongly correlated (r=4.9, p=.00). HAZ and WAZ ≤2SD were significantly associated with poor performances on RSPM ((p=.03 and p=.05 respectively). Similar findings were seen with the DAP[HAZ (P=.00) and WAZ (p=.048)]

Conclusion: Poor nutritional indices with its attendant effect on intelligence is a major problem of childhood in developing countries.

Key words: intelligence, nutritional status, children

O163

INCREASED RESTING ENERGY EXPENDITURE IN YOUNG ADULTS WITH HIGH TRIGLICERYDES

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Background and objectives: At present there is an increased percentage of young people that have been affected by diseases that normally were appearing in old adults, such as cardiovascular diseases, diabetes and obesity. For this reason the aim of this study was to evaluate the effect of metabolic alterations related to glucose and lipid profile on resting energy expenditure (REE) of young adults from Queretaro (central Mexico).

Methods: A total of 225 Mexicans, aged 20-45 y, were recruited in this study. After signed informed consent, the participants were cited in fasting conditions for anthropometric evaluation. Besides, a blood draw was collected for the analysis of glucose (Glc), triglycerides (TG), total cholesterol (T-Chol), LDL and HDL. Body composition was assessed by bioimpedance and RER was measured by mean of a CO2/O2-calorimeter.

Results: Overweigh and obesity (OW/OB) were presented in 29.1% of the participants. Abnormal glucose was absent; however, 6.4% presented elevated T-Chol, 36.0 % low HDL, 5.1% high LDL and 10.4% elevated TG. Body fat was elevated in 22.2%, being women the most affected. RER was greater in men than women. A higher RER was observed in participants with elevated TG compared to those with normal TG when controlling by lean body mass (1693.8±387.4 vs. 1521.6±212.9 kcal/d; P=0.0055), and remain significant when adjusting by body mass index, thus RER was significantly higher in normal weighed participants with elevated TG (1332.0±152.7 vs. 1480.4±198.4 Kcal/d P=0.01523) and either in OW/OB participants with elevated TG (1814.3±368.3 vs. 1650.5±211.1 Kcal/d, P=0.01049).

Conclusions: RER measurement can be used along or together with anthropometric evaluation as a better indicator that can be used for the diagnosis of metabolic alterations since young age and to prevent the onset of metabolic disease in old age.

Key words: Resting energy expenditure, triglycerides, metabolic alterations, young adults

O164

SERUM RETINOL AND ANTHROPOMETRIC STATUS OF 2-5-YEAR-OLD SOUTH AFRICAN CHILDREN AND THEIR CAREGIVERS WITH DIVERSE DIETARY PATTERNS

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Background and objectives: According to a 2005 national survey, 63.6% of 1-9-year-old South African children and 27.2% of women were vitamin A deficient (serum retinol <20 μg/dL). South Africa's cultural, geographical and socio-economic diversity is reflected in the eating habits of its population. This study determined anthropometric status, dietary intake and vitamin A status of 2-5-year-old children and their caregivers in four diverse resource-poor geographical sites.

Methods: Children-caregiver pairs were randomly selected in two rural (n=140 and 206, respectively) and two urban sites (n=194 and 207, respectively). Height and weight measurements were used to calculate z-scores for children using WHO 2006/2007 growth standards, and BMI for caregivers. The caregivers' 24-hr dietary recall data was used to construct a dietary diversity score (range: 0-9). Blood samples were analysed for serum retinol; CRP and AGP were measured as indicators of infection. Socio-demographic information was collected through an interviewer-administered questionnaire.

Results: For caregivers, the prevalence of overweight/obesity in the four study sites ranged from 50.2% to 83.8%; underweight was more prevalent in the urban sites (12.2% and 15.8%). Stunting in children ranged from 13.9% to 40.9%; and overweight from 1.2% to 15.1%. Less than 1% of children were wasted. The prevalence of low dietary diversity (<4) ranged from 26.0% to 57.8%. Less than 15% children and 2% caregivers across the four study sites had serum retinol concentrations <20 μg/dL, which is significantly lower than the national levels reported previously; compulsory fortification of bread flour and maize meal since 2003 could have contributed towards these findings.

Conclusions: A low prevalence of vitamin A deficiency was observed. The large variation in anthropometric status of children and caregivers across the study sites highlights the importance of targeting nutrition interventions across geographical sites within a country.

Acknowledgement: Funded by Sight and Life

Key words: vitamin A, overweight, stunting.

O165

DESIGN, ASSESSMENT OF REPRODUCIBILITY AND VALIDITY OF A FOOD FREQUENCY QUESTIONNAIRE IN A SAMPLE OF ADULTS LIVING IN QUITO-ECUADOR(QFA-QUITO)

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Background and objectives: The food frequency questionnaire (FFQ) is one of the most used tools in epidemiologic studies to assess long-term nutritional exposure.The purpose of this study was to assess the reliability and validity of a FFQ design to evaluate usual intake of adults in Quito-Equador over the past year.

Methods: This study included two phases: (1) the development of a quantitative FFQ and (2) the reliability and validity of the FFQ. Dietary data using 24h recalls were used to design the list of usually consumed foods. Relative validity of a 111-item FFQ was evaluated by comparing nutrient intakes against three non-consecutive 24h recalls. The comparisons between the FFQ and the R24h were assessed by the Pearson correlation coefficient. Nutrients were categorized into quartiles and assessed using weighted kappa statistics. The level of agreement between methods was evaluated by Bland & Altman analysis. Reliability was assessed using two FFQs and assessed by the Intraclass correlation coefficient.

Results: The FFQ produced higher energy and nutrient intakes. Reproducibility correlation coefficient after adjusting for energy, ranged from 0.62 (protein) to 0.88 (calcium). For the validity study, energy-adjusted and deattenuated correlation coefficients between the questionnaire and the recalls ranged from 0.21 (fat) to 0.65 (calcium). Only 4% of the subjects were grossly misclassified and 46% had weighted Kappa higher than 0.42. Bland & Altman plot showed that differences tended to increase between methods from energy intake equal or greater than 2.500 kcal.

Conclusions: The FFQ showed reasonably good relative validity and reliable measurements, and can be used to assess nutrient intake in this population.

Key words: Validity studies, reliability, food frequency questionnaires, dietary intakes

O166

RELATIONSHIP BETWEEN MAGNESIUM INTAKE, C- REACTIVE PROTEIN LEVELS AND THE METABOLIC SYNDROME COMPONENTS IN A HEALTHY ADULT POPULATION FROM MADRID

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Background and objectives: Evidence suggests that low magnesium intake is related with some metabolic abnormalities involved in Metabolic Syndrome (MS); some of these abnormities are also associated with increased levels of C-reactive protein (CRP). The aim of this study was to investigate the relationship between magnesium intake, plasma CRP concentrations and the prevalence of MS components in a healthy adult population.

Methods: Anthropometric, dietary (3 day food record) and biochemical data were obtained from 129 subjects aged 18-50 years (62 men and 67 women) from Madrid. Energy adjusted magnesium intakes were calculated and divided in tertiles. A BMI and age-adjusted model was developed to understand the relationship of magnesium and CRP. MS was defined using ATP-III criterion. The statistical analysis was performed using SPSS v.20.0, dietary data was calculated using Dial software (Alce Ingenieria 2010).

Results: The prevalence of MS in the studied population was 4% and 29% of the subjects had at least one MS component. 81.2% covered their recommended Intake of magnesium. Mean magnesium intakes for ascending tertiles were 247.5±21.7, 252.5±18.9, 396.8±55.8 mg/day which corresponded to 81.1±13.2, 104.0±15.1 and 132.4±25.7% of the Estimated Average Requirement of magnesium, respectively. Magnesium intake was inversely associated with plasma CRP levels (r=0.-483 p<0.001); the mean CRP levels for ascending tertiles of magnesium were 1.8, 1.4, .87 mg/l, respectively (P trend 0.001). Comparing with first tertile, subjects in the highest tertile of magnesium intake where more likely to have CPR values <3 mg/l(OR= 10.25 [95% CI 1.21–86.2 p<0.001]. As number of MS components increased, higher CPR levels and lower magnesium intakes are observed.

Conclusions: In this healthy population those with higher magnesium intake had lower inflammation risk and lower number of MS components.

Key words: Magnesium, C-reactive protein, metabolic syndrome

O167

DETERMINANTS OF VITAMIN D STATUS IN PATIENTS WITH STABLE ANGINA

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Background and objectives: Scandinavia is situated far north of the equator, but the vitamin D status is better than in many countries further south. Many Norwegians consume cod liver oil, which is a dietary supplement rich in vitamin D. We assessed whether cod liver oil and other relevant factors associated with vitamin D status in patients with stable angina.

Methods: We measured serum 25-hydroxyvitamin D (25OHD) by LC-MS/MS in 3273 participants with stable angina pectoris from the Western Norway Coronary Angiography Cohort (WECAC, 2000–2004). We modelled 25OHD as a continuous variable using multivariate linear regression.

Results: A daily intake of cod liver oil was associated with a 9.9 nmol/L increase in 25OHD levels compared to those with no intake (p for trend <0.001). Any intake of cod liver oil improved 25OHD levels (p for trend < 0.001) compared to no intake. Having blood drawn between April and October was associated with a 9.9 nmol/L increase in 25OHD levels (p<0.001) compared to blood draw between November and March. Obesity (BMI 30-40) was associated (p<0.001) with a 6.2 nmol/L decrease in 25OHD levels compared to normal weight (BMI 17.5-25) individuals. Increased glomerular filtration rate was associated with reduced 25OHD levels (p<0.001). C-reactive protein (3-10 mg/L) was associated with a decrease in 25OHD of 2.0 nmol/L compared to those with CRP below 1 mg/L.

Conclusion: Any intake of cod liver oil is associated with a higher vitamin D status Obesity and low grade inflammation were associated with lower vitamin D status. These findings reflect that other factors than vitamin D intake influence the vitamin D status and should be taken into account.

Key words: Vitamin D, 25OHD, determinants, cod liver oil.

O168

RISK FACTORS OF IRON DEFICIENCY AMONG CHILDREN 6-59 MONTHS IN THE NORTHERN REGION OF GHANA.

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Background and objectives: Most anemia worldwide is due to iron deficiency (ID). This study assessed risk factors for ID among children 6-59 months in the Northern Region of Ghana where the prevalence of anemia is 81% among this group.

Methods: Structured interviews were administered to 161 mothers in two selected districts regarding the diets of all their children 6-59 months (N=175; 54.5% female), using a food frequency questionnaire, 3x24-hour recalls, and questionnaires on socio-demography and iron bioavailability. WHO Anthro Plus® software and Food Processor Plus® (Version 6.02) software were used for data analysis. Adequacy of iron intake at 5% and 10% bioavailability was assessed with the probability method.

Results: Most children (90.9%) were born at home (birthweights unknown). A third (30.4%) was moderately stunted and 16.7% severely stunted. Most children (58.9%) were still breastfeeding; 73.7% ate maize porridge ("koko") daily; and 54.7% drank tea in the 24 hours before survey. The probability of inadequate iron intake was 31.2% at 5% bioavailability and 14.8% at 10% bioavailability. Mean fiber intake was 13.3g/day. Although 49.7% of households reported running out of food/money for food in the previous 12 months, only 3.1% indicated that children had gone to bed hungry. Of the children 31.6% did not sleep in treated mosquito nets, with the mothers' reasons listed as not possessing a net, the net being torn, weather being hot, or that there were no mosquitoes. In the 3 months before the study 36.6% of the children had malaria, for which 5% were treated with herbal remedies and 21% with over-the-counter drugs.

Conclusion: Dietary practices and inadequate care practices in this population may negatively affect the iron status of children. Educating mothers regarding these factors may to an extent reduce ID among children in Northern Ghana.

Key words: Iron deficiency, risk factors, children, Northern Ghana

O169

TOWARDS A COMPREHENSIVE WEB-BASED DIETARY RESEARCH INFRASTRUCTURE TO SUPPORT INTERNATIONAL MONITORING AND EPIDEMIOLOGICAL NUTRITIONAL STUDIES

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Background and objectives: The double nutritional disease burden observed worldwide requires standardized methodologies to measure/follow-up dietary exposures and to evaluate diet-disease associations to support public health actions across countries. Through different EU-funded projects, a standardized computerized 24-hour dietary recall program (EPIC-Soft®) has been successfully developed, validated and used in international epidemiological studies and monitoring surveys. However, beside this standardized methodology for collecting dietary information across countries, it is equally important to provide a comprehensive framework and technical and managerial infrastructures to support international studies.

Methods: To respond to these needs, a centralised web-based platform, the dietary e-Standardised Methodologies Platform (e-SMP), is under development at IARC. It comprises 4 main modules: 1) maintenance of the EPIC-Soft® databases, 2) interview collection using EPIC-Soft®, 3) management of collected interview data, and 4) administration. The step-wise approach used to develop and evaluate the platform includes 4 successive phases, 1) conceptual design; 2) evaluation by internal and external end-users; 3) development of the applications and the web-platform; 4) evaluation of the applications and web-platform internally, by end-users and in real study conditions.

Results: Although the development of e-SMP is still ongoing, the overall general and detailed concepts have been developed. A first release focusing particularly on the "Interview Management Application" and other facilities to support international studies, in terms of implementation, data collection and management was launched. The first evaluation of this release is currently in process and results are expected by the end of April. Communication and data synchronisation/exchange will also be facilitated and e-training facilities will be provided to the platform users.

Conclusions: This e-SMP platform should facilitate the standardization of dietary methodologies between countries/projects. The concepts, development and evaluation of this web-based platform will be presented.

Key words: research infrastructure, standardisation, dietary assessment

O170

COLD PRESSED OILS AS A SOURCE OF BIOACTIVE COMPOUNDS

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Background and objectives: Consumers awareness regarding health and diseases prevention, functionality of food products, create demand for minimal processed food as a rich source of bioactive compounds The beneficial influence on human health of the cold pressed oils is coming from the presence of the major and minor constituents such as fatty acids, sterols, tocopherols or phenolic compounds. The objective of the study was to determine bioactive compounds in selected cold pressed oils.

Methods: As a study material were used cold pressed oils obtained from Flax (Linseed), Camelina, Pumpkin, Borage and Evening primrose seeds. Oils were characterized by gas chromatography coupled with mass spectrometry (GC/MS) in respect of profiles of fatty acids, sterols and squalene and liquid chromatography (HPLC) in profiles of tocopherols.

Results: Oils showed a wide variation in the content of individual fatty acids and the sum of the groups of fatty acids: saturated, monounsaturated and polyunsaturated (PUFA). Oils were characterized by a high content of unsaturated fatty acids and borage oil had the highest content of PUFA's (86.9 g/100g of oil). Flax and camelina oils seeds were the only representatives of the major content of α-linolenic acid. Borage and evening primrose oils were characterized by high content of γ-linolenic acid. Comparing content of sterols in studied oils, evening primrose seed oil had the highest content (997.63 mg/100 g of sterols oil) and this value was much higher than in other oils. Borage oil had the highest content of tocopherols (258.3 mg/100g). Presence of squalene has been shown only in pumpkin oil (353.5 mg/100 g).

Conclusions: As a result of unique composition of fatty acids and minor constituents cold pressed oils can have significant influence on lowering risk of chronic diseases, especially coronary artery disease.

Key words: cold pressed oils, fatty acids, sterols, tocopherols, squalene

O171

INHIBITORY EFFECTS OF LYCOPENE ON THE PROLIFERATION AND PROGRESSION OF HUMAN COLON CANCER CELLS IN BOTH IN VITRO AND IN VIVO MODELS

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Background and objectives: Colorectal cancer (CRC) is one of the leading causes of cancer death in many countries. Epidemiologic studies reported statistically significant inverse association between tomato consumption and colon cancer risk for humans. The anticancer effects of lycopene on the growth and progression of human colon cancer cells have not been well demonstrated yet. To achieve our specific aims, we investigated the inhibitory effects of lycopene on the proliferation and progression of human colon cancer cells in both in vitro and in vivo studies.

Methods: This study was examined by using MTT assay, western blotting assay, bioluminescence imaging, histopathological, immunofluorescence (IFC), immunohistochemical (IHC) staining , ELISA, zymogram assay and Real Time-PCR analysis.

Results: The current study demonstrated that lycopene significantly inhibited the proliferation of human colon cancer cells in vitro. Moreover, consumption of lycopene prevented the growth and progression of colorectal tumor in a mouse xenograft model. Bioluminescence imaging, histopathological, immunofluorescence (IFC), and immunohistochemical (IHC) staining results indicated that lycopene effectively suppressed the growth and progression of colon cancer. The results demonstrated that lycopene significantly suppressed the nuclear expression of PCNA and β-catenin proteins. Consumption of lycopene augmented the E-cadherin adherent molecule and nuclear levels of cell cycle inhibitor p21CIP1/WAF1 protein. The chemopreventive effects of lycopene were associated with suppression of COX-2, PGE2, and phosphorylated ERK1/2 proteins. Furthermore, the inhibitory effects of lycopene were inversely correlated with the plasma levels of matrix metalloproteinase 9 (MMP-9) in tumor-bearing mice.

Conclusions: These results suggested that lycopene could act as a chemopreventive agent against the growth and progression of colorectal cancer in a mouse xenograft model.

Key words: Lycopene; Akt; β-catenin; matrix metalloproteinase; colorectal cancer

O172

ANTI-INFLAMMATORY AND ANTIOXIDANT PROPERTIES OF FLAVONOID-RICH EXTRACTS FROM HELICHRYSUM AND GRAPEFRUIT IN INSULIN RESISTANT RATS

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Background and objectives: Obesity is a multifactorial disease associated with insulin resistance, resulting in an increased risk of developing type 2 diabetes mellitus. Likewise, oxidative stress is a process implicated in these pathological conditions which contributes to generate a chronic low-grade inflammatory condition. Several flavonoids have been demonstrated to exert antioxidant and anti-inflammatory properties. Thus, the aim of this study was to determine the effects of dietary supplementation with flavonoid-rich extracts isolated from helichrysum and grapefruit, on inflammation and oxidative stress-related states in rats fed high-fat sucrose (HFS) diet-induced insulin resistance.

Methods: Thirty eight male Wistar rats were randomly assigned into two groups: Control group (n=8) and HFS group (n=30). After 22 days of ad libitum water and food access, the rats fed HFS diet were divided into three groups: Non-supplemented group (n=10), helichrysum group (2g/kg bw) (n=10) and grapefruit group (1g/kg bw) (n=10). After 35 days of supplementation, rats were sacrificed and tissue samples and serum were obtained. Thiobarbituric acid reactive substrates (TBARS) were analyzed in liver and serum, while cytokines in serum. The expression of different cytokines was analyzed in epididymal adipose tissue and intestinal mucosa.

Results: Rats supplemented with both extracts gained less body weight, which was accompanied by lower visceral fat in the grapefruit group. Both supplemented groups displayed lower liver TBARS levels than the non-supplemented group. Serum adiponectin levels were significantly higher in the grapefruit group, whereas TNFα levels were decreased in the helichrysum group. Helichrysum and grapefruit extracts reduced the expression of several proinflammatory cytokines in visceral adipose tissue.

Conclusions: These results demonstrate that helichrysum and grapefruit extracts rich in flavonoids regulate the expression associated of several proinflammatory cytokines and improved their circulating levels in insulin-resistant rats, decreasing also the HFS diet-induced oxidative stress in liver.

Key words: flavonoids, inflammation, insulin resistance, oxidative stress

O173

ORAL INTAKE OF A SPECIFIC OREGANO EXTRACT BY HEALTHY HUMANS INCREASES CALMNESS, VIGILANCE AND MENTAL PROCESSING SPEED

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Background and objectives: We have recently reported the identification of a specific oregano extract (OE) with the ability to inhibit the reuptake of the monoamine neurotransmitters, serotonin, noradrenalin and dopamine, in a dose-dependent manner (triple reuptake inhibitory effect). In vivo microdialysis experiments in rats revealed a significant elevation of serotonin levels in the brain. Moreover, mice treated with OE performed better in animal models broadly accepted to test the effectiveness of antidepressant and anxiolytic compounds (Mechan et al, 2011).

Methods: We assessed the biological effects of OE on brain functions by analyzing the local field potentials in freely moving rats and in healthy humans after acute oral supplementation.

Results: Acute oral intake of OE produced fast and robust dose and time dependent EEG alterations consisting of significant changes of spectral power in comparison to controls. Strongest effects were seen in alpha1, alpha2 and beta1 waves representing an activation of serotonergic, dopaminergic and glutamatergic neurotransmission, respectively (Mohajeri et al., 2012). In agreement to rodent data, we observed an increase in absolute energy of alpha-1 and beta-1 frequency bands in resting condition in adult young healthy males (n=20). Moreover, Evoked-Related Potentials (ERPs) measurements revealed a significant increase in P300 amplitude.

Conclusions: These results indicate that a single dose of OE induced a state of wakeful relaxation, enhanced vigilance and improved concentration in addition to increased mental capacity and a possible increase in processing speed. In summary, the presented data support using of OE as a dietary supplement to promote mood, motivation and mental wellbeing.

Key words: EEG, neurotransmission, diet, serotonin, reuptake inhibition

O174

IMPROVEMENT EFFECTS OF CHLOROGENIC ACID ON LATE DIABETES THROUGH ADIPONECTIN RECEPTOR SIGNALING PATHWAYS IN DB/DB MICE

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Background and objectives: Chlorogenic acid (CGA) is a kind of phenolic acid condensated by caffeic acid and quinic acid, widely available in plants foods such as seeds, fruit, vegetables and coffee drinks. CGA is known to be likely beneficial for preventing diabetes, but the researches on mechanism are limited. In this study, we examed the effects of CGA on glucose and lipid metabolism of late diabetes as well as on adiponectin receptors and their signaling moleculars.

Methods: 16 female db/db mice aged 5-6 weeks were randomly divided into db/db-CGA and db/db-CON group equally, respectively. db/m mice as control mice. The mice in CGA-groups were administrated 80mg /kg/d CGA by lavage for 12 weeks. At the end of intervention, we detected the parameters of glucose and lipid metabolism in plasma, aldose reductase (AR) and transformation growth factor-1(TGFβ-1) in kidney, measured adiponectin receptors and their signaling moleculars proteins expression in liver and muscle tissues respectively.

Results: Compared with db/db-CON group, FPG and HbA1c in db/db-CGA group significantly decreased by 28.8% and 22.9% respectively, TGFβ-1 protein expression and AR activity of kidney decreased by 33.3% and 29.5% respectively, adiponectin lever of visceral adipose increased by 50.2%. ADPNR-2 of liver and ADPNR-1 of muscle protein expression, AMPK protein phosphorylation lever in liver and muscle, PPAR-αmRNA and protein expression in lever, GLUT4 protein expression in muscle were all significantly higher in db/db-CGA group than in db/db-CON group, but glucose-6-phosphatase activity in liver was lower significantly in db/db-CGA. In db/m mice, CGA decreased HbA1c by 45.2% , increased plasma insulin lever and adiponectin of visceral adipose, compared to db/m-CON.

Conclusion: CGA could low FPG and HbA1c of late diabetes, and improve kidney fibrosis in some extent by adiponectin receptor signaling pathways in db/db mice.

Key words: chlorogenic acid; adiponectin receptors; pAMPK

O175

YOUNG ZEA MAYSPOWDER IMPROVES SOME NUTRIENT COMPOSITION AND REDUCES GLYCEMIC INDEX OF BUTTER BISCUIT

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Background and objectives: Zea mays was previously studied to be rich in dietary fibre, antioxidants, vitamins and minerals which could benefit human health. The aim of the present study was to assess the effects of young corn powder (YCP) on glycemic index (GI) and physicochemical properties of biscuit.

Methods: Dried young corn was used to partially substitute wheat flour in biscuit formulations at different levels (0%, 10%, 20% and 30%). The effects of YCP incorporation on proximate compositions and physical characteristics (hardness and fracturability) and sensorial attributes (colour, aroma, appearance, crispiness, flavor and overall acceptance) were explored. Based on sensory evaluation using 7-point hedonic scale by 60 volunteers, the most acceptable formulation was continued with GI investigation. Eleven healthy subjects were fed with 25 g available carbohydrate portions of glucose (reference food) and test foods (biscuits) on 5 separate sessions after an overnight fast. Capillary blood samples were collected at 0, 15, 30, 45, 60, 90, and 120 minutes after consuming the biscuits.

Results: The incremental area under the blood glucose curve values for the 2 different types of biscuits were significantly low compared with reference food glucose ($p<0.001$). The GI value of the biscuits with 0% YCP and 10% YCP was 61±11 and 46±13, respectively. It was noted that the biscuit added with 10% of YCP had significantly increased protein ($p=0.023$) and total dietary fibre ($p<0.001$) when compared with biscuit without YCP. There was no significant difference in hardness ($p=0.583$) and fracturability ($p=0.935$) attributes between 0% and 10% level of YCP addition. Biscuit containing 10% YCP received better overall acceptance score (5.27±1.02) than control (4.97±1.30).

Conclusion: The results of this study showed that biscuit added with 10% YCP has a low GI with acceptable physicochemical properties.

Key words: Young Zea mays, nutrient composition, glycemic index

O176

GLYCEMIC AND INSULINEMIC RESPONSES DIFFER DEPENDING ON THE CONTENT OF SLOWLY DIGESTIBLE STARCH IN CEREAL PRODUCTS INCLUDED IN BREAKFAST

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Background and objectives: Low glycemic index (GI) diets have shown beneficial effects on the prevention of metabolic diseases. For cereal products, several studies have linked glycemic response with digestibility rate of starch. The aim was to study the postprandial effect of two cereal products differing by their Slowly Digestible Starch (SDS) content on glycemic and insulinemic responses when consumed within a breakfast.

Methods: Twelve healthy volunteers consumed in a randomised crossover study two breakfasts containing a cereal product (biscuit or bread-substitute with High SDS=18g/100g and Low SDS=1g/100g, respectively) with milk and a non-caloric hot beverage. Breakfasts were matched for their calorie and carbohydrate contents. Glycaemia and insulinaemia were measured at regular intervals during the postprandial period (270 min). In addition, GI and insulinemic index (II) of cereal products were measured separately.

Results: GI of biscuit was lower compared to GI of bread-substitute (43 ± 3 and 67 ± 7, respectively). II of both cereal products were consistent with their GI values (56 ± 6 and 75 ± 7, respectively). Glycemic response was significantly higher with low SDS (LSDS) breakfast compared to high SDS (HSDS) breakfast over 120 min. After 75 min, the curves inversed such that the HSDS breakfast induced higher glycemia compared to LSDS breakfast on the second part of the morning between 120 – 270 min. Similar results were observed on insulinaemic responses with lower responses during the first part of the morning with HSDS breakfast compared to LSDS breakfast. The inversion of the insulinaemic responses is still present but not significant between 120-270 min. Conclusion. This study confirmed that, whatever the cereal food category tested, a high SDS product induced lower glycemic and insulinemic responses compared to a low SDS product, due to a slower release of carbohydrates into the blood.

Key words: Slowly digestible starch, glycemia, insulinemia.

O177

COMPARISON OF THE EFFECT OF DARK AND WHITE CHOCOLATE ON APO B, APOA-1,LIPID PROFILE,HS-CRP,GLYCAEMIC CONTROL AND BLOOD PRESSURE IN HYPERTENSIVE TYPE 2 DIABETICS

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Background and objectives: Given the inverse correlation between the dietary intake of flavanols and the mortality of cardiovascular disease, the aim of this study was to examine the effects of high flavanol chocolate on lipid profile,weight, blood pressure, glycaemic control and inflammation in individuals with Type 2diabetes and hypertension.

Methods: Sixty nine individuals with Type 2 diabetes on stable medication were enrolled in a randomized, placebo-controlled double-blind study,receiving either 25 g dark chocolate (DCG) or white chocolate (WCG) for 8 weeks. Changes in weight, blood pressure, glycaemic control, lipid profile and highsensitivity C-reactive protein(hsCRP) were measured at the beginning and at the end of intervention.

Results: Energy intake, macronutrient and micronutrient composition of the diet were not different between groups at baseline and did not change in the DCG or WCG during the intervention period. Fasting blood glucose (FBG), blood pressure, HbA1c, triglyceride levels, Apo-lipoprotein A-1 and Apo-lipoprotein B and hsCRP levels in the DCG was significantly changed after the intervention compared with baseline ($p<0.05$); however no such effects were observed in the WCG. Systolic and diastolic blood pressure decreased significantly ($P=0.002$ and $P=0.001$ respectively) and TG levels were also reduced meaningfully in DCG compared with WCG ($P=007$). There were not any significant changes in Body weight and BMI in both groups at the end of the study.

Conclusions: High polyphenol chocolate is effective in improving TG levels and decreasing blood pressure in hypertensive diabetic patients.

Key words: chocolate, Polyphenols, type 2 diabetes *This study was funded by a grant(No989) awarded by Tehran University of Medical Sciences.

O178

ADOLESCENT DIETARY PATTERNS: TRADITION OR CONVENIENCE

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Background and objectives: Dietary habits and practices instilled during adolescence influences future health. The aim of this study was to identify major dietary patterns of female Sri Lankan adolescent school dropouts and lifestyle factors that influence dietary patterns.

Methods: BMI was calculated in n = 600 adolescent school dropouts (15-19 years). Percentage body-fat was calculated using a population specific skin-fold thickness equation. The sum of hours / week spent on walking, exercising and carrying out strenuous activities was used for calculation of physical activity. Focus group discussions (FGD) were held following standard protocol. Dietary patterns were identified based on information obtained from a pretested food frequency questionnaire. Principal component analysis was used for the extraction of factors.

Results: Two dietary patterns were identified; Pattern-1 (Urban) with higher factor loadings for starchy foods other than rice, animal food, dairy products, fruits, sweetened food and fried food, Pattern-2 (traditional) with higher factor loadings for rice, tubers and potatoes, vegetables and dark green leafy vegetables. Scores for pattern-1 were significantly ($p<0.005$) higher for girls with central obesity (Waist circumference > 80cm), overweight and low physical activity. When controlled for both BMI and physical activity, a girl residing in the urban area had a 70% greater likelihood of consuming pattern-1 than a girl in the rural area. When controlled for physical activity, a girl consuming pattern-1 has a 64% chance of being centrally obese and a 40% chance of not being overweight. FGD results indicate that urban girls preferred purchase of food from vendors and rural girl preferred and consumed home-cooked meals.

Conclusion: Girls consuming an urban dietary pattern (pattern-1) with lower physical activity were associated with un-healthy body composition indices. Urbanization was linked with convenience foods.

Key words: Dietary pattern, adolescent girls, urban, rural

O179

IMPROVING WOMEN AND CHILDREN NUTRITION THROUGH TARGETED CAPACITY BUILDING INTERVENTIONS: EXPERIENCE FROM ETHIOPIA

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Background and objectives: Children and women are vulnerable to malnutrition because of low dietary intakes, infectious diseases, limited access to health care, and lack of appropriate care. In Ethiopia, , progress have been made as the Ethiopian Demographic Health Surveys show 14 percent point reduction in stunting (2000-2011) and 10 percent point reduction of anemia in women and in children under-five (2005-2011). Since 2003, USAID funded projects have assisted the government of Ethiopia. The Integrated Family Health Program (IFHP) focus on implementing at scale (292 woredas with 33.4 people) reproductive health, new born & child health, Nutrition, HIV /AIDS and Malaria

Methods: The program integrates and harmonizes all its plans with the ministry of health. The activities included: building the capacity of health workers, health extension workers, post training follow up visits and logistic support . The government recognized Essential Nutrition Actions (ENA) framework training s materials as well as "family Health Card" were used to implement of high impact nutrition interventions through counseling, communication skills and management of severe acute malnutrition.

Results: Achievements were assessed by comparing representative household surveys in 2008 and 2012. Significant improvements were documented, 50% of pregnant women received iron/folic acid during the last pregnancy compared to 18%, 76% of newborns started breastfeeding within the first hour compared to 62% and introduction at 6 months of solid and semisolid complementary food increased from 54% to 63%;Vitamin A supplementation to children 6-23 months also increased from 66% to 87%.

Conclusion: Using multiple existing contacts and platforms of the implementation of the ENA framework, high impact nutrition interventions were effectively delivered to contribute to the improvement women and children nutrition.

Key words: Children, counseling, vitamin A, nutrition

O180

CONDITIONS OF NUTRITION OF CHILDREN FROM 7 TO 10 YEARS IN PUBLIC SCHOOLS AT REGION MARUÍPE, VITORIA/ES - BRAZIL

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Background and objectives: The implementation of nutritional programs in schools and, consequently, the creation of a healthy environment, which implicates promotion of healthier alimentation and lifestyle, is a strategy to solve nutritional problems and avoid them in the future. Therefore it is needed to study the factors that may be associated to the low quality of alimentation among children.

Methods: A research was developed at 6 different public schools in Vitoria/ES (Brazil) with children between 7 and 10 old. Anthropometrics, health, socioeconomic and life style data were collected, and then associated with the quality of alimentation, measured by the "Índice de Alimentação Escolar" (ALES) that classified into: low, medium and good quality. Subsequently were collected data about pedagogical policies related to nutrition at schools, cafeterias and adjacent markets to identify food items sold at these places and classify them by its nutritional aspects (advisable or of moderate consumption).

Results: 204 students have participated in the study, of whom 121 (59,3%) are female. 31,3% of the students presented an excess of weight and 65,7% had a normal weight. The alimentation quality of 41,5% of the children was categorized as low, whereas 37,1% presented good alimentation. Among these, 46,3% watch TV for less than 4 hours a day (p=0,03) and 51,7% practice sports. There was not found any relation between the nutritional state and alimentation quality. The ALES indices showed that the nutritive quality was medium, what contradicts the positive results of institution's participation promoting healthy meals, showing that the nutritional education is not only being made by trained staff. The statistical analysis was made by frequencies test and qui-square, with significance of $p<0,05$.

Conclusions: The practice of a healthy alimentation is associated with other healthy lifestyles and can be influenced by adequate nutritional education in childhood.

Key words: Diet quality, Alimentation at school, nutritional education.

O181

TRENDS IN FOOD CONSUMPTION OVER 25 YEARS IN A DUTCH ADULT POPULATION.

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Background and objectives: Food consumption might change over time, influenced by an increasing variety and availability of foods, food campaigns and other societal challenges. Identifying time trends provides valuable information to support policy regarding health and safe foods. The aim of this study was to identify trends over a 25-year time period in a Dutch adult population.

Methods: Dietary data of participants aged 19-69 years included in the Dutch food consumption surveys of 1987-1988 (n=3975) and 2007-2010 (n=2106) were used for this study. Data was collected with a two-day food record in 1987-1988 and two non-consecutive 24-hour dietary recalls in 2007-2010. To account for methodological differences between studies, only data from the first collecting day was used. Consumption of food groups in 2007-2010 were compared with that from 25 years ago. Food groups were categorized using the classification from the Dutch food Composition Database.

Results: The absolute intake of non-alcoholic beverages (like water, syrups, fruit- , soft- and isodrinks) and fortified foods increased between 1987 and 2010. Vegetable and fruit consumption decreased, however the variety of fruits increased. For milk, a shift from full fat to skimmed milk and to other dairy products was seen. Also, the consumption of diet-margarine instead of margarines increased. The type of meat that was consumed changed to relatively more poultry and processed meat.

Conclusions: Over the past 25 years beneficial changes in food consumption were observed, for example from full fat to skimmed milk. The identified changes for fruit and vegetable consumption were less favorable. It is important for food and nutrition policies to connect with present food habits of a population. Therefore continuously monitoring of the food assortment and food consumption remains to be important.

Key words: Time trends, food consumption, foods

O182

SOCIO-DEMOGRAPHIC PATTERNS OF HYPERTENSION, KNOWLEDGE, BEHAVIOURS AND PRACTICES OF ADULT TRIBAL (ADIVASIS) POPULATION IN INDIA: A FIRST NATIONAL MONITORING SURVEY

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Background and objectives: The prevalence of hypertension has been increasing in epidemic proportions among adults even in developing countries like India. In the age olden days, the prevalence was significantly higher among urban population compared to others. Currently, the differences were not observed. The objective of the study was to assess the prevalence of hypertension, their knowledge, practices and risk behaviours.

Methods: It was a community based study and adopted multi-stage random sampling. The study was carried out by National Nutrition Monitoring Bureau (NNMB) in 9 major states in India, as a part of National Monitoring Programme.

Results: A total of 47,401 adult subjects (>20y) were participated in the study. In general, the prevalence of hypertension among tribals was 24%, while it was not significantly different across the different socio-economic groups (24-30%). Only 8% of were aware of their hypertension and of them, about three quarters (74.1%) were on treatment. However, the risk of hypertension was higher among subjects, whose BMI ≥ 25 (1.47; CI =1.23-1.77) and WHR ≥ 0.95 (1.59 (CI=1.45-1.74) and among women the risk was still higher (1.79; CI=1.52-2.11 and 1.20; CI 1.11-1.30 respectively). Abdominal obesity showed 2 times higher risk (OR: 1.86; CI=1.49-2.33). Tobacco (CI: 1.64) and alcohol (CI: 1.37) consumption was significantly ($p<0.01$) associated with hypertension. Tobacco, alcohol consumption and obesity were observed to be significantly associated with the hypertension. Awareness, knowledge, practice of anti-hypertension medication and health seeking behavior of tribals was very poor.

Conclusion: The prevalence of hypertension is a major public health problem even among tribal population, which could be due to decline of physical activity and nutrition transition. Timely and an appropriate strategies are needed for its prevention and control.

Key words: Hypertension, tribal adults, overweight, India, NNMB

O183

THE EFFECT OF AFRICAN LEAFY VEGETABLES ON THE MICRONUTRIENT STATUS OF SCHOOL CHILDREN IN SOUTH AFRICA: A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Food and nutrition insecurity severely compromises the quality of life in rural farm communities in South Africa. To achieve optimal dietary requirements to combat malnutrition a possible more sustainable approach is the use of indigenous and traditional foods. The aim was to investigate the effect of micronutrient-rich African Leafy Vegetables (ALVs) on children's iron, zinc and vitamin A status.

Methods: Children of two rural farm schools in the North West Province were randomly allocated per grade to receive either 300 gram cooked ALVs and school meal starch (N=86) or the normal school meal (N=81) as daily meal (5/weeks) for 3 months. The vegetables in the intervention meal consisted for 80% out of Amaranthus cruentus and for 20% out of either Cleome gynandra, Cucurbita maxima, or Vigna unguiculata. Iron, zinc and vitamin A contributions of ALVs were 3.9-4.2 mg, 1.15-1.37 mg and 373-439 µg RAE per meal, respectively. Potential intervention effects were analysed by using ANCOVA on the endpoint measurement adjusting for respective baseline values, gender, age, school and compliance.

Results: Zinc deficiency (serum zinc <65 µg/dl) was the most prevalent (76%) micronutrient deficiency. Deficiency prevalence in iron (serum ferritin <15 µg/l) and vitamin A (serum retinol <20 µg/dl) were 17.6% and 4.9%, respectively, while 12.8% of the children were anaemic (haemoglobin <11.5g/dl). No intervention effects were found on blood haemoglobin, serum ferritin, serum transferrin receptor, zinc protoporphyrin, serum zinc and serum retinol.

Conclusions: Consumption of ALVs did not improve or deteriorate the micronutrient status of the children during the intervention. Hence, including micronutrient rich dark leafy vegetables in children's diet might not be enough to alleviate mild micronutrient deficiencies. However, these indigenous vegetables can play an important role in the diversification of diets in a low-cost and sustainable way.

Key words: African Leafy Vegetables, micronutrients

O184

DEVELOPING HEALTHY INDIGENOUS MENUS THROUGH WOMEN'S GROUP PARTICIPATION

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Background and objectives: Northern Thailand rural communities have created homestay tourism services as supplementary occupation for the villagers. Food preparation for tourists is the responsibility of women groups. Thailand's Health Ministry is supporting homestay communities to focus on health tourism. One area of health tourism is healthy food that is prepared with indigenous ingredients. The researchers conducted a participatory study with women's group in two homestay communities in Chiang Mai and Lampang in order to improve healthy indigenous menus for tourists.

Methods: The Participatory Action Research focused on basic and applied nutrition knowledge incorporating indigenous ingredients. The researchers' conducted SWOT analysis with women's group in developing healthy indigenous menu and food management.

Results: Women's group had a limited knowledge of creating healthy items for menu. Indigenous menus improvement was focused only in lowering of salt, fat and sugar and high in fiber. Some of the original indigenous diets were high in sodium, cholesterol and calories in set menu items. Women's group could manage healthy diets by lowering sodium, fat and cholesterol with reducing/replacing some ingredients, by adding good source of fiber, preparing the correct serving size, and by setting menu items based on nutritional value hence the ability to develop healthy menus. SWOT analysis showed the key statements which support setting up a master model of food items and nutritional value for a healthy food menu which is proper for health tourism community and easily prepared by women's groups.

Conclusions: Women groups are able to offer healthy indigenous menus (at least 4 set menus) for serving tourists in two homestay tourism communities.

Key words: Indigenous menus, women's group, health tourism, homestay community.

O185

PURCHASES OF ULTRA-PROCESSED PRODUCTS BY COLOMBIAN HOUSEHOLDS AND THEIR ASSOCIATION WITH DIETARY QUALITY

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Background and objectives: The production and consumption of readily available "fast" or "convenience" ready-to-eat or ready-to-heat processed food is growing throughout the world. In Colombia, consumption of ultra-processed products is unknown. The objective was toanalyze purchases of ultra-processed products by Colombian households and to assess their association with dietary quality.

Methods: Design:Application of a classification of foodstuffs based on the nature, extent and purpose of food processing to data from the most recent national household food budget survey conducted in Colombia by the Departamento Nacional de Estadística (DANE) of Colombia throughout 2006. Foods are classified as unprocessed/minimally processed foods (Group 1), processed culinary ingredients (Group 2) or ultra-processed products (Group 3). Setting: 25 departments of Colombia, 2006. Subjects: Households (n 30 644).

Results: All food purchases made by Colombian households for home consumption in 2006 added up to a mean per capita energy availability of 1344 kcal/d (SD=311). Over 49,9% of all energy purchased was from unprocessed or minimally processed foods (Group 1); 32% was from processed culinary ingredients (Group 2); and a total of 18,1% was from ultra-processed products (Group 3). The overall diet exceeded WHO upper limits for fat, saturated fat, free sugars and sodium density, with less fibre than recommended. Group 3 products taken together are more fatty, carbohydrates, and energy dense than a combination of Group 1 and Group 2 items. Significant differences were observed with group 2 and 3 over the total energy availability according with the household socio economic situation

Conclusions: As reported by those findings, Colombian diet on 2006 was dominated by unprocessed/minimally processed foods, with lower consumption of ultra-processed products. Food policies should promote healthy diets including control, marketing and consumption of processed culinary ingredients by ultra-processed food products.

Key words: Processed food,nutrition,diet, food classification.

O186

THE INFORMAS FRAMEWORK FOR MONITORING AND BENCHMARKING DIET QUALITY GLOBALLY: A STEP-BASED APPROACH

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Background and objectives: Complementary to WHO monitoring efforts, the International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) is setting benchmarks for creating healthy food environments and reducing obesity and NCDs. This paper describes the INFORMAS framework for monitoring and benchmarking population diet quality. To assess the impact of changes in food environments on national diet quality, national food consumption data are needed on a regular basis, comparable over time and if possible across countries.

Methods: An overview of existing sources of dietary data and their strengths and limitations for monitoring dietary quality was prepared and a review of pre-existing indicators of dietary quality was performed. A step-based framework was developed for INFORMAS to monitor and benchmark population dietary quality globally, both between countries and within countries over time.

Results: Food Balance Sheets (FBS) can be used in the 'minimal approach' to explore national trends of availability of several food groups and energy from fats, sugar and proteins. Household Budget Surveys (HBS) are the most suitable source of dietary data for INFORMAS, as they are available for many countries and provide more details than FBS. In the 'expanded approach', the share of ultra-processed products in the diet will be measured as a predictive indicator of energy-dense, nutrient-poor diets using either HBS or food intake surveys. The 'optimal approach' will include pre-defined and validated indices of overall dietary quality using data from national dietary surveys.

Conclusions: FBS, HBS and food intake surveys can all be used to assess quality of population diets at different levels. Dietary quality can be expressed through the share of ultra-processed products in the diet and dietary quality indices. More work is needed in future to improve both data collection methods and diet quality indicators.

Key words: Food environments, benchmarking, diet quality, ultra-processed foods.

O187

MONITORING THE NUTRITIONAL COMPOSITION OF FOODS TO IMPROVE THE GLOBAL FOOD SUPPLY

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Background and objectives: Non-communicable diseases account for more than 60% of total deaths globally. Growing rates of overweight and obesity, along with a rise in nutrition-related diseases, mean that the food industry has an increasingly important role to play in public health. The United Nations (UN) and regional governments are calling for concerted and strategic population-wide preventive measures based upon an improved food supply.

Methods: The Food Monitoring Group was established in 2010 to create a global branded food database to allow direct comparisons of nutritional composition between countries and over time.

Results: There are 29 countries involved globally, with high level input from the Food and Agriculture Organisation of the United Nations, World Health Organisation and Pan-American Health Organisation. Training seminars have been held in several countries to increase capacity to undertake data collection in low and middle income countries in the Asia-Pacific and Latin America, advanced technologies to improve data collection have been developed and distributed to eight countries, pilot data have been collected in Argentina, Australia, Brazil, Canada, Costa Rica, Fiji, Mongolia, New Zealand and the UK with data collection in six additional countries planned for 2013. Pilot data have already shown the often wide variation in nutrient levels in foods (e.g. sodium), lack of consistency with how nutrients are displayed on nutrition labels both nationally and globally, and variations in locally made versus imported products in lower and middle income countries as opposed to developed countries.

Conclusions: This project will identify where food reformulation activities will have the greatest impact, will lead to improvements in the healthiness of the global food supply and

contribute significantly to tracking progress of the food industry and governments towards commitments made at the recent UN high level meeting on chronic disease.

Key words: food composition, public health nutrition, food industry

O188

HIGH BIOAVAILABLILTY IRON MAIZE (Zea maysL.) DEVELOPED THROUGH MOLECULAR BREEDING PROVIDES MORE ABSORBABLE IRON IN-VITRO (CACO-2) AND IN-VIVO (Gallusgallus)

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Background and objectives: Iron (Fe) deficiency is the most common micronutrient deficiency worldwide. Iron biofortification is a preventative strategy that alleviates Fe deficiency by improving the amount of absorbable Fe in crops. Here we used an in vitro digestion/Caco-2 cell culture model as the guiding tool for breeding and development of two maize lines with contrasting Fe bioavailability (Low and High). Our objective was to confirm and validate the in-vitro results and approach. Also, to compare the capacities of our two maize hybrid varieties to deliver Fe for hemoglobin (Hb) synthesis and to improve the Fe status of Fe deficient broiler-chickens.

Methods: We compared the Fe-bioavailability between these two maize varieties with the presence or absence of added Fe in the maize based-diets. Diets were made with 75% (w/w) maize of either low or high Fe-bioavailability maize +/- Fe (ferric-citrate). Chicks were fed the diets for 6wks. Hb, liver ferritin and Fe related transporter/enzyme gene-expression were measured. Hemoglobin maintenance efficiency (HME) and total body Hb-Fe values were used to estimate Fe bioavailability from the diets.

Results: DMT-1, DcytB and ferroportin expressions were higher ($P<0.05$) in the 'Low-Fe' group than in the 'High-Fe' group (no added Fe), indicating lower Fe status and adaptation to less Fe-bioavailability. At-times, Hb concentrations, HME, Hb-Fe and liver ferritin were higher in the 'High Fe' than in the 'Low Fe' groups ($P<0.05$), indicating greater Fe absorption from the diet and improved Fe-status.

Conclusions: We conclude that the High Fe-bioavailability maize contains more bioavailable Fe than the Low Fe-bioavailability maize, presumably due to a more favorable matrix for absorption. Maize shows promise for Fe biofortification; therefore, human trials should be conducted to determine the efficacy of consuming the high bioavailable Fe maize to reduce Fe deficiency.

Key words: Maize, biofortification, iron bioavailability, in vitro digestion/Caco-2 cell model, broiler-chicken.

O189

ASSOCIATION BETWEEN DIETARY INTAKES OF POLYCHLORINATED BIPHENYLS (PCBS) AND RISK OF OBESITY

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Background and objectives: Polychlorinated biphenyls (PCBs) are persistent organic pollutants (POPs) that we consume because of their bioaccumulation through the food chain. Recent studies have highlighted the implication of POPs in the development of metabolic diseases like type 2 diabetes and obesity. However, this relationship is not entirely consistent and has not been investigated in longitudinal studies. We aimed to prospectively examine the association between dietary intakes of PCBs and the incidence of obesity in the SUN Project.

Methods: Prospective study of 11,701 participants without obesity at baseline followed-up for a median of 8.15 years. Daily dietary intakes of PCBs, expressed as World Health Organization toxic equivalents, were assessed at baseline with a validated 136-item semi-quantitative food-frequency questionnaire and the published concentration levels of PCBs measured in samples of foodstuffs consumed in Spain. Cox regression models were fitted through successive quintiles of PCBs intake, to estimate multivariable-adjusted hazard ratios (HR) and 95% confidence interval for incident obesity.

Results: During follow-up, we observed 436 incident cases of obesity. Participants in the fifth quintile of PCBs intake were at higher risk of becoming obese [adjusted HR: 1.66; (95% CI: 1.21 to 2.27)] compared with those in the first quintile. Moreover dose-response was evaluated, and the p for linear trend was statistically significant ($p=0.001$). After additional analyses of energy-adjusted PCBs intake through the residual method, results did not substantially change.

Conclusions: Increasing concentrations of PCBs were positively associated with the incidence of obesity. More longitudinal studies are needed to confirm our results. Funding: The SUN Study has received funding from the Spanish Government (Grants PI01/0619, PI030678, PI040233, PI042241, PI050976, PI070240, PI070312, PI081943, PI080819, PI1002658, PI1002293, RD06/0045, G03/140 and 87/2010), and the Navarra Regional Government (36/2001, 43/2002, 41/2005, 36/2008, 45/2011).

Key words: Obesity, Polychlorinated biphenyls (PCBs), Cohort study, BMI, Prospective study

O190

COMPARISON OF EFFECT OF CASH TRANSFER WITH OR WITHOUT SPECIAL NUTRITIOUS FOOD ON PREVENTING CHILDHOOD ACUTE MALNUTRITION IN NIGER

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Background and objectives: Finding the most appropriate strategy for the prevention of childhood acute malnutrition is essential in countries like Niger with annual hunger gaps. Although ready-to-use supplementary foods (RUSF) are effective options for large-scale preventive distributions, the role of cash transfers, as household support or nutritional interventions, requires further investigation. Here, we compare different preventive strategies on the incidence of acute malnutrition and mortality among children 6-23 months.

Methods: Exhaustive open observational cohorts including all children 60cm to 80cm, resident in 29 villages of Madarounfa, Niger. Three different strategies of monthly distributions were assessed: 1) and 2) RUSF 500kcal/d or RUSF 250kcal/d for 15 months along with cash transfer (38€/month) for the first 5 months; 3) cash transfers only (43€/month) for the first 5 months. Anthropometric and clinical data were collected monthly. All children had access to the same primary health care package. Endpoints included wasting (WLZ<-2) and mortality.

Results: A total of 1,741 children were included in August 2011. At 5-months of follow-up, both strategies involving RUSF with cash transfer showed reduced incidence of wasting compared to cash transfers alone (cash vs. RUSF 500kcal/d(ref) HR=1.93, 95%CI:1.52-2.44; cash vs. RUSF 250kcal/d(ref) HR=2.19, 95%CI:1.76-2.74). Over 15 months, incidence of wasting was similar between the RUSF 500kcal/d and the RUSF 250kcal/d groups (HR=0.96, 95%CI:0.98-1.22). Mortality in the RUSF 500kcal/d group (0.72 death/10,000 child-days) and the RUSF 250kcal/d group (0.46 death/10,000 child-days) were not different (HR=0.80, 95%CI:0.40-1.57).

Conclusions: A 15-month supplementation with RUSF 500kcal/d or RUSF 250kcal/d had a similar effect on wasting and mortality in a region with high acute malnutrition. During the hunger gap, strategies where a cash transfer to support households was combined with supplementary foods were more effective for preventing acute malnutrition compared to cash transfer alone.

Key words: Acute malnutrition, prevention, ready-to-use-supplementary food, cash transfer, Niger

O191

POTENTIAL OF WILD EDIBLE PLANTS TO COMBAT NUTRITIONAL AND FOOD INSECURITY: A CASE FROM INDIAN HIMALAYAN REGION

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Background and objectives: The traditional system of food has strong bondage to combine cultures and play an important role in biodiversity conservation. This relationship between food, biodiversity and cultural diversity significantly contributes in ensuring sustainable human development. However, over the time the rapidly changing socio-economic and environmental scenario has greatly affected the traditional systems of food, leading to disruption of these linkages and existing knowledge systems. This has consequently narrowed the food base. Implication of this deterioration in food base is wide ranging and needs revival. In this context, wild edibles, which have historically remained a part of dietary system in traditional societies in the mountains region deserve attention.

Methods: In this study, we have analyzed nutritional and antioxidant properties of selected wild edibles growing in Himalayan region through standard methods.

Results: Analysis of the nutritional and antioxidant properties of the selected wild edibles proved that they are potential source of nutritional and antioxidant activities. For instance, fruits of Berberis species contained high content of fiber (4.4-8.1%), protein (4.7-8.5%), fat (2.6-5.3%). Similarly, total phenolics (0.92-76.67 mg/g GAE) and flavonoids (4.77-6.8567 mg/g GAE) in Terminalia chebula, anthocyanins (upto 24.59 mg/g) in Berberis asiatica, ascorbic acid (34.15 mg/g) in Embelica officinale, was considerably high. The phenolics compound namely, gallic acid, catechin, chlorogenic acid, caffeic acid and ñ-coumaric acid analyzed through high performance liquid chromatography (HPLC method) showed significantly (<0.01) higher values in Terminalia chebula. Antioxidant activity was evaluated by 3 in vitro assays showed a positive relationship with total phenolics (ABTS - r = 0.894; DPPH-r=0.877; FRAP-r= 0.994).

Conclusion: This study attempts to establish that the wild edibles are rich source of nutritional and antioxidants and can be utilized as complementary food resource to fulfill nutritional as well as health requirement of local inhabitant.

Key words: Antioxidants,Himalaya,nutrients,wild edibles

O192

EFFECTIVE COMMUNICATION CHANNELS FOR COMMUNITY MOBILIZATION DURING VITAMIN A SUPPLEMENTATION CAMPAIGNS IN 3 STATES OF NIGERIA

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Background and objectives: Vitamin A supplementation (VAS) is an important child survival intervention known to reduce all-cause mortality in children under-five by 24%-30%. In Nigeria, VAS is delivered through biannual Maternal Newborn and Child Health Weeks (MNCHW), an integrated package of preventive interventions to pregnant & lactating women and children under-5. Many VAS programs struggle to meet target population coverage levels due to poor community mobilisation. Formative research can help improve effectiveness of communication messages.

Methods: Exit interviews were conducted for 676 caregivers in Benue, Federal Capital Territory (FCT) and Adamawa states attending MNCHW at health facilities in May and November 2012. Respondents were asked the source of information through which they heard about the week.

Results: In May, Benue caregivers heard about MNCHW mainly through worship centres (WC) and word-of-mouth (WoM) (33.85% each) but none radio. In November, main sources were WC (78.1%), TAs (34.3%) radio (27.6%) and WoM (19.1%). In May, Adamawa caregivers heard through radio (44%), TAs (42%) and WC (32%); in November main sources included radio (40%), TAs (33%), WC or WoM (31% each). In May, FCT caregivers heard mainly through health workers (53.9%), WoM (38.5%) and WC (25.6%); in November main sources were radio (28.8%), WoM (55.6%) and WC or TAs (38.9% each). Comparing May and November 2012 rounds, Vitamin A coverage improved from 78% to 97% in Benue and from 61% to 79.4% in FCT, while it dropped from 80% to 75.6% in Adamawa.

Conclusions: Radio, places of worship, town announcers, WoM and health workers were main sources of information about MNCHW and may be effective tools for community mobilisation to improve coverage of VAS. While factors contributing to improved Vitamin A coverage are multifactorial, introduction of radio jingles corresponded with concurrent improvement in coverage in Benue and FCT.

Key words: VAS, community mobilisation

O193

PHYTOCHEMICAL COMPOSITION OF PROCESSED AND RAW SAMPLES OF SOME LESSER KNOWN VEGETABLES FROM EASTERN ZONE NIGERIA

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Background and objectives: Phytochemicals are non-nutrient bio-active compounds found in vegetables and fruits. Increased awareness of their health protecting properties found has attracted immense attention to green leafy vegetables as vital component of daily diets. Our objective is to determine qualitative and quantitative phytochemicals on processed Agbara (Mucuna pruriens), Akokoro (Ficus capensis), Uturukpa (Pteracarpus santalinoides), Ogbu (Ficus thonningli), Uchakiri (Vitex doniana) and Ujuju (Myranthus arboreus).

Methods: The leaves (700 g) each were separated into three equal parts; shade dried, cooked for five minutes and the third sample was blended raw. Qualitatve and quantitative phytochemical compositions were analysed chemically in triplicates by standard method of AOAC. The data collected were subjected to statistical analysis.

Results: The phytochemicals evaluated were alkaloid, anthocyanin, carotenoid, flavonoid, glycoside, oxalate, saponin and tanin. The result showed that phytochemical content of the vegetables varied significantly. Shade drying increased significantly ($p<0.05$) the phytochemicals content of the vegetables while cooking reduced it. Quantitatively, Ficus capensis and Ficus thonningli had the highest Alkaloids 3.47 g/100 g and 2.29 g/100 g and the least was found in Mucuna pruriens (0.10 g/100 g). But the shade dried F.capensis and F.thonningli Alkaloids were 4.94 g/100 g and 3.21 g/100 g while the cooked samples had 1.20 g/100 g and 0.87 g/100 g alkaloids. M. pruriens with shade drying had higher flavonoid, saponnin and tannin (4.69 g, 6.44 g and 4.24 g/100 g) respectively.

Conclusion: Therefore the evaluated green leafy vegetables offer cheap but rich sources of a number of phytochemicals having health protective properties.

Key words: Lesser known vegetables(LKVS), phytochemical composition, Health protecting properties, processing.

O194

TOWARDS NUTRITION GUIDELINES FOR MATERNAL AND INFANT NUTRITION TO INFLUENCE LONG-TERM HEALTH OF THE OFFSPRING: THE PAST AND FUTURE OF ILSI EUROPE WORK ON METABOLIC IMPRINTING

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Background and objectives: Increasing evidence suggests that maternal and infant nutrition influence long-term health of the offspring. The ILSI Europe Task Force on Metabolic Imprinting aims to provide insight into the effects of the diet in various phases of early life on both disease and health endpoints.

Methods: Since its inception in 2006, the Metabolic Imprinting Task Force has brought together leading global experts to address specific questions including: research priorities and future opportunities in imprinting, programming and epigenetics; the effects of pre- and postnatal nutrition of infants with overweight and obese mothers; implications of obesity in pregnancy; and harmonization of mother-child cohort studies to improve available data. These efforts have resulted in publications widely disseminated and leading to the current project evaluating the impact of growth velocity on later health, which will be also covered.

Results: The Expert Groups established under Task Force have collected disparate and multi-disciplinary evidence in the field to highlight the knowledge gaps for future research. Thus far, the deliverables address factors contributing to offspring obesity, how to improve mother-child study designs and make optimal use of existing data. Given that growth velocity was noted to be a key risk factor, an Expert Group is now undertaking a review of current knowledge on the relationships between early growth (velocity) and later health. Data from this exercise initiated in 2013 will be presented.

Conclusions: The body of research in the field of metabolic imprinting as related to offspring health is rapidly expanding. The ILSI Europe Task Force on Metabolic Imprinting has organized small Expert Groups to collate and evaluate this wealth of data and contribute to understanding the totality of information to identify research needs.

Key words: Metabolic imprinting, programming, maternal weight, offspring.

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T1. Advances in nutrition research

PO001

TOTAL BODY IRON OF WOMEN RESIDING IN THE PEARL MILLET PRODUCING BELTS OF RURAL BANASKANTHA, GUJARAT, INDIA

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Background and objectives: Low dietary intake of iron rich foods and faulty feeding practices has lead to detrimental increase in iron deficiency anemia across the world. Populations residing on Pearl millet with iron 8mg/100g FW and anti nutritional factors such as phytates and phenols, which may decrease bioavailability of iron, may be anemic with low iron stores. The present study aimed to assess the relationship between dietary iron intake from pearl millet and total body iron of women of child bearing age from the pearl millet producing district of Banaskantha, Gujarat, Western India.

Methods: A cross-sectional, 30-cluster sampling design covering 1075 women from 30 villages of 3 districts of Banaskantha. Dietary data (24DRM) was elicited and assessed using the CS dietary software developed by Harvest Plus, USA. Iron status indicators, Hb, (Serum ferritin (SF) and transferring receptors (TfR) were assessed from a subsample of 360 women (non-pregnant, age 18-35 y) and were used to calculate the total body iron (mg/kg).

Results: Average Pearl millet consumption in the form of Rotla, Khichadi, Ghes, kuler or matar ranged from 250-350 g/day contributing to an iron intake of 23.13mg/d. Overall in 358 women the total body iron was found to be 4.04 mg/kg. Among these, 78.77% women had a positive body iron store of 6.19 mg/kg.

Conclusions: Adequate meal combinations with enhancers along with pearl millet may improve the iron status of the millet based population which suffered from mild to moderate anemia and improve the total body iron stores.

Key words: pearl millet, anemia, dietary profile, total body iron.

PO002

EXCHANGEABLE ZN POOL SIZE AND ZN ABSORPTION FROM SPRINKLES AND TRADITIONAL FOODS IN PAKISTANI INFANTS/TODDLERS

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Background and objective: Zinc supplementation is being promoted on wide scale, but the biological implications of long term, routine supplementation at population level have not yet been fully evaluated.Our objective was to determine absorption of zinc (AZ) from a test meal consisting of local complimentary food (kitchri) with multiple-micronutrient powder MNP added to it and to compare the size of (EZP).

Methods: This was a community based nested study within a large prospective cluster randomized trial.Subjects were randomized to receive MNP alone or MNP+Zinc mixed with local complimentary diet (Kitchri) in a cohort of children 6-18 months age.Stable isotope methodology was applied to repeated measures of zinc absorption from test meals (kitchri) containing(MMP)vs.(MMP+Zinc)at 6-9 months and at 6 months follow up.Urine samples were collected for measurement of isotope ratios and determination of fractional absorption of zinc(FAZ)by dual isotope tracer ratio (DITR).

Results: Mean EZP declined in both groups at 6 months follow up (5.8mg/kg ±0.91 vs.4.5mg/kg ±1.03 p=<0.001).FAZ was higher in the MMP group: 0.30 ± 0.11 vs. 0.16 ± 0.08 at baseline and 0.33 ± 0.11 vs 0.13 ± 0.09, at follow up (p< 0.001). AZ was significantly higher in the zinc group both at baseline and at follow up: (p=< 0.001).

Conclusions: Declining EZP over a period of 6 months may reflect decline in compliance, technical difficulties or growth rates. The amount of test meal kitchri consumed varied signifi-

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cantly and also the absorbed Zinc, despite that, the two groups differ in their absorbed zinc AZ. This confirms that the Zn from the sprinkles in kitchri was absorbed. Based on our absorption of Zn and FAZ data, we hypothesize that addition of MMP can be a method of food fortification in low resource settings.

Key words: EZP exchangeable Zinc pools, Multiple micronutrient powder, Dual isotope Tracer ratio DITR

PO003

EFFECT OF DATE PLANTING AND CUTTING ON YIELD AND YIELD COMPONENTS OF BARLEY IN DIFFERENT NITROGEN FERTILIZATION

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Background and objectives: To survey and determine the best planting time of dual purpose barley under various levels of nitrogen.

Methods: A research in the field of Islamic Azad University of Ahvaz in 1389 was conducted. This experiment was carried out in split plot factorial in randomized complete block design with four replications. The planting times in this experiment are 01/08/89, 21/08/89 and 11/09/89 and application of different amounts of nitrogen fertilizer is 90 kg and 120 kg N ha, in the main and factorial plots. Moreover, cutting treatment consists of without cutting (control) and one time cutting take out on the subplots.

Results: Based on the results of this experiment, planting time treatment showed significant difference on harvesting index, seed weight, ($p<0.05$). So that the delay in planting increased harvest index and reduced seed weight. Meanwhile, nitrogen fertilizer increased the biological yield and harvest index. On the other hand, among traits which were affected by cutting treatment, only harvest index increased grain yield, biological yield, and reduced grain weight. In addition, interaction effect of factors on traits was significant. So that, the interaction effect of planting time and nitrogen fertilizer on biological yield showed ($p<0.05$). Interaction effects of cutting and planting time on green fodder yield, showed significant difference ($p<0.001$). Meanwhile, interaction effects of nitrogen fertilizer and cutting had significant effect on grain yield, harvest index and number of spikes per unit area ($p<0.05$).

Conclusions: There is a significant correlation between planting time and other harvest variables.

Key words: barley, nitrogen fertilizer, planting time, cutting

PO004

STUDY OF ALLERGENIC PROPERTIES OF A PROTEIN HYDROLYZATE OF RICE ON THE INTESTINAL MUCOSA OF BALB/C MICE IMMUNIZED WITH THE (ß-LG)

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Background and objectives: The allergy in proteins of cow's milk represents a real public health problem, the processing of this affection requires a real coverage, and several hydrolysate was marketed and recommended to the affected infants. Among these preparations our interest concerned an infantile formula with protein of rice which could be a possible alternative in the processing of this pathology.

Methods: The purpose of our work is to study the allergenic properties of a milky formula with hydrolysed proteins of rice (Modilac Expert rice) on the structure of the intestinal mucous membrane.The technique consists in immunizing mice Balb / c with ß-Lg, and then to feed them with some hydrolysed rice milk.

Results: The obtained results show that:The mice of the experimental group immunized with ß-Lg and fed with the rice milk present a height villositaire comparable to that obtained to the negative control group as well as a number reduces of DREGS with regard to the positive control group of mouse. The mouse of the positive control group presents an atrophy villositaire pronounced with an important infiltration of lymphocytes compared with the experimental group and with the two control groups.

Conclusions: This type of milk is an interesting perspective as substitution for the children with allergy to cow's milk.

Key words: Proteins of cow's milk, hydrolysed rice milk, allergy to cow's milk proteins in children

PO005

THE EFFECT OF DIFFERENT NO3- / NH4+ RATIO ON QUALITATIVE AND QUANTITATIVE CHARACTERISTICS OF APPLE FRUIT CULTIVARS GALA AND GOLAB

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Background and objectives: In this research the effect of different nitrate to ammonium ratio on quality and quantity characteristics of apple fruit was studied.

Methods: The nitrate to ammonium ratios were (2.5 : 0.1, 6 : 0.3, 6: 0.5, 6 : 0.7, 6: 1 meq/l). nutrient solution pH on the 6.5 ± 0.1 was adjusted. The experimental design was randomized complete block and was performed in three replicate. Qualitative and quantitative evaluation of fruit characteristics including fruit length, fruit diameter, fruit length to diameter ratio (L / D), fruit weight, hardness, pH, soluble solids and acidity (TA).

Results: Results of statistical analysis showed that with increasing Ammonium concentration increased acidity, firmness, fruit weight and diameter and with decreasing concentration of ammonium characteristics such as soluble solids, pH, length and fruit length to diameter ratio (L / D) increased. The highest percentage of soluble solids, length and L / D ratio in terms of quality and quantity of fruit very impressive in 4 and 5 solution, respectively, that ammonium concentrations were low, was observed.

Conclusions: Nitrate to ammonium ratio has a definite effect on apple fruit.

Key words: Nutrient solution, Cultivar, nitrate to ammonium ratio, quality and quantity characteristics.

PO006

ADVANCE ON THE POLYPHENOL-PROTEINS INTERACTION IN FOOD

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Dietary flavonoids and stilbenes are important polyphenols in foods, such as, e.g., fruits, vegetables, nuts, and tea. A variety of chemical structures are possible within this group of polyphenols. Recently, the polyphenol-protein interaction (PPI) has obtained wide attentions. The effect of food proteins on the antioxidant activity of dietary polyphenols has been the subject of much controversy. For example, the dual effects of milk proteins on the antioxidant capacity of tea polyphenols were reported. The structural characterization of the interaction between food proteins and dietary polyphenols is a major step to illustrate the induced effects on food protein structure and on the antioxidant activity of polyphenols. This review will focus on the advance on the interaction of dietary polyphenols and food proteins on following aspects: Influence of food proteins on bioactivities of dietary polyphenols. Effects of polyphenol-protein interaction on the quality of foods. Polyphenol-protein complex as functional food. Influence of dietary polyphenols on the structure of food proteins. Proteins of plant origin and polyphenols in the wine/milk/beer system. Structure-affinity relationship of polyphenol-food proteins interaction. Application of polyphenol-protein interaction in food. Advanced methods used to study the polyphenol-protein interaction.

PO007

FRUIT QUALITY AND QUANTITY AND N, K, CA CONCENTRATION OF 'GALA' AND 'GOLAB' APPLE (MALUS DOMESTICA B.) TREES AS INFLUENCED BY DIFFERENT NO3-/NH4+ RATIO.

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Background and objectives: We aimed to assess the influence of nitrate to ammonium ratio on apple maturation.

Methods: Responses of pot-grown apple trees (Malus domestica B.) with five nitrate to ammonium ratio of fruit quality and quantity characteristics and N, K, Ca concentration in two cultivars including gala and golab (Iranian cultivar) on Malling 9 (M.9) was studied. The nitrate to ammonium ratios solution of 1 to a solution of 5 were (2.5 : 0.1, 6 : 1, 6: 0.7, 6 : 0.5, 6: 0.3 meq/l) respectively. Nutrient solution pH on the 6.5 ± 0.1 was adjusted. Substrate consisting of soil and perlite with a volume ratio of 1/3 and 2/3 respectively.The experimental design was randomized complete block and was performed in three replicate. Qualitative and quantitative characteristics evaluation of fruit including fruit length, fruit diameter, length/ diameter (L / D), fruit weight, firmness, Juice pH, total soluble solids (TSS), titrable acidity (TA), TSS/TA, humidity and dry matter(DM) percentage. And mineral nutrient measured were N, K, Ca.

Results: Results of statistical analysis showed that TSS/TA, TA, firmness characteristics and N, K and Ca concentration show the significant influence of ammonium and higher calcium and potassium concentration, firmness, TSS/TA obtained in ratio of (2.5:0.1) which had the lowest concentration of ammonium, among other solutions and increasing concentrations of ammonium Stimulate increased nitrogen concentrations

but fruit weight, fruit length, fruit diameter, length/ diameter (L/D), juice pH, dry matter and humidity percentage showed no significant effect with increase ammonium.

Conclusions: There is a significant influence of nitrate to ammonium ratio on apple maturation.

Key words: Malus domestica, Pot culture, quality and quantity characteristics

PO008

FONIO (DIGITARIA EXILIS) AS A STAPLE FOOD IN MALI: AN APPROACH TO UPGRADE NUTRITIONAL VALUE

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Background and objectives: Fonio (Digitaria exilis) is the most ancient West African cereal representing a key crop in food supply during crop shortfall periods. Less is known about the potential of fonio to contribute to nutrition and health in West Africa. We explored a set of strategies as possible solutions to existing nutritional problems among West African women, using fonio as product.

Methods: Randomly selected samples of women of reproductive age in two West African countries (Mali and Benin). Dietary assessment; food ethnography focused on fonio; and iron absorption study using stable isotopes.

Results: Average daily frequency consumption (68% consuming 1 to 3 times/month) and daily portion size of fonio (152 g) was relatively low as compared to other staples. Fonio consumption was strongly predicted by intention to consume ($r = 0.78$, $P < 0.001$), which was influenced by positive beliefs and attributes ($b = 0.32$, $P < 0.05$). Subjective norms (opinion of the husband, the family and the neighborhood) motivated intention to consume fonio ($r = 0.26$, $P < 0.001$). Time-consuming processing and lack of skills in cooking fonio had a significant interaction between intention to consume and fonio consumption ($b = -0.72$, $P < 0.05$). Dephytinisation with intrinsic wheat phytase reduced phytate-to-iron molar ratio from 23.7:1 to 2.7:1 and iron fortification decreased the molar ratio to 0.3:1. Dephytinisation with wheat phytase and fortification significantly increased iron absorption from 2.6% to 8.2% in fonio porridges.

Conclusions: Dephytinisation with native wheat phytase and iron fortification appeared relevant for adding nutritional value to fonio. Enhancing fonio consumption should emphasize positive attitudes and opinions of men, family and neighbors, while strengthening skills of women in cooking good quality fonio meals.

Key words: Fonio (Digitaria exilis); dietary intake and nutritional status of women in Mali; the value chain approach for nutritional goals

PO009

IMPROVMENT OF YIELD, PROTEIN, ASH AND IRON CONCENTRATION OF FORAGE MAIZE 704 BY USING POTTASIUM , MICRONUTRIENTS AND DROGHT STRESS

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Background and objectives: To study the effect of drought stress, potassium and, soil and foliar application of micronutrient on yield and yield components of hybrid grain–maize K.S.C.704.

Methods: This study was conducted in split-split-plot experiment based on RCBD with three replications in Urmia. The factors were: drought stress as a main factor with two levels(normal irrigation and drought stress), potassium as a sub-plot factor with two levels(non-application and 200kg/ha application) and micronutrients as sub-sub-plot factor with three levels(non-application, soil application for Fe, Mn and Zn at the rate of 100, 100 and 60 kg/ha and foliar application at the rate of 5kg/ha). The studied factors were:, biomass,concentration of Fe, percentage of protein and ash in grain, leaf and stalk.

Results: Our results show that intraction of droght stress and foliar application of micronutrients significantly increased concentration of leaf iron, stalk proteine and leaf ash. With drought stress and pottasium using; foliar application of micronutrients increased biomass, Iron concentration of grain and stalk and grain ash significantly, but soil application of micronutrients increased prolin, stalk ash and grain protein significantly, and non application of micronutrienuts under this situation significantly increased grain protein.

Conclusions: It can be concluded that in drought stress, useing potassium with micronutrients leads to improvement of growth index, therefore under this conditions useing these nutrients is recommended in Urmia.

Key words: drought stress, forage maize, micronutrients, potassium

PO010

CONSUMPTION AND CONTRIBUTION OF BISCUIT TO VITAMIN A DIETARY INTAKE OF PRESCHOOLERS IN POOR-URBAN METROPOLITAN LAGOS

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Background and objectives: Nigerian biscuit is baked with vitamin A fortified wheat flour. Aim of study is to determine consumption pattern and contribution to preschooler's vitamin A dietary intake.

Methods: A cross-sectional and experimental study was carried out in four poor-urban Local Government areas (LGAs) in Lagos Metropolis, Nigeria. Pretested food frequency questionnaire was administered to randomly selected mothers of 1280 preschoolers (24-59 months). Retinyl Palmitate content of seven biscuit samples was analyzed at 0 and 30 days at room temperature using High Performance Liquid Chromatography. Data was analyzed at p<.05.

Results: Biscuit was consumed 4-7times/week by 71.3% preschoolers. Mean total intake of vitamin A was 278.6±298.82IU (83.58 μg RAE). Biscuit contributed 3.0–72.4% of preschoolers RDA (1333i.u/400μgRAE). Mean contribution to vitamin A intake was 21%. Linear by linear association existed between total vitamin A intake and % RDA (p<.01).

Conclusions: Biscuit make an important contribution towards vitamin A intake in poor-urban Lagosian preschoolers.

Key words: biscuit, preschoolers, Lagos, RDA, vitamin A dietary intake

PO011

MONITORING IMMUNE MODULATION BY NUTRITION IN THE GENERAL POPULATION: IDENTIFYING AND SUBSTANTIATING EFFECTS ON HUMAN HEALTH

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Background and objectives: There is a need for guidance on the assessment and interpretation of immune modulation by nutrition as optimal immune function is essential for health and wellbeing in the general population.

Methods: ILSI Europe commissioned an Expert Group (EG) comprising experts from academia, government and the food industry to prepare a guidance document. An early draft was discussed at a workshop involving additional experts to refine the recommendations.

Results: The EG first agreed upon scaled criteria to evaluate usefulness of immune markers in a structured manner. Over 75 markers were scored within the context of three distinct functions of the immune system: A) defence against pathogens, B) prevention of allergy and C) control of low-grade inflammation. The most useful markers were classified depending on whether by themselves they signify clinical relevance AND/OR involvement of immune function. In addition, five theoretical scenarios were drafted describing potential changes in marker values compared to a relevant reference, including (significant) modulation within the reference range; modulation from outside the range back into the range; modulation from within the range out of the range; prevention of modulation induced by other factors; and modulation from a less favourable range to the reference range of a comparator group with a more desired immune function (e.g. from bottle-fed to breast-fed infants). Finally, all elements were combined providing a framework to aid the design and interpretation of studies assessing effects of nutrition on immune function.

Conclusions: The step-wise approach offers a rationale for selecting markers for future trials and helps to provide a framework for the interpretation of outcomes. In fact, a similar step-wise approach may also be useful to rationalize the selection and interpretation of markers for other physiological processes critical to the maintenance of health and wellbeing.

Key words: biomarkers, immune function, validation, guidance, criteria

PO012

ASSESSING IRAN'S ENGLISH PUBLICATIONS IN THE FIRST DECADE OF THE 21ST CENTURY IN IRAN: THE NECESSITY OF NUTRITION RESEARCH MAP

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Background and objectives: This study was conducted to identify and assess the trend of nutrition research English publications in Iranian and international English journals, 2000-2010.

Methods: A descriptive study was done in two phases. First, all English Iranian journals were identified through the databases named Iran Medex, SID and Magiran and all nutrition related articles were determined. Second, all English nutrition articles published by Iranian authors and their population studies were Iranian searched and determined by using CABI keywords in Scopus, pubmed and ISI:WOS databases. Type, design and subject headings of the articles were assessed.

Results: All the English articles were 1426. More than 60% of English papers by Iranian researchers published in international English journals. English original articles were 93.6%. Clinical nutrition with 44% was in the first place. Then nutrition and health (15%), nutritional biochemistry and physiology (13%), foods (23%) and finally techniques (5%) were respectively. Descriptive articles were 45.1% regarding the design. Interventional and In vitro articles were 19.8% and 19.6% were respectively. Cohort studies with the lowest 2% showed the least. Among the interventional articles, clinical trials and community trials were 67% and 33% respectively. Statistical comparison regarding type, design and subject of papers in two five year periods did not show any significant changes in the trend of publication type and subjects except in foods which its P value was in the borderline of significancy (p=0.057). Also, there were significant differences in descriptive (p=0.025) and interventional (p=0.023) article trends.

Conclusions: Type, design and subject headings of papers did not follow a defined planning and policy. The present study provided essential data for planning longitudinal projects and to promote national food and nutrition research programs to planners and policy makers.

Key words: Database, Nutrition, Type, Subject Headings, Design

PO013

COMPARISON STUDY BETWEEN THE EFFECT OF OAT AND BARLEY BREADS ON SERUM GLUCOSE AND LIPID PROFILES IN DYSLIPIDEMIC AND TYPE 2 DIABETIC SUBJECTS (A SHORT-TERM TRIAL)

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Background and objectives: Due to increasing the trend of lipid levels, performance difficulties and incompliance of diets in diabetic patients and side effects of medicines, this study

compare the effects of oat and barley bread on lipid profile and blood glucose of type 2 diabetic patients.

Methods: A double blind cross over trial was conducted on 36 patients with type 2 diabetes. Subjects were selected based on the fasting blood sugar higher than 126 mg/dl and one of the lipidemic indexes that was out of the normal limit, and then randomly assigned into 2 bread groups. Patients were then given daily 250 gr oat or barley bread for 3 weeks. 5 cc of venous blood was taken before, after 10 days and at the end of trial for respective assay. Patients were entered into a washout period in which had their usual diet, for 3 weeks. They were then moved into the opposite group and all of the previous phase was accomplished similarly. 3 day food recall questionnaire was completed at the 1st, 10th and 21st days in both phases of the trial.

Results: Findings indicated that all of the metabolic and anthropometric indicators were improved in both groups unless WHR. The mean differences of serum fasting glucose in barley group and oat bread group were -32±2.7 and 6.2±9.2 mg/dL and for serum HDL in barley group and oat bread group were 9.2±1.8 and 1.34±0.2 mg/dL, respectively, but the trend of the differences in fasting glucose and HDL were significant between two groups (P=0.001).

Conclusions: This study indicated that both oat and barley bread are effective on improvement of anthropometric and metabolic indicators, the beneficial effects of oat bread was higher to reduce blood glucose and HDL cholesterol.

Key words: Diabetes type 2, Oat bread, Barley bread, Dyslipidemia, Lipid profile

PO014

EVALUATIONS OF FRUIT QUALITY AND NITROGEN, POTASSIUM, AND CALCIUM CONCENTRATION OF APPLE (MALUS DOMESTICA BORKH. CVS. GALA AND GOLAB) GROWN WITH FIVE TREATMENTS OF NO3-:NH4+ RATIOS WERE MADE IN POT CULTURE.

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Background and objectives: To assess the effect of NO3-:NH4+ ratios on apple.

Methods: Evaluations of fruit quality and nitrogen, potassium, and calcium concentration of apple (Malus domestica Borkh. cvs. Gala and Golab) grown with five treatments of NO3-:NH4+ ratios were made in pot culture. The concentrations of NO3-:NH4+ ratios were 2.5:0.1, 6:1, 6:0.7, 6:0.5, 6:0.3 meq L-1.

Results: Fruit size, percent dry matter, total dissolved solids, total acidity, or juice pH was not affected by increased ammonium in the ratio. Firmness decreased as the proportion of NH4+ increased. Gala and Golab differed in some of these parameters. Concentrations of N and K increased as NH4+ increased, whereas Ca had no trend or decreased. Generally, the treatment of 2.5:0.1 produced fruits with lower N but higher K and Ca concentrations than the other treatments.

Conclusions: This research showed that some parameters such as fruit weight, length, and diameter, juice pH, and dry matter were not affected significantly by NH4+ concentration whereas composition was affected.

Key words: Malus domestica, plant nutrition, plant composition

PO015

IMPACT OF POSTPRANDIAL GLYCAEMIA ON HEALTH: ROLE IN BODY WEIGHT CONTROL AND DIABETES PREVENTION

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Background and objectives: Postprandial glycaemia (PPG) (and related insulinemia and lipidemia) has been implicated in the etiology of metabolic chronic diseases. Obesity and related health complications lead to reduced quality of life, massive healthcare costs and ultimately premature death, indicating the

urgency for simple cost-effective strategies for prevention and management.

Methods: The International Life Sciences Institute, European Branch assembled an Expert Group to evaluate the data relating PPG to chronic metabolic diseases.

Results: Body weight control Studies suggest that the types of foods which elicit a lower PPG response may be useful as part of an overall strategy for combating obesity, and its associated burden of chronic disease, but the evidence for a role of PPG per se in these effects is considerably weaker. Several underlying mechanisms linking PPG to satiety have been suggested involving hormonal and metabolic changes. There currently exists little data on the chronic impact of reducing PPG on body weight. Type 2 diabetes mellitus There is mechanistic evidence from animal and human studies that elevated blood glucose and an altered pattern of PPG, together with an elevated insulin concentration, lead to transitory deleterious metabolic and hormonal state in healthy subjects. These phenomena are exacerbated in impaired glucose tolerant subjects. Thus, there exists evidence that reducing blood glucose and insulin responses is beneficial to prevent type 2 diabetes genesis. One of the principal challenges in clinical experiments is to provide effective low-glucose response diets to be able to draw a more definite conclusion on the role of PPG in diabetes prevention.

Conclusions: It is evident that more randomised controlled dietary intervention trials inducing effective low glucose response diets are necessary to be able to draw more definitive conclusions on the role of postprandial glycaemia in relation to health.

Key words: Cognition, memory, attention, executive function, nutrition, validation

PO016

NUTRACEUTICALS IN PREVENTION AND FIRST LINE ERADICATION OF HELICOBACTER PYLORI-FROM NATURAL MEDICINE TO SCIENTIFIC EVIDENCE

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Background and objectives: Helicobacter pylori is a gram negative bacteria which is reported widely in humans and is known to be harmful. The emergences of antibiotics resistance makes the treatment so complicated that alternative treatments are still needed. Nutraceuticals appear to be a good approach of the treatment of H. pylori infection. The present study evaluates scientific evidence for the rational use of nutraceuticals like probiotics, curcumin and cranberry juice in eradication of H. pylori and describes their mechanism of action.

Methods: To attain these goals, articles were review dating from January to February 2012. Initial stage of this research was focused on H. pylori eradication or reduction in reported symptoms of infection on patients followed in cohort study or clinical trials or any study according to the review articles. An additional aim of this review was to describe mechanisms of action of nutraceuticals.

Results: Nutraceuticals present an interesting alternative to prevent or support eradication of gastrointestinal tract infection. The use of probiotics, curcumin and cranberry juice in some clinical trials has shown their benefit by reducing H.pylori infection.The mechanisms of action have shown that probiotic increase barrier functions and antimicrobial activity by direct interaction with gastrointestinal cells while curcumin inhibits the growth of H pylori and cranberry juice exerts an anti-adhesion effect on H pylori.

Conclusions: Nutraceuticals may give a new approach to manage gastrointestinal tract infection but more clinical trials should be conducted in a larger population group in order to assess the eradication potential of nutraceuticals.

Key words: nutraceuticals, probiotics, curcumin, cranberry juice

PO017

THE ROLE OF BREAKFAST ENERGY IN TOTAL DAILY ENERGY INTAKE

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Background and objectives: The role of breakfast energy in total daily energy intake is a matter of debate. Acute feeding experiments demonstrated that high breakfast energy leads to greater overall intake supported by cross-sectional data of a free-living population. On the other hand, a large intra-individual analysis has indicated that a high proportion of breakfast to overall intake is associated with lower daily energy intake. To evaluate these apparently contradictory results in greater detail both ways of analysis were applied to the same data set of dietary records in Tamale central Hospital (Ghana).

Methods: On an intra-individual basis total daily energy intake was related to the absolute values of breakfast energy intake or to the ratio of breakfast to overall intake, respectively. Food intake of 280 obese and 100 normal weight subjects was analyzed who recorded over 10 (obese) or 14 (normal weight) consecutive days, respectively.

Results: Increasing breakfast energy was associated with greater overall intake in normal weight and obese subjects. The increasing ratio of breakfast to total daily energy intake was associated with a significant reduction of overall intake on days

where post-breakfast energy was significantly reduced. Correlation and multiple regression analysis support the concept that absolute breakfast calories have the strongest influence on daily energy intake.

Conclusions: Reduced breakfast energy intake is associated with lower total daily intake. The influence of the ratio of breakfast to overall energy intake largely depends on the post-breakfast rather than breakfast intake pattern. Therefore, overweight and obese subjects should consider the reduction of breakfast calories as a simple option to improve their daily energy balance.

Key words: breakfast, food intake, obesity, correlation

PO018

IMPROVEMENT OF SOME METABOLIC SYNDROME PARAMETERS ON RATS AND HUMANS BY HYPODAHNIS ZENKERI

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Background and objectives: Obesity is characterized by alterations in metabolism resulting in a variety of clinical complications. His management must include the improvement of some, or all parameters of metabolic syndrome. The barks of Hypodaphnis zenkeri (HZ) are used as spices in Cameroon. We therefore proposed to study theirs effect on some metabolic syndrome parameters of rats and overweight or obese subjects.

Methods: Three groups of Wistar rats were used. Groups 1 and 2 received a High fat High sucrose (HFHS) diet for 6 months; while group 3 received a standard diet. Simultaneously, group 1 received the dry powder of HZ in the diet at a proportion of 10%. At the beginning and the end of the experiment, a glucose tolerance test have been done, body weight measured each week until the end of the experiment where rats were sacrificed and plasma prepared for the evaluation of lipid parameters. Subsequently, a pilot study involving 30 overweight and obese subjects has been conducted and the two test groups received HZ at concentrations of 250 or 400mg, two times per day. Anthropometric parameters, blood lipids and blood glucose measured during the experiment.

Results: The treatment with HZ inhibited the weight gain, reduced the TG blood levels and the evolution of postprandial glycaemia on rats. In human study, we observed a significant (P<0, 05) decrease of body weight, body fat, and waist circumference on the entire treated group with the elevated percentage of variation with the 250mg treated group. Triglycerides, LDL and cholesterol were also reduced with the increased level of HDL.

Conclusions: We have shown that the barks of HZ can play a positive role in some complications linked to obesity and insulin resistance.

Key words: Hypodaphnis zenkeri, metabolic syndrome, obesity

PO019

FOOD BEHAVIOR AND EATING HABITS IN SCHOOL CHILDREN

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Background and objectives: Among the features of the contemporary food appear skipping meals, high consumption of sugary drinks, consumption of products ready to use and eating meals in front of the TV. These factors may be associated with the current epidemic of obesity. We aim to estimate the prevalence of overweight and obesity in our study population and to assess the nutritional status of children by studying their food behavior and eating habits.

Methods: A study was conducted on a sample of 340 children (153 girls and 187 boys) aged 6 to 12 years old, enrolled in the commune of Constantine in 2011. Data included anthropometric measurements, dietary habits and socioeconomic status. The IOTF criteria were used to assess overweight and obesity. Statistics were performed using the software StatviewTM. The significance level was set at 0.05.

Results: The overall prevalence of overweight is 21.76%. That of obesity is 5%. A significant association was observed between obesity and female gender ($p = 0.007$). Overweight and obesity are more common in families of low socio-economic level (51.35%, 52.94%) compared to the average (12.16%, 23.53%) and the high level (33.78%, 17.65%). Most obese children do not have breakfast compared to children of normal weight (23.53% vs 11.65%, $p < 0.0001$). They are more likely to take their lunch twice a day (64.70% vs 59.84%, $p < 0.05$). Dinner is consumed by 97% of children at home. A percentage of 30.52% of normal weight children, 27.03% overweight and 29.41% obese children eat their meals in front of the television. Carbonated soft drinks are taken by 15.59% of children more than five times a week.

Conclusions: Our study reveals the existence of behaviors associated with an increased risk of overweight and obesity, including unhealthy eating habits and low socioeconomic status.

Key words: children, obesity, prevalence, food behavior

PO020

THE FUTURE OF PERSONALISED NUTRITION: IS PHENOTYPIC CLUSTERING THE KEY?

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Background and objectives: Personalised nutrition can be defined as giving tailored advice based on an individual's diet, phenotype or genetic profile. As this is an area still in its infancy, it is felt that there is insufficient evidence to deliver advice at an individual level. A more conservative approach would be to give advice at a group level, often referred to as 'targeted nutrition'. The objectives of this study were: to investigate whether cluster analysis can be used to identify groups or clusters in the population and to determine if this technique could be used to find certain groups who could be given specific/tailored dietary advice.

Methods: The present work was performed on biochemical data obtained from 1,500 free living adults as part of the National Adult Nutrition Survey (NANS). K-means clustering was used to identify groups based on blood markers of metabolic health (triglycerides, total-cholesterol, direct HDL-cholesterol and glucose) (n=875). ANOVA with Bonferonni post hoc tests were performed to investigate differences between the groups, adjusting for age and gender.

Results: The three clusters identified were found to be significantly different in terms of anthropometric measures such as body weight (p=2.22e-13) and various biochemical markers including NEFA (p=4.05e-07), leptin (p=0.002) and adiponectin (p=1.27e-23). Cluster 3 had an 'at risk' metabolic profile with the highest levels in terms of BMI (29.26±4.67), insulin resistance (HOMA scores 3.71±3.99), TNF alpha (7.73±2.74) and the highest percentage of subjects with the metabolic syndrome (35.5%).

Conclusions: Phenotypic clustering can be used to identify adverse biochemical profiles in the Irish population using markers of metabolic health. This method could potentially be used in populations to identify metabolically 'at risk' groups that could be given specific dietary advice i.e. targeted nutrition.

Key words: personalised nutrition, phenotype, clustering.

PO021

RELATION BETWEEN DIETARY PATTERN AND INFERTILITY IN MEN AND WEMON

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Background and objectives: Infertility is said to be 12 months of unsuccessful attempts to fertilization. The most common type of infertility is ovarian infertility for women and disorder in sperm motility in men. Infertility statistics is 15 % in the world. Studies show the effects of macronutrients, micronutrients, food groups, isoflavonoids and heavy metals in the prevention or the occurrence of infertility. The present study aims to review the relationship between dietary pattern and infertility in men and women.

Methods: In order to review the studies on the relationship between nutrition and fertility the authors searched many sites such as Sciencedirect.com, Pubmed and google scholar within the years 1978 to 2012 by some keywords such as food pattern, food groups, nutrient, sperm production, infertility, ovulation, nutritional epidemiology. A total of 90 articles were obtained.

Results: with the review of studies, it was found that the women who had the lowest fertility problem followed a dietary pattern with plant resources, with a low glycemic load ($p = 0.01$),no animal protein ($p = 0.03$) and Trans fats ($p=0.02$). They also served at least 1 unit of full-fat dairy products. ($p = 0.01$). Studies also show the impact of nutrients on male infertility, such as selenium ($p <0.001$), zinc ($p <0.05$), vitamin C ($p <0.001$), vitamin E ($p <0.001$) L - carnitine ($p <0.001$) and Coenzyme Q10 ($p <0.05$). A dietary pattern based on soybeans and other isoflavonoids results in sperm concentration reduction. ($p=0.02$). Seafood consumption is associated with blood mercury levels. Infertile men and women had higher blood mercury concentrations. ($p <0.05$).

Conclusions: Studies show that dietary patterns in terms of macronutrients, micro nutrients, food groups, antioxidants, flavonoids and heavy metals have direct effects on fertility in males and females.

Key words: Dietary patterns,nutrients, infertility, ovulation, sperm production

PO022

NUTRITIONAL QUALITY AND SAFETY OF POTENTIAL COMPLEMENTARY FOOD BLENDS PRODUCED AT SMALL SCALE INDUSTRIES IN TANZANIA

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Background and objectives: Various complementary foods based on cereal/legume flour mixtures have been increasing in the markets, stalls and retail shops in urban areas. These products are processed by small scale food processors in their backyards as part of income generating activities. The availability of the products could be an opportunity but the challenge is that quality and safety of these products is not ascertained. A study was conducted to evaluate the nutritional quality and safety of cereal/legume flour blends used as complementary foods.

Methods: Proximate analysis was used to establish nutritional composition and spread plate technique for microbiological analysis. Aflatoxin was determined qualitatively using Minicolumn method and rancidity by Kreis Test.

Results: A total of 21 different complementary brands were documented. The nutrition quality and safety analysis showed that moisture content and ash were within levels as per Tanzania Bureau of Standards (TBS) recommendations i.e. 5.3 to 10.3% moisture and 0.4 to 2.6% ash. Protein content ranged between 6.4 to 27.3% with a median value of 8.5% (mean 9.7%) which is below recommended levels by TBS that is 15%. Almost half of the samples had gone rancid and aflatoxins were detected in four samples. Microbiologically, only three samples were within the acceptable range of coliform bacteria content i.e. not more than 10 colon forming units per gram sample.

Conclusions: Whereas these foods may be convenient for users as an opportunity, the way and conditions under which they are produced may be hazardous to consumers. We recommend that, the producers be sensitized and educated on basic principles of hazard analysis critical control points and good manufacturing practices to ensure acceptable quality and safe products for their customers. Standards and guidelines for the preparation of complementary foods should also be in place.

Key words: Complementary, quality, safety

PO023

GENOME HEALTH EFFECT OF ZINC SUPPLEMENT IN ELDERLY AUSTRALIAN POPULATION WITH LOW ZIN STATUS

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Background and objectives: An increased intake of Zinc (Zn) may reduce the risk of degenerative diseases but may be toxic if taken in excess. This study aimed to investigate whether taking daily supplements (20mg of Zn carnosine) can improve Zn status and genome stability events in an elderly South Australian cohort with low Zn status.

Methods: 208 volunteers were screened for low plasma Zn levels (≤10.5 μM) and 90 were selected and randomized into two groups. A 12 week placebo-controlled intervention trial was performed with 84 volunteers completing the study, (Placebo, n=42) and (Zn group, n=42). Fasted blood was collected at baseline and at the end of the 12 week intervention.

Results: In the placebo group, plasma Zn showed a significant drop after 12 weeks from 0.907 ± 0.099 mg/L to 0.861 ± 0.080 mg/L. Plasma Zn was significantly increased by 5.69% in the Zn supplemented group after 12 weeks raising plasma zinc levels from 0.926 ± 0.096 mg/L to 0.972 ± 0.135 mg/L. A significant decrease in the micronucleus frequency (24.18%) was observed for the Zinc supplemented cohort relative to baseline compared to the placebo group which also recorded a small increase of the micronucleus frequency with 1.77%. Comet assay results showed a significant effect of time and treatment of Zn supplementation for both tail moment and tail intensity ($p<0.05$). Telomere base damage was found to be significantly decreased in the Zn group ($p<0.05$) (Baseline: 13.82 ± 18.04, 12 weeks: 6.89 ± 15.18 [8 oxodG/kb telomere]), but no change was observed between groups.

Conclusions: Zn supplementation may prove to have a beneficial effect in an elderly population with low Zn levels by improving Zn status and lowering DNA damage events.

Key words: zinc supplement, micronuclei, tail moment and tail intensity, elderly

PO024

ZINC DEFICIENCY INCREASES TELOMERE LENGTH AND IS ASSOCIATED WITH INCREASED TELOMERE BASE DAMAGE, DNA STRAND BREAKS AND CHROMOSOMAL INSTABILITY

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Background and objectives: This study aimed to investigate the impact of Zinc (Zn) on telomere length and telomere base damage in two different human cells types namely the WIL2-NS lymphoblastoid cell line and the Human Oral Keratinocyte cell line (HOK).

Methods: Zn deficient medium (0 μM) was produced following Chelex treatment, and two Zn compounds, Zinc Sulphate (ZnSO4) and Zinc Carnosine (ZnC) were tested at concentrations of 0.0, 0.4, 4.0, 16.0 and 32.0 μM.

Results: Telomere length and telomere base damage (both measured by qPCR) increased in Zn-deficient WIL2-NS and HOK cells ($p<0.05$). The relationship of telomere length and telomere base damage together with DNA damage biomarkers as measured by the comet and the cytokinesis block micronucleus cytome assay, were determined using correlation analysis. For WIL2-NS cells, telomere length was significantly positively correlated ($p<0.05$) with telomere base damage ($r= 0.474$), micronuclei ($r= 0.380$), nucleoplasmic bridges ($r= 0.444$) and nuclear buds ($r= 0.332$). Telomere base damage was significantly positively correlated with micronuclei ($r=0.409$), nucleoplasmic bridges ($r=0.692$) and nuclear buds ($r=0.351$). For the HOK cells, the only significant correlation ($p<0.05$) observed involved a positive association between telomere length and tail moment ($r= 0.607$), tail intensity ($r= 0.425$), micronuclei ($r= 0.420$) and nucleoplasmic bridges ($r= 0.301$).

Conclusions: These results suggest that Zn may play an important role in telomere length maintenance. Furthermore, these data indicate that longer telomeres induced by Zn deficiency are not indicative of improved chromosomal stability and that other parameters, such as telomere base damage, are required to obtain a more reliable assessment of telomere integrity and telomere functionality.

Key words: telomere length, telomere base damage, zinc, chromosomal instability, DNA strand breaks

PO025

ASSOCIATION OF PLACE, TIME OF MEAL AND TYPE OF MACRONUTRIENT CONSUMED WITH A SUCCESS FUL PROGRAM OF WEIGHT LOSS

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Background and objectives: Current treatment of overweight and obesity focuses on diet, physical exercise and behavior modification. The purpose of this study was to evaluate the effect of place, time and type of diet consumed at each meal in subjects participating in a weight loss program based on Mediterranean diet, physical activity, and behavior modification.

Methods: The study included three hundred ninety two patients (330 female and 62 male), mean age 38.9+11.9 and mean IMC 31.1+5.2. that were enrolled in a weight loss program. Subjects maintained a nutritional diary for seven days during the treatment. Successful weight loss (>5% of original weight) was evaluated in relation to place, time, and the type of diet consumed at breakfast, lunch, afternoon snack and dinner.

Results: Eighty four percent of those who always ate at home achieved weight loss success versus eighty two percent of those who ate outside the home. A key finding was that weight loss was associated significantly with the two last meals of the day, afternoon snack and dinner. It was also related to the macronutrient composition of the meals. Indeed, those patients who achieved their weight loss had higher protein and lower lipids at the last two meals of the day.

Conclusions: The effectiveness of the treatment is related to the place, time and composition of food of the two last meals of the day.

Key words: place, time, type of food, weight loss, obesity

PO026

TRULY NIACIN DEFICIENCY IN QUINOLINIC ACID PHOSPHORIBOSYLTRANSFERASE (QPRT) KNOCKOUT MICE

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Background and objectives: Pyridine nucleotide coenzymes (PNCs) are involved in over 500 enzyme reactions. PNCs are biosynthesized from the amino acid L-tryptophan (L-Trp), as well as the vitamin niacin. Hence, "true" niacin-deficient animals cannot be "created" using nutritional techniques. We wanted to establish a truly niacin-deficient model animal using a protocol that did not involve manipulating dietary L-Trp.

Methods: We generated mice that are missing of the quinolinic acid phosphoribosyltransferase (QPRT) gene. QPRT activity was not detected in qprt–/–mice. The qprt+/+, qprt+/– or qprt–/– mice (8 weeks old) were fed a complete diet containing 30 mg nicotinic acid (NiA) and 2.3 g L-Trp/kg diet or an NiA-free diet containing 2.3 g L-Trp/kg diet for 23 d.

Results: When qprt–/–mice were fed a complete diet, food intake and body weight gain did not differ from those of the qprt+/+ and the qprt+/– mice. On the contrary, in the qprt–/– mice fed the NiA-free diet, food intake and body weight were reduced to 60% ($P < 0.01$) and 70% ($P < 0.05$) of the corresponding values for the qprt–/– mice fed the complete diet at d 23, respectively. The nutritional levels of niacin such as blood and liver NAD concentrations were also lower in the qprt–/– mice than in the qprt+/+ and the qprt+/– mice. Urinary excretion of quinolinic acid was greater in the qprt–/– mice than in the qprt+/+ and the qprt+/– mice ($P < 0.01$).

Conclusions: These data suggest that we generated truly niacin-deficient mice.

Key words: mice, niacin-deficient, pellagra, quinolinate phosphoribosyltrasnferase, tryptophan.

PO027

DEVELOPMENT OF VALUE ADDED "DEHRORI" A TRADITIONAL CHHATTISGARHI, (INDIAN) PRODUCT AND ITS IMPACT ON SCHOOL CHILDREN

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Background and objectives: Cereals and pulses are considered as major source of energy and protein all over the world. It is a known fact that cereals are good source of energy but they contain less protein than animal protein. Dehrori is one of the popular sweet in Chhattisgarh. It is an indigenous product which is nutritionally beneficial, tasty and low cost also. The present study was undertaken to determine the physical properties and organoleptic analysis of traditional rice based product of Chhattisgarh with slight modifications. The traditional product is mainly prepared by cereal only, so the study was designed for value addition of traditional product with soybean.

Methods: The new product was prepared out of rice and soy flour. The rice flour was substituted by soy flour for the generation of a protein rice based traditional dish. All the ingredients were purchased from local market. Four types of Dehrori namely, standard Dehrori , RSP1, P2 and P3 were prepared substituting 10, 20 and 25% full soy flour to rice. All the products were analyzed for sensory, organoleptic and proximate analysis. The results were then compared with standard Dehrori.

Results: Dehrori prepared with 20-25% soy flour qualified as high protein product, approximately 19.03gm and 21.89 gm respectively, as reflected by their protein content. The overall appearance and taste of the product was not affected by the soy flour used. The acceptability and taste of the product decreased with increasing percentage of soy flour above 25% level. The team of panelist had shown high acceptability for the new developed Dehrori with 20% soy flour substituted to the basic rice flour.

Conclusions: The fortification of traditional dishes can be used as a way of improving nutritional status of vulnerable group in the society.

Key words: traditional product, soy fortification, protein rich product

PO028

NUTRITIONAL FACTS,TRACE ELEMENTS AND SENSORY ACCEPTABILITY OF BOILED INCUBATED FERTILIZED DUCK EGG (BALUT), AN INDIGENOUS FOOD IN THE PHILIPPINES

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Background and objectives: Balut is a fertilized duck egg incubated for about 18 days with a developed embryo inside that is boiled and eaten in the shell. The high protein content is known as an energizer, especially, to pregnant women in Vietnam and students in the Philippines who eat balut for energy without necessarily knowing the actual nutrition facts about this food. Objectives This study aimed to investigate trace elements, nutritional value and chemical aspects of balut, and determine the sensory acceptability of the newly developed cuisine of the egg product.

Methods: Two 'Balut' recipes were introduced. Commercial duck eggs purchased in Japan were incubated in the university laboratory at 37°C, and fresh duck eggs and balut from the Philippines were used as samples.

Results: Results of this study showed that saturated fatty acids decreased and EPA and DHA increased in balut. The total amino acid content specifically taurine significantly increased with the development of embryo during incubation. Moisture decreased and ash content conformed to the increasing values of Na, Mg, K, Ca, Fe, Zn, and P after incubation. Trace elements I, Mo, and Se were detected and these elements had been reported to be generally accepted as essential for health and wellbeing in higher animals. Other trace elements considered detrimental to health were found but concentrations were low and out of threat with large intake. Total cholesterol increased after incubation. Sensory evaluation on balut by unfamiliar panelists accepted the taste but rejected the appearance and smell. The new cuisine was accepted by almost all of the 50 untrained panelists.

Conclusions: Balut has higher nutritional value than the control. This information will bolster consumer's knowledge of the nutrition facts in balut and promote a widespread consumption with the introduction of new cuisine.

Key words: Balut, incubated duck egg, indigenous food, Philippines

PO029

STUDY ON ASSESSMENT OF FOOD SAFETY AND HYGIENE PRACTICES AMONG STREET FOOD VENDORS IN DELHI, INDIA

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Background and objectives: A study was done to assess food safety and hygiene practices among street food vendors in Delhi, India.

Methods: Practices and hygiene status of 200 street food vendors were studied by questionnaire based findings and observations of vending site. Data was entered and analyzed with the help of statistical tools.

Results: It was found that majority of the respondents (33%) were in the age group of 25+ years i.e. 25 to 34 years and 24% were illiterate. Around 36% of the vendors were permanent resident of Delhi and from rest of the respondents 55% were from Uttar Pradesh only. Ninety percent (90%) of the vendors were operating full time and 40% were earning more than Rs. 10,000 and above per month. None of the respondents were registered or licensed.Seventy percent were disposing garbage in open lid bins and 16% were throwing it on the road. With regard to personal hygiene, only 3% of the vendors were using hand gloves and from rest of the respondents only 2% were washing hands before and after handling raw or cooked food. Majority of respondents (72%) had short clean nails and few (4%) had open wounds present. While observing for the environmental conditions,presence of flies/mosquitoes was observed in 45% of the vending sites.Sixty one percent (61%) of the vendors were using DDA water for drinking and 19% were washing utensils in open only.

Conclusions: Food vended is of different flavor, cheap and tasty, which becomes popular among people easily.This study highlighted few points which need to be addressed for better hygiene status and food practices among street food vendors. There is need of generating awareness among street vendors and WHO's five keys to safety should be incorporated. Another recommendation can be to implement the policies effectively and proper interventions.

Key words: Food Safety, Food Vendors, Hygiene Practices, Nutrition, street food

PO030

PLASMA 25-HYDROXYVITAMIN D DETERMINES THE ASSOCIATION OF INSULIN RECEPTOR SUBSTRATE 1 RS2943641 WITH TYPE 2 DIABETES AND INSULIN RESISTANCE

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Background and objectives: Associations of either insulin receptor substrate 1 (IRS1) genetic variants or circulating 25-hydroxyvitamin D (25(OH)D) with type 2 diabetes are inconsistent. Few studies have examined the interaction of IRS1 variants with circulating 25(OH)D. This study aimed to determine whether plasma 25(OH)D modulated the association of a potential functional variant at IRS1 (rs2943641) with T2D risk and insulin resistance in the Boston Puerto Rican Health Study.

Methods: Plasma 25(OH)D, fasting insulin, glucose and rs2943641 genotype were measured in 1144 Puerto Rican adults. T2D was defined as fasting glucose ≥7 mmol/L or taking diabetes medication. Insulin resistance was estimated with the homeostasis model assessment of insulin resistance (HOMA-IR).

Results: Higher plasma 25(OH)D was significantly associated with lower risk of T2D (P-trend=0.046), but not associated with HOMA-IR or insulin. A significant inverse association of 25(OH)D with HOMA-IR (P=0.041) and insulin (P=0.043) was observed only in rs2943641 minor allele T homozygotes, and not in C allele carriers (P-interaction=0.036 for HOMA-IR, and 0.02 for insulin). Subjects with high plasma 25(OH)D (>17 ng/mL) had a lower risk of T2D compared to subjects with low 25(OH)D ≥ 17 ng/mL) only in T allele homozygotes (odds ratio = 0.16; 95%CI: 0.04, 0.65; P = 0.011), not in C allele carriers (P-interaction=0.016).

Conclusions: Higher concentrations of plasma 25(OH)D are associated with lower insulin resistance, insulin and risk of T2D only in IRS1 variant rs2943641 minor allele T homozygotes, but not in C allele carriers. Our findings warrant replication in other populations.

Key words: IRS1; genetic variant; 25-hydroxyvitamin D; type 2 diabetes; interaction

PO031

AQUEOUS GARLIC EXTRACT MITIGATE HYPERCHOLESTEROLEMIA AND HYPERGLYCEMIA; RABBIT EXPERIMENTAL MODELLING

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Background and objectives: Functional foods are gaining popularity worldwide owing to the consumer's preference towards the consumption of natural product in dietary modifications. Garlic (Allium sativum), is one of the most essential vegetables provides health promoting perspectives due to array of bioactive ingredients. These bioactive moieties especially sulfur containing compounds are responsible for curing various lifestyle related disorders like diabetes, hyperlipidemia and cancer insurgence.

Methods: Considering the aim, garlic extraction was carried out using various solvents (aqueous ethanol, aqueous methanol and water) at different intervals (4, 5 and 6 hours) for best solvent extraction efficiency. In vitro studies were carried out to evaluate the status of antioxidant potential in these extracts. For the purpose, DPPH assay, antioxidant activity, FRAP test and glucose diffusion were examined. Efficacy study was conducted using New Zeeland type Rabbits by providing best aqueous garlic extract for a period of 28 days. Accordingly, four groups were designed using different doses of extract (control, 3, 6 and 9 mL/kg b.w).

Results: Functional garlic extract containing water soluble active components resulted in significant reduction in total cholesterol and LDL level indicating their effectiveness against hypercholesterolemic perspectives. Maximum reduction in total cholesterol and LDL was 8.9% and 4.5% respectively in G2 consumed garlic extract @ 6 mL/Kg b.w. Likewise, serum glucose was also substantially reduced however, effect was more pronounced in G2 as compare to other groups. Similarly, hematological analyses were also improved by phytotherapy of functional food diets. Furthermore, serum biochemistry, protein ratios, electrolytes and non-electrolytes were within normal range revealing safety of its utilization in food products.

Conclusions: From the present investigation, it is deduced that garlic preparations like aqueous extract, garlic oil, garlic macerates are effective against hypercholesterolemia and hyperglycemia therefore, proposed to cure various life threatening disorders.

Key words: Functional food, aqueous garlic extract, hypercholesterolemia & hyperglycemia and rabbit modeling

PO032

EFFECTS OF RESVERATROL ON THE METHYLATION OF LIPOGENIC ENZYME GENES IN 3T3-L1 ADIPOCYTES

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Background and objectives: Epigenetic modifications, induced partially by environmental factors, may have a role in the etiology of obesity. Methylation fluctuation of CpG-islands in the promoter-region is a mechanism known to silence/activate genes. Polyphenols show potential in addressing diseases like obesity. Resveratrol (RSV), a phytoalexin found in grapes, wine, nuts and berries, has been proposed as anti-obesity molecule. The present study aimed to assess the effect of resveratrol on the methylation of genes involved in lipogenesis and to relate these effects with its anti-obesity action.

Methods: 3T3-L1 pre-adipocytes were grown in a medium with DMEM+10% FBS. Two days after confluence, differentiation was induced (day-0). Cells were treated from day-0 either with ethanol (control) or 10 μM of RSV. Medium was changed every 2 days. On day-10, DNA was extracted and underwent bisulfite modification. Pyrosequencing was used to determine the nucleotide sequence of Acetyl-CoA-Carboxylase (ACC) and Fatty-acid-synthase (FASN). Kruskal-Wallis non-parametric test was used for statistical analysis.

Results: A significant increase in the methylation of 3 CpG-sites in the ACC promoter-region was observed in resveratrol treated cells. Likewise, there was a clear trend towards increased DNA methylation in all the CpG-sites of FASN, being statistically significant at 3 CpG-sites. The overall methylation status of ACC showed a significant increase; however for FASN, although there was a trend towards increased methylation, statistical significance was not achieved.

Conclusions: Resveratrol induces methylation of CpG dinucleotides in the promoter regions of ACC and FASN, suggesting gene silencing. Therefore, the anti-obesity effect of this polyphenol observed in vivo may be, at least in part, achieved by methylation of genes involved in lipogenesis.

Key words: Epigenetics, methylation, resveratrol, obesity, lipogenesis.

PO033

THE DIFFERENTIAL EFFECTS OF FULL-TIME AND PART-TIME WORK STATUS ON BREASTFEEDING

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Background and objectives: Return to work is associated with diminished breastfeeding. Although more mothers breastfeed after returning to work compared to a decade ago, research has not documented the variations in breastfeeding initiation and duration based on full-time and part-time (less than 35 h/week) work status. In this study, we clarify these differences.

Methods: Cohort study, collected between 2010 and 2011, for over 200 mothers are used. In analyzing initiation, mother's work status was categorized by the expected number of hours she planned to work postpartum. In the duration model, work status was categorized based on the actual number of hours worked upon mother's return to employment after controlling for baby's age when she returned to work. Covariates in logistic and censored regressions included demographics, maternity leave, parity, past breastfeeding experience, hospital experience, and social support.

Results: Compared with expecting not to work, expecting to work <35 h/week was not associated with breastfeeding initiation while expecting to work full-time decreased breastfeeding initiation. Compared with breastfeeding mothers who did not work, returning to work within 12 weeks regardless of work status and returning to work after 12 weeks while working more than 34 h/week were associated with significantly shorter breastfeeding duration.

Conclusions: Part-time work and increased amount of leave taken promote breastfeeding initiation and duration.

Key words: Full time and part time breastfeeding, work status

PO034

EXPLOITING THE POTENTIAL HEALTH BENEFITS OF WATER YAM

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Background and objectives: Yam tubers are mainly used as food providing relatively cheaper calories to its consumers. Few yam species are grown for use as health food and for medicinal purposes. The potential exist to explore yam, especially the underutilized and less preferred ones such as D. alata, for health benefits. The study aimed at investigating the total dietary fibre and selected mineral composition of D. alata to ascertain its potential contribution to better human health.

Methods: Twenty varieties of D. alata and one reference variety, D. rotundata were used. The tubers of nine months maturity were processed into flour. Dry matter, amylose, total dietary fibre and mineral contents were determined. Statistical analysis was done with Statistical Analysis Systems (SAS) package (2003) and LSD test was used to test significant differences ($p<0.05$) between means.

Results: Dry matter content ranged from 19.10 to 33.80% and amylose was from 27.90 to 32.30%.Total Dietary fibre (TDF) composition varied widely from 4.10 to 11.00%. In mg/kg, mineral content of the varieties were from 10.10-17.60 for Zn, 10550-20100 for K, 83-131 for Na, 260-535 for Ca, and 390-595 for Mg. The results show significant differences ($P>0.05$) among the test varieties in all the parameters determined.

Conclusions: The test varieties had lower dry matter but higher total dietary fibre and amylose contents in comparison to the reference variety. The test varieties had appreciable amount of Zn, P, Ca and Mn; and higher total dietary fibre than what is reported for brown rice with only 2 varieties having comparable values to whole wheat flour. The results show water yam has significant amounts of dietary fibre and minerals which can be tapped by health conscious individuals and by the food industry for health benefits. .

Key words: total dietary fibre, minerals, water yam, untapped health benefits

PO035

EFFECT OF RESVERATROL METABOLITES ON ADIPOKINES EXPRESSION AND SECRETION IN 3T3-L1 MATURING ADIPOCYTES

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Background and objectives: Resveratrol is rapidly metabolised in enterocytes and liver. Consecuently, glucuronide and sulfate metabolites are produced and high concentrations of them reach plasma and tissues. Although very little data exists concerning their biological activity, they have shown to exert anticarcinogenic effects. However, little is known concerning their effect on insulin function and glucose homeostasis. The aim of the present study was to determine whether resveratrol metabolites have any effect on the expression and secretion of adipokines involved in the glycaemic control in 3T3-L1 maturing pre-adipocytes.

Methods: 3T3-L1 pre-adipocytes were cultured in DMEM+FBS media. Two days after confluence, differentiation was induced. Cells were treated on day 0, 2, 4 and 6 of differentiation with 25 μM trans-resveratrol or its metabolites (trans-resveratrol-3-O-glucuronide, trans-resveratrol-4'-O-glucuronide and trans-resveratrol-3-O-sulfate) and on day 8, medium was removed and cells were harvested. Adipokine (leptin, adiponectin, visfatin and apelin) gene expression and secretion were analyzed by Real Time RT-PCR and ELISA respectively. The statistical study was performed by using Student 's t test.

Results: Resveratrol reduced mRNA levels of leptin and increased those of adiponectin, visfatin and apelin. Trans-resveratrol-3-O-glucuronide and trans-resveratrol-4'-O-glucuronide increased adiponectin, apelin and visfatin mRNA levels and reduced leptin secretion. Trans-resveratrol-3'-O-sulfate increased adiponectin and leptin mRNA levels and reduced those of apelin.

Conclusions: The present study shows for the first time the regulatory effect of resveratrol metabolites on adipokine expression and secretion during adipocyte differentiation. Taking into account that resveratrol has demonstrated to improve insulin sensitivity, and considering that these adipokines are involved in this function, it may be proposed that resveratrol metabolites contribute to this beneficial effect of resveratrol.

Key words: 3T3-L1 preadipocytes, Adipokines, Glucuronide metabolites, Resveratrol, Sulfate metabolites

PO036

LIPID PROFILE OF RATS FED WHITE GUINEA YAM(DIOSCOREA ROTUNDATA) DIETS

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Background and objectives: White Guinea Yam(Dioscorea rotundata) locally known as 'ehuru' is commonly consumed in different diet forms in Ibarapa area of South-West Nigeria, hence it was necessary to determine their effect on lipid profile.

Methods: The yams were freshly purchased and transported to the department of Biochemistry laboratory of the University of Calabar. The diets were prepared as boiled yam (BY), pounded yam with soup and stew (PYSS), boiled yam and stew (BYS), fried yam and stew (FYS) and boiled yam with palm oil (BYPo), in cue with traditional. Normal rat chow served as the control. The soup was prepared using the tender leaves of Okro (Abelmoschus esculentus) known locally as 'Ilasa'. The diets were fed to the rats for a period of eleven weeks until the female rats littered to produce the first generation. The weaned rats were further placed on the same diets while the parent rats were sacrificed, blood sample obtained and used for lipid profile determination using standard methods.

Results: The triacylglyceride (TG) levels in the female rats ranged from 13.01 to 81.23mg/dl and 11.24 to 85.33mg/dl in the male rats. High density lipoprotein cholesterol (HDL-c) levels in the female rats ranged from 10.56 to 15.92mg/dl while the male rats recorded a range of 12.86 to 23.04mg/dl. Results also showed TG and HDL-c levels in PYSS were significantly higher ($P<0.05$) than in other diets and RY in both the male and female rats. LDL-c level was lowest in PYSS for female rats and FYS for male rats. The LDL-c/HDL-c ratio was lowest in the female rats. **Conclusions:** These results showed no significant risk factors in lipid profile levels in both sexes. The results also suggested that the diets may not predispose to atherogenesis.

Key words: Dioscorea rotundata diets, lipid profile, Abelmuschus esculentus and Wistar rats.

PO037

EFFECTS OF LIVE LACTOBACILLUS PARACASEI ON PLASMA LIPID CONCENTRATION IN RATS FED AN ETHANOL-CONTAINING DIET

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Background and objectives: Lactobacillus paracasei NFRI 7415 isolated from a Japanese traditional fermented fish (funasushi) showed high ƒÁ-aminobutyric acid (GABA)-producing ability. Although we showed that Lb. paracasei NFRI 7415 was able to use the development of functional fermented food, this ability has not yet been studied in vivo for humans and animals. Alcoholic liver disease (ALD) has been increasing in Japan, as can be seen in several recent surveys. This study examined the protective effects of live Lactobacillus paracasei NFRI 7415 on alcoholic liver disease were investigated.

Methods: Male Fischer 344 rats were fed a control diet (CD), an ethanol diet (ED) (35.8% of total energy from ethanol), or an ethanol diet containing 20% live Lb. paracasei NFRI 7415 (107 cfu/g) (LD) for 10 weeks.

Results: The results indicated that the live Lb. paracasei NFRI 7415 reduced the total cholesterol concentration of plasma and liver in rats fed the LD. The level of docosahexaenoic acid (DHA; 22:6 n-3) in the plasma and liver of the LD group was higher than that in the ED group. The chronic alcohol consumption decreased the level of n-3 fatty acid in the plasma and liver of the ED group.

Conclusions: These results showed that the live Lb. paracasei NFRI 7415 can adjust the fatty acid composition of plasma and liver, and that it is possible to decrease liver damage when chronic alcohol intake.

Key words: Lactobacillus paracasei; Ethanol containing diet; Alcoholic liver disease; Plasma fatty acid; Liver fatty acid

PO038

EFFECTIVENESS OF HOME FORTIFICATION WITH MULTI-MICRONUTRIENT POWDERS IN BHUTANESE REFUGEE CHILDREN: A FIVE YEAR FOLLOW-UP

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Background and objectives: Anemia remains a significant public health problem in refugee settings. Efficacy of micronutrient powders in reducing anemia in moderately anemic children aged 6-24 months has been demonstrated in several trials. Effectiveness of this intervention when scaled up and targeted at all children aged 6-59 months is unknown. This study was conducted to evaluate the effectiveness of a large-scale micronutrient powder distribution program in refugee children aged 6-59 months.

Methods: Six representative cross-sectional surveys were conducted during 2007-2012: 13 months before, and 7, 14, 26, 45 and 56 months after initiation of supplementation program. Data collected on children aged 6-59 months included hemoglobin concentration, anthropometric indicators, morbidity, feeding practices, and information on micronutrient distribution program.

Results: Sample sizes of the six surveys ranged from 497 to 569. The overall prevalence of anemia was 43.3% at baseline. It remained relatively stable during the first three follow-up surveys, decreased to 26.1% at 45 months, and increased to 49.9% at 56 month post-intervention. The prevalence of moderate anemia decreased from 18.9% at baseline to 7.6% at 45 months, and increased to18.8% at 56 months. The prevalence of stunting decreased significantly from 39.2% at baseline to 19.8% at 56 months ($p<0.0001$). Reported coverage, use and acceptance of micronutrient supplements remained consistently high throughout the study.

Conclusions: In absence of control group, changes in key outcomes should be interpreted with caution. Minor effect on hemoglobin status overall and large increase in anemia at the last follow-up are puzzling and require further investigation of underlying causes of anemia in this population. Large positive effect on linear growth may be a significant benefit of supplementation, if confirmed by future studies. Effectiveness of micronutrient powders in reducing anemia in large-scale programs targeting all children aged 6-59 months requires further investigation.

Key words: micronutrient powders, anemia, effectiveness

PO039

LIPID PROFILE AND PREVALENCE OF CARDIOVASCULAR RISK FACTORS IN A MEDITERRANEAN POPULATION OF WOMEN IN NUTRITION TRANSITION

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Background and objectives: To study the lipid and apolipoprotein profile, and the adherence to Mediterranean dietary (MD) pattern in urban adult Moroccan women at procreating age, living in an agricultural Mediterranean province; El Jadida.

Methods: A random sample (n=213) of Moroccan women (18-55 years old) was interviewed. Plasma cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C) concentration were determined. Plasma apolipoproteins AI, B, E, apoB48, ApoCIII and the triglyceride-rich lipoprotein (TRL-TG) fraction (VLDL and chylomicrons and their remnants) were also measured. The Metabolic Syndrome (MS) prevalence was determined by the ATPIII criteria. Adherence to the Mediterranean diet (MD) was defined according to a score constructed considering the consumption of known MD components.

Results: The women studied showed elevated TC, TG and LDL-C levels among 10%, 12.7% and 19.4% respectively; low HDL-C levels in 45%. Obesity and hypertension were highly prevalent among 23.9% and 35.8% respectively. TRL-TG level higher than 0,8 mmol/l was found in 13.4%. Plasma TG concentration was closely correlated with plasma TRL-TG ($R=0.86$, $P=0.0001$), apo B ($R=0.50$, $P=0.0001$) and apo CIII ($R=0.52$, $P=0.0001$) concentration and moderately correlated with levels of HDL-C ($R=0.3$, $P=0.0001$) and BMI ($R=0.4$, $P=0.0001$). Obesity, BP, TRL-C, TRL-TG, TG, apo B, and apo CIII increased with age. The overall prevalence of MS was 20.9%. The mean adherence to MD was 62.84 %. Some components of the MD such as Cereals and mono-unsaturated to saturated fatty acids showed a protective effect on MS.

Conclusions: The results show a high prevalence of metabolic syndrome associated with altered lipid profiles in this po-

pulation. This can be explained by the nutrition transition and its influence certainly on food habits and adherence to the MD.

Key words: Lipid profile, metabolic syndrome, Mediterranean diet, cardiovascular risk, Morocco

PO040

HEAVY METAL EXPOSURE ASSESSMENT IN KOREAN ADULTS

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Background and objectives: Global interest in the adverse health effects of heavy metal have focused on dietary exposure as the principal source of heavy metal exposure to the general populations. Heavy metal not only the long-term, but also the short-term intake may be important, depending on the health effects considered.

Methods: We studied populations of Korean adults(n=2,101) > 19 years old who were registered for the Korean Research Project on the Integrated Exposure Assessment to Hazardous Materials for Food safety (KRIEFS), 2010-2011. The two non-consecutive 24-hour dietary recalls and Food Frequency Questionnaire (FFQ) were used to calculated dietary intakes of lead, cadmium, mercury.

Results: Lead intakes were 0.12 μ/kg b.w./day for 24 h-recall and 0.16 μ/kg b.w./day for FFQ. Cadmium intakes were 0.21 μ/kg b.w./day for 24 h-recall and 0.18 μ/kg b.w./day for FFQ. Mercury intakes were 0.07 μ/kg b.w./day for 24 h-recall and 0.10 μ/kg b.w./day for FFQ. The food groups that contributed to the major part of heavy metal exposure were vegetables (25.5%) for lead, cereals (40.1%) for cadmium, and 37.4% fishes & shellfishes for mercury. 14% of PTWI of FFQ, 24hr-recall 10% for mercury 21% for FFQ, 18% for 24 h-recall for cadmium. 4.5% for FFQ, 3.4% for 24hr-recall for lead.

Conclusions: The average lead, cadmium, and mercury dietary intakes for Korean adults are considered safe. However, the high level of dietary heavy metal intakes of adults deserves our attention. These data may be thus used to establish safety standards for fish and shellfish consumption.

Key words: heavy metals, food safety, mercury, lead, cadmium

PO041

DIOXINS AND DIOXIN-LIKE PCBS LEVELS IN FOOD AND ANIMAL FEED IN KUWAITI MARKET

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Background and objectives: Dioxins and dioxin-like PCBs are highly toxic environmental pollutants. They are considered as a class 1 carcinogen by the world health organization and can cause many serious health problems to human. Dioxins are produced as byproducts of burning chlorine-based chemicals with hydrocarbons in some industrial processes. Human exposure to dioxin is mainly from diet in Kuwait over 90% of the foodstuffs are being imported from different countries where control measures vary. Therefore it becomes of utmost importance to test foodstuffs that are being marketed in Kuwait for the presence of these contaminants. The objective of the study was to determine the levels of dioxins and dioxin-like PCBs in animal feed and foodstuffs that are consumed in Kuwait.

Methods: A total of 317 meat, chicken, milk, egg and animal feed samples of local and imported origin were purchased from Kuwait market. Samples were prepared and analyzed by DR CALUX bioassay (Dioxin Responsive- Chemically Activated Luciferase Expression) as well as by a high resolution gas chromatography-high resolution mass spectrometry (HRGC-HRMS) for total PCDD/PCDF/dl-PCB-TEQ (polychlorinated dibenzo-p-dioxin, polychlorinated dibenzofuran, dioxin-like polychlorinated biphenyl toxic equivalent.

Results: Results showed out of the 317 samples, 12 samples were selected for confirmation by HRGC-HRMS. Out of 12 samples analyzed by HRGC-HRMS, only two beef samples were positive.

Conclusions: This study provided the first database on dioxin and dioxin-like PCB levels in feed and foodstuffs in the State of Kuwait. Expansion on these data is essential at this stage to further conduct a total diet study for the assessment of dioxins and dioxin-like PCBs intake by the population for health risk assessment.

Key words: Dioxin, DR CALUX, Kuwait

PO042

ASSOCIATION GLN223ARG POLYMORPHISM OF GENE LEPR, LEVELS OF LEPTINA AND NOURISHING HABITS IN MEXICAN ADOLESCENTS WITH MORBID OBESITY

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Background and objectives: Mexico occupies the second world-wide place of morbid obese people (10- 12 million). Factors that predispose the development of MO are: genetic, environmental, physiological, psycho-social and behavioral (nourishing habits. Objective: Associate Gln223Arg polymorphism of gene LEPR, levels of leptina and nourishing habits with the presence of morbid obesity in adolescents of the south of Jalisco (México).

Methods: In 41 adolescents (18 normal weight and 23 morbid obesity) of 12 to 19 years of age, both sexes which were measured size and weight with tanita scale and stadimeter to determine IMC. Morbid obesity was determined by tables of the WHO and was established with a standard deviation >3. The Gln223Arg polymorphism will be identified by PCR and leptina levels by ELISA. Nourishing habits was evaluated by the questionnaire the Adolescent Food Habits Checklist. The statistical analysis was performed to compare mean scores obtained from the questionnaire when we compare morbid obesity vs normal weight adolescents with p=0.03 and a significance of 95%.

Results: Gene and allelic frequencies were not statistically significant when compared to normal weight adolescents with obesity morbidity with p = 0.011 and p = 0.279 respectively. Leptin levels and nourishing habits were associated with morbid obesity.

Conclusions: Dietary habits and leptin levels in adolescents are important factor that predisposes the development of obesity in adolescents. the presence of the polymorphism are not associated with morbid obesity in these subjects.

Key words: Leptin, Nourishing habits and morbid obesity.

PO043

THE IMPACT OF THE FIVE YEAR NUTRITION PROJECT IN SELENGE PROVINCE OF MONGOLIA

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Background and objectives: Thesis is based on the result of a study of the impact of World Vision Mongolia's five year Nutrition Project which was implemented in the poor nomadic area, Selenge province of Mongolia. The general objective of this thesis is to analyse the child nutritional status in Selenge province since the project implementation and assess whether the changes in child nutritional outcomes were associated with the nutrition project interventions.

Methods: In collaboration with Nutrition Research Centre the nutrition project assessment was done pre and post intervention design with the comparison of indicators from the baseline and the evaluation. Within the scope of this thesis all data collected during the surveys will be analysed. A literature review of studies on main interventions will be done in order to look at impacts of those interventions in developing countries.

Results: The implementation of the Nutrition Project contributed to the improvement of the child nutritional impact and nutritional status of children under five and mothers despite their poor socio-economic condition. The Nutrition Project reached its goal of elimination of severe PEMand 50% of reduction of moderate PEM among children under five. The mean prevalence of stunting decreased from 16.4% to 6.4%. Underweight and wasting declined from 5.1% to 1.8% and from 2.2% to 0.6% respectively. Project was unable to achieve its target to reduce anaemia by 30% but did achieve its target to reduce 30% of the prevalence of rickets.

Conclusions: The implementation of the WVM Nutrition project was associated with improved child macronutrient nutritional status but not with micronutrient nutritional status in the nomadic soums of Selenge province. In terms of the supplementation, the project almost achieved its target coverage 80%. Recommendation Define the project specific target group as children under two years.

Key words: Mongolia, malnutrition, maternal-child nutrition, micronutrients deficiency

PO044

EFFECT OF DIFFERENT CONCENTRATIONS OF VITAMIN A ON THE CHICK BROILER EMBRYO DEVELOPMENT

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Background and objectives: Vitamin A used in this study as the purest form of vitamin A palmtate , it solved in sterilized corn oil before incubation, Four concentrations of vitamin A were taken , one was lower than LD50 (3500 I.U) , LD50 concentration (4200 I.U), and tow higher than LD50 (6000,6800 I.U). These concentrations were injected directly before the incubation. The acute toxicity of vitamin A was carried out by injection the vitamin in the air space of fertilized eggs , the LD50 was 4200 I.U. According to this test .

Methods: Used in these study eggs of chick broiler Gallus domesticus ,the number of eggs is 360 , the eggs transferred to an incubator , incubated at 38C for 21 days. The morphological abnormalities were studied in different ages (3,5,7,9,11,13 and 21 days respectively). From the incubation .

Results: The concentration (3500 I.U) shows lower embryo's death (41.67%) while the highest death ratio (69.57%) was in a concentration (6800I.U), the other concentration shows different death ratio between these two ratios. The different concentration of vitamin A show clear side effects on embryos weight and length , the effect increased with the increase of concentration in all ages. The morphological examination of embryos in different ages shows many deformations in the eyes, head , brain, beak, heart , limbs, thorax and abdomen as omphalocele. They also show deformation in head and brain like Anencephaly, Exencephaly and undifferentiated brain seen in earlier stages of growth (three days of incubation), deformation in the upper beak and eyes (Anophthalmia, Microphthalmia, different eyes size or prominent small eye and other big eye, deformation in limbs similar that in the length of front and hind limbs, crooked hind limbs with immotile embryo, crooked fingers, short tail, in addition to deformation in heart which appear short and un prominent in the early stages while in the late stage of growth, the deformation appear abnormal and outside the thorax cavity. Also, new swelling organ found in the embryo after hatch in a concentration of 6800 I.U.

Conclusions: Vitamin A has a significant impact on chick broiler embryo development.

Key words: Incubation, Abnormalities, Omphalocele, deformation

PO045

BIOCHEMICAL MARKERS AND BONE MINERAL DENSITY IN CHILDREN WITH PHENYLKETONURIA

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Background and objectives: Most Phenylketonuria (PKU) patients develop bone turnover impairment and low bone mineral density (BMD). Measurements of BMD reflect only bone mineral status but not the dynamics of bone turnover. Bone markers are noninvasive tools to assess bone formation and resorption processes. This study was to assess bone markers in PKU children in order to select a screening marker to be combined with BMD for appropriate follow up.

Methods: 33 classic PKU children were studied (mean age 8.4±4.6 yrs), and 30 age- and sex-matched children served as controls. Dual energy X-ray absorptiometry (DXA) was used to measure the Z score for total bone mineral content (TBMC), bone mineral density of femur neck (BMD-FN), and BMD of lumbar vertebrae (BMD-L). Total alkaline phosphatase (ALP), osteocalcin (OC) and Carboxy-terminal propeptide of type I collagen (CICP) as bone formation markers; osteoprotegerin (OPG) and receptor activator of nuclear factor êâ ligand (RANKL) as markers of osteoclast activity; as well as Deoxypyridinoline (DPD) as a bone collagen breakdown marker were assayed.

Results: PKU children showed significantly decreased TBMC (P=0.000), BMD-FN (P= 0.000), BMD-L (P=0.01), OC (P =0.000), ALP (P=0.005) and DPD (P= 0.000). As regards OP and CICP, no significant differences were found between PKU patients and controls. Interestingly, ALP showed a high significant negative correlation with TBMC on one hand and BMD-L on the other hand. No other significant correlations were observed.

Conclusions: ALP provides a good indicator of bone formation in PKU patients and can be used as a screening and/or follow-up marker in these patients. Detection of low ALP levels could be followed by BMD measurements and other specific markers to verify the dynamics of bone turnover. This will reduce the exposure risk hazards of DXA, and limit its use to the highly suspected cases.

Key words: Phenylketonuria, bone markers.

PO046

THE PROTECTIVE EFFECT OF SESAME OIL AGAINST NONALCOHOLIC STEATOHEPATITIS INDUCED HEPATIC FIBROSIS IN MICE

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Background and objectives: Nonalcoholic steatohepatitis (NASH) is a chronic liver disease. In Western countries and Taiwan, the prevalence of NASH is 3-15%. Steatosis, oxidative stress, and inflammation are major risk factors in NASH by which may lead to fibrosis, cirrhosis, and hepatic carcinoma. Sesame oil is a potent functional food with anti-steatosis, antioxidation, and anti-inflammation against various diseases. The protective effect of sesame oil against NASH induced hepatic fibrosis was unclear. We examined the effect of sesame oil against NASH-induced hepatic fibrosis in mice.

Methods: Mice were fed with methionine and choline deficient (MCD) diet for 21 days to induce NASH and for 28 and 35 days to induce different grades of hepatic fibrosis. Seven doses of sesame oil (1, 2, or 4 ml/kg/day) were given orally from 22nd to 28th and 29th to 35th, respectively. Those mice were killed at 29th and 36th days and serum and tissue were collected to examine the effect of sesame oil on NASH-induced hepatic fibrosis.

Results: Sesame oil decreased malonaldehyde, tumor necrosis factor-£\, leptin, transforming growth factor-£], metalloproteinase-2, metalloproteinase-9, but it increased tissue inhibitor of metalloproteinase-1 and peroxisome proliferator activated receptors-£^. Sesame oil given from 22nd to 28th days prevented NASH-induced hepatic fibrosis. In addition, sesame oil given from 29th to 35th days inhibited the progression of NASH-induced hepatic fibrosis.

Conclusions: Sesame oil protected against NASH-induced hepatic fibrosis in mice.

Key words: NASH, steatosis, oxidative stress, inflammation, hepatic fibrosis

PO047

ANALYSIS OF MICRO NUTRIENT SUBSTANCE (IRON, FOLIC ACID AND ZINC) IN PREGNANT WOMEN ANEMIA IN BONTONOMPO AND SOUTH BONTONOMPO GOWA REGENCY SOUTH SULAWESI INDONESIA 2012

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Background and objectives: Micro nutrients that may interact with the iron in hemoglobin synthesis function in pretty much the two of them are folic acid and zinc. So far it is known that iron deficiency is not the only cause of the anemia. For it is necessary a study that analyzes the status and role of substance micro nutrient especially iron, folic acid and zinc in pregnant women anemia. That objective is to determine the status of micronutrients (iron, folic acid and zinc) in maternal anemia.

Methods: This study is an observational study with cross-sectional. The sample in this research were 69 pregnant women. Carried out for 2 months, from September to October 2012. This study will analyze the status of micronutrients on the incidence of first trimester maternal anemia by using SPSS 18.0.

Results: The results obtained are characteristic of 33.3% of respondents have a lifespan of 25-30 years, 27.5% graduated levels SD / MI and SMP / MI, and 78.3% are housewives (IRT). There are 39.1% of pregnant women trimester I are anemia. The results for respondents who have low ferritin <12 mcg/ml are 100% anemia, for respondents with folic acid levels <6.7 ng / ml are 50% for respondents with anemia and zinc levels <65 mg / l are 39.1 % anemia. Ferritin levels had a significant association with the incidence of anemia with $p = 0.027$ ($p < 0.05$). As for the levels of folic acid and zinc did not have a significant association.

Conclusions: The conclusions obtained there is a significant association between levels of ferritin in this case is the iron status with hemoglobin levels (anemia) in pregnant women first trimester in Gowa regency.

Key words: Iron, Folic, Zinc, Anemia, Pregnant

PO048

UNHEALTHY DIETARY HABITS IN ADOLESCENTS MIGHT INFLUENCE THE CELLULAR METABOLISM THROUGH AN EFFECT ON MEMBRANE STRUCTURAL PROPERTIES

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Background and objectives: There is an increasing trend of overweight and obese adolescents in the developed countries. Due to the importance of the problem, there has been increasing research on the relationship between adolescence lifestyle and obesity. If the diet can induce changes in the lipid profile of cell membranes [Barceló et al. Hypertension 54 (2009) 1143-1150], then dietary habits in obese adolescents can affect the structural membrane properties and may influence membrane protein functions that take part in relevant physiological activities. In this context, we set out a pilot study to compare the structural properties of erythrocyte membranes of obese and normal-weight adolescent subjects, assuming that the erythrocyte membrane lipid profile could be a dietary biomarker.

Methods: The study was conducted in a group of 12 obese and 12 normal-weight adolescent subjects. By conventional methods, we analysed the lipid profile, lipid peroxidation and acetylcholinesterase enzyme (AChE) activity. The structural properties of reconstituted erythrocyte membranes were characterized by X-ray diffraction.

Results: Comparatively, obese adolescents showed a lipid profile differentiated by a higher cholesterol/phospholipid ratio, an increase in SFA and a decrease in MUFA and n-6 PUFA fatty acids and lower AChE activity. Differences in the lipid content were associated with changes in the structural properties of reconstituted membranes and the membrane oxidative damage.

Conclusions: Our data indicate that the consequences of unhealthy dietary habits are reflected in the erythrocyte membrane properties and may influence the activity of membrane associated proteins and membrane functions. They also suggest that such interrelations may have implications in the development of diseases associated with the obesity in adolescents.

Key words: Erythrocyte membrane structure; obesity; adolescent subjects

PO049

LYCOPENE IN NATURE OR CAPSULES FOR SYSTEMIC PHOTPROTECTION AGAINST ULTRAVIOLET B: A RANDOMIZED AND COMPARATIVE STUDY

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Background and objectives: carotenoids are endogenous antioxidant agents. Lycopene, the most powerful carotenoid, reduces the immediate erythema after exposure to ultraviolet B (UVB) radiation. The objective was to evaluate and compare the photoprotective effect of synthetic (capsules) or in nature (tomato paste) lycopene.

Methods: interventional, randomized, comparative 10-weeks study, including 21 subjects, divided in two groups: 11 for capsule, 10 for tomato pasta intake. Blood samples were collected for serum lycopene dosage by high performance liquid chromatography (HPLC). Colorimetry (Chromatometer CR400 Konica Minolta Sensing Inc. Japan) was used to measure minimal erythematous dose (MED) 24 hours after UVB irradiation (Ultraviolet Solar Simulator Model Solar Light Co. Inc. USA) and variation of color a (maximum erythema 24 hours after skin irradiation compared to normal skin). Evaluations were made at baseline and after 4, 8, 10 weeks. Data were analysed by ANOVA with repeated measures.

Results: three subjects dropped out after 4 weeks. Serum lycopene demonstrated great variability with no possibility of statistical analysis; for subjects taking capsules it ranged from 0.15 μmol/L to 0.55 μmol/L at baseline and, after 10 weeks, from 0.2 μmol/L to 0.73 μmol/L; for those receiving tomato pasta it ranged from 0.2 μmol/L to 0.5 μmol/L at baseline and, after 10 weeks, from 0.25 μmol/L to 0.42 μmol/L. No visual change for MED was observed in all evaluations, for both groups. Chromatometer measures showed no difference in the mean MED at baseline between groups, but variation of color a from baseline to 10 weeks was observed [marginally significant (p=0.054)]. Therefore, reduction in delta a occurred, with a tendency to be greater for capsule [marginally significant (p=0.066)].

Conclusions: Lycopene regular intake, in capsule or in nature, has demonstrated some positive effect for systemic photoprotection that indicates the advantage of promoting its regular intake.

Key words: carotenoids, lycopene, photoprotection

PO050

EFFECT OF DIETARY FORAGE SOURCE ON EGYPTIAN LACTATING BUFFALOES PERFORMANCE

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Background and objectives: green forage represent very important part in lactating animal rations, so this study was conducted to determine the effect of dietary forage sources (berseem or/and corn silage) on digestibility, blood metabolites, milk performance of lactating buffalo.

Methods: Buffaloes (on average 580 kg LW± 25 kg weight and 10 kg milk per d) in 3x3 Latin square design with 4 replications (n = 12) after 8 weeks of calving. Each group of buffaloes was fed one of the three diets with different source of forage: berseem as control group (B), berseem plus corn silage (BCS), or corn silage (CS). Animals were fed forage and concentrate feed mixture (CFM) in the 1:1 ratio. The experiment was conducted over three independent 30-day periods with the last 7 days used for data collection. Nutrients digestibility were determined by (AIA) technique. Blood samples were collected from all the buffaloes at the end of tested period of each ration.

Results: The lowest digestibility of DM, CP and cellulose ($P<0.05$) with corn silage ration compared with the other rations (66.84%, 69.49% and 62.76%, respectively for all diets). Crude fiber digestibility showed significant increase when B ration was fed (69.60%), compared to CS (67.64%) and BCS (62.00%) diets. TDN of rations were; 62.27, 63.33, 64.55 % for B, BCS and CS diets respectively with insignificant differences. Milk yield and SNF appeared insignificant effect of tested forage, however milk fat and protein content was significantly lower in CS ration, compared with the other treatments. TS of milk were lower with B and CS rations comparing to BCS ration.

Conclusions: Buffaloes receiving B or corn BCS forage diets had improved digestibility of nutrients that reflected on milk composition especially fat and protein content.

Key words: berseem, silage, buffaloes.

PO051

HAEMOGLOBIN, SERUM FERRITIN AND C - REACTIVE PROTEIN LEVELS AMONG WOMEN IN PERI-URBAN SETTLEMENTS IN GHANA

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Background and objectives: Micronutrient under-nutrition of women in developing countries is a public health concern. To date only a few studies have focused on the interaction between infection and indicators of nutritional anaemia. This study assessed the prevalence of iron deficiency (ID) and iron deficiency anaemia (IDA) among women of reproductive age (WRA) in peri-urban settlements in Ghana.

Methods: We studied at baseline; inflammation, ID and IDA among 134 women enrolled in a peanut-based clinical trial. Whole blood was used to measure haemoglobin concentration using haematology automated analyzer. Serum ferritin was measured by an automated immune assay. C-reactive protein (CRP) was determined using an enhanced turbidimetric immunoassay technique. Associations with CRP were determined by stratifying ferritin and haemoglobin concentration across categories of CRP.

Results: The mean age of the women was 28.93 ± 8.24years. Mean haemoglobin and serum ferritin concentrations were 12.09 ± 1.79g/dL and 175.18 ± 66.06µg/L respectively whiles positive CRP values ranged from 12.0mg/L to 48.0mg/L. Mild, moderate and severe anaemia due to iron deficiency were present in 35.8%, 6.7% and 1.5%, of women respectively. Serum ferritin was within normal range for 39.8% of the women whiles 60.2% were at severe risk of iron overload. CRP was positive for 17.8% of the women, an indication of inflammation. CRP was poorly associated with ferritin and haemoglobin concentrations ($r=0.03$ and $r=0.12$ respectively; $P>0.05$)

Conclusions: Anaemia due to iron deficiency and iron overload co-exist as a public health problem among women in peri-urban settlements in Ghana. Inflammation does not appear to affect ferritin and iron deficiency anaemia.

Key words: Women, anaemia, inflammation Acknowledgement: Funding was provided by the Collaborative Research Support Programme (CRSP) Peanut, University of Georgia, Athens, USA.

PO052

HIGH SENSITIVITY C-REACTIVE PROTEIN AND TOTAL ANTIOXIDANT STATUS IN PATIENTS WITH CHRONIC KIDNEY DISEASE, DIABETES AND HYPERTENSION

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Background and objectives: Low grade systemic inflammation and total antioxidant status can be assessed by the levels of high sensitivity C-reactive protein (hs-CRP) and Total antioxidant capacity (TAC). The study was carried out to evaluate the levels of hs-CRP and antioxidant status in chronic kidney disease, diabetic and hypertensive subjects in the presence of traditional risk factors. The relationship between total antioxidant capacity, C-reactive protein and other risk factors like blood pressure and Anthropometric measurements were also evaluated.

Methods: A total of 180 patients (90 control, 90 test(45 males ; 45 females respectively) aged 18-76years old, diagnosed as having chronic kidney disease, Diabetes and hypertension, but clinically stable were recruited from University of Benin Teaching Hospital. The controls were apparently healthy individuals. Anthropometric measurements were carried out (weight and height to calculate the Body mass index (BMI). Serum samples were collected for hs- CRP and TAC assays.

Results: BMI increased significantly ($P<0.05$) in hypertensive and Diabetic patients but no change was observed in CKD. Blood pressure was increased in CKD subjects. The Diabetic subjects had normal Blood Pressure values while it was uncontrolled in the hypertensive. The results revealed that hs-CRP levels were significantly increased ($P<0.05$) while TAC levels were decreased in all the subjects recruited for the study. The CKD subjects showed no correlation ($P>0.05$) between CRP, BMI and TAC. However, in hypertensive and Diabetic patients, CRP and TAC correlated positively with BMI and blood pressure. TAC correlated negatively with CRP.

Conclusions: Low grade systemic inflammation as measured by hs-CRP and TAC was increased in the chronic kidney disease, diabetes and hypertension subjects. CRP correlated positively with BMI in hypertensive and diabetic patients.

Key words: High sensitivity CRP, Total antioxidant capacity, chronic kidney disease, Diabetes, hypertension

PO053

NUTRIENT COMPOSITION AND DENSITY OF FOUR COMMONLY USED LOCALLY FORMULATED COMPLEMENTARY FOODS IN AKWA IBOM STATE, NIGERIA

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Background and objectives: Childhood malnutrition in form of protein-energy malnutrition and micronutrient deficiencies is still prevalent in many developing countries of the world, Nigeria inclusive. Adequate nutrition between conception and the first twenty-four months of life serve as window of opportunity for optimal growth. However, malnutrition sets in for most children from introduction to complementary foods as many of the locally formulated ones are energy dense but low in micronutrients. The study was designed to evaluate the nutrient composition and adequacy of four commonly used complementary foods in Akwa Ibom State, Nigeria.

Methods: A cross-sectional survey was conducted at two immunization centres each in two Local Government Areas (Urban and Rural) of Akwa Ibom State using 300 mothers of 6 – 24 months children attending the centres. Validated questionnaire was used to obtain information on commonly used complementary foods, and the four identified most commonly used complementary foods were standardised (unripe banana porridge with biscuit bone (BPBB), unripe banana and bonga fish (BPBF), mixed cereals (millet, guinea corn, maize) fortified with soybean, crayfish and groundnut (MCTB), mashed beans (MB)) and analysed using standard Methods of analyses of AOAC.

Results: 100g portion of the complementary foods contained 2.5 - 6.7g protein, 1.3 -7.2g lipid, 8.2-14.0g carbohydrates and 60.0–148.0Kcal of energy. Minerals ranged between 31.58 - 230.40mg potassium, 46.78-184.68mg calcium, 55.23-120.93mg phosphorus, 10.37-23.26mg iron, 7.53- 18.53mg zinc/100g portion. Their antinutrient levels were very low and cannot pose health hazards in infants. The complementary foods were nutrient dense, contained all essential nutrients in required proportions to meet nutrient needs for optimal growth of 0-24 months children.

Conclusions: Right combination of indigenous foodstuffs in complementary foods pose to be promising in reducing childhood malnutrition, and encourage dietary biodiversification in infant feeding.

Key words: Complementary foods, Nutrient density, Standardised diets, Micronutrients

PO054

CONCURRENT NUTRITIONAL DEFICIENCIES AND CARDIO-METABOLIC RISK FACTORS IN BURKINA FASO ADULTS: THE DOUBLE BURDEN OF MALNUTRITION

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Background and objectives: The 'double burden of malnutrition' is usually fostered by a rapid nutrition transition in low and middle-income countries. It has primarily been described as concurrent undernutrition and 'overnutrition' (obesity) in the same populations or households, and not in the same individuals. The purpose of the present study was to document the double burden of nutritional deficiencies and nutrition-related cardio-metabolic risk factors (CMRF) in West-African urban adults, and to identify its correlates.

Methods: In Ouagadougou, capital city of Burkina Faso, 330 adults aged 25y-60y were randomly selected after stratification by income level. Anthropometric, socioeconomic and biochemical data were collected. Undernutrition indicators were underweight, iron depletion and vitamin A deficiency. Cardiometabolic risk factors were those of the metabolic syndrome, plus overweight/obesity based on BMI >25.

Results: A total of 310 subjects completed the study (51.9% women). Overall, 23.6% presented with at least one nutritional deficiency combined with one CMRF. The following double burden phenotypes were identified: 1) Micronutrient deficiency + CMRF other than overweight/obesity (9%); 2) Micronutrient deficiency + obesity/overweight (7.8%); 3) Underweight + CMRF (6.8%). Women had a higher prevalence of iron depletion, vitamin A deficiency and overweight/obesity than men, explaining a significantly higher rate of double burden of malnutrition (30.4% vs 16.1%). CMRF other than overweight/obesity were as prevalent in men as in women. The occurrence of the double burden was also significantly higher among the non-educated and lower income subjects.

Conclusions: Concurrent nutritional deficiencies and nutrition-related CMRFs appear to be widespread in urban adults of low-income countries. Undernutrition and obesity is not the only double burden phenotype. This double burden of malnutrition represents a dual challenge and it is of particular concern as it affects proportionally more women and lower socioeconomic status individuals. This study was funded by CIDA.

Key words: Double burden of malnutrition; Africa

PO056

IDENTIFYING FOODS THAT CONTRIBUTES TO SOUTH AFRICANS' HIGH SALT INTAKE

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Background and objectives: Hypertension contributes significantly to mortality in South Africa and in 2000 accounted for 9% of all deaths in people 30 years and older. One of the most cost-effective ways to reduce blood pressure is by lowering sodium intake in a population to less than 2000mg per day. For a country to initiate a salt reducing policy it is necessary to ascertain which commonly consumed foods in the population's food pattern contribute most to their high salt intake in order to accurately define the required policy steps. This paper summarises data on sodium intake using sodium urinary excretion and dietary as well as the major food sources of sodium intake

Methods: Secondary data analyses of cross-sectional dietary studies undertaken in adult South Africans were conducted to assess the quantities and food sources of Na intake.

Results: Sodium intake based on urinary excretion ranged from 2000 to over 4000 mg/day. The sodium intake from dietary surveys ranged from 855 mg to 2733 mg per day. Discretionary salt intake ranged between 33% and 46% for different groups. Bread is the largest contributor to the salt intake in all South Africans and contributed more to the intake in the different black populations (31–52%) than in the coloured (16–31%), white (15–25%) and Indian (22%) groups. Gravy/soup powders contributed 14% and 16% (males and females) to sodium intake in a black population.

Conclusions: The level of sodium intake in South Africa is too high and contributes to high rates of hypertension. Based on these results, draft legislation has been published to reduce the salt content of processed foods, especially bread. A salt reduction strategy should also include a population based campaign to motivate the population to use less salt during food preparation, adding less salt at table and use less salty products.

Key words: Sodium, food, legislation

PO057

BIOFORTIFIED BLACK BEANS (PHASEOLUS VULGARIS L.) BASED DIET PROVIDES MORE BIOAVAILABLE IRON IN VITRO (CACO-2) AND IN VIVO (GALLUS GALLUS)

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Background and objectives: Iron (Fe) deficiency is the most common nutrient deficiency worldwide. A major cause of Fe-deficiency is low bioavailability from plant-based diets containing mineral absorption inhibitors such as polyphenols. The common bean, provides significant quantities of protein and energy and is a source of vitamins and minerals including Fe. The common bean is an attractive candidate for Fe-biofortification because there is genetic variability of Fe concentration and therefore it is possible to breed for significant increases in Fe concentrations in beans. Also, Fe concentrations in beans are high relative to the cereals and therefore beans can deliver substantial increased amounts of Fe. Our objective was to compare the capacities of biofortified (88ìg-Fe/g) and standard (59ìg-Fe/g) black beans to deliver Fe for hemoglobin (Hb) synthesis.

Methods: Bean based diets (no added Fe) were formulated (dietary Fe concentrations were 39.4±0.2 and 52.9±0.9mg/kg). Chicks were fed the diets for 6wks (n=12) and Hb, feed-consumption and BW were measured.

Results: Hb-maintenance-efficiency was different between groups on wks 2-4 ($P<0.05$). Total body Hb-Fe contents were different between standard (23.32±0.6mg) and biofortified (25.50±0.8mg) bean groups ($P<0.05$). Duodenal DMT1, DcytB, and ferroportin expressions were higher and liver ferritin was lower ($P>0.05$) in standard vs. the biofortified groups. In-vitro analysis showed no significant differences in Fe bioavailability between diets. The in-vivo results suggested a relatively small nutritional benefit to the biofortified bean variety.

Conclusions: Evidence suggests that the nutritional benefit of the biofortified beans is reduced by the presence of polyphenols. Hence, modification of the bean seed coat polyphenols may be a means to improve bean Fe bioavailability. We conclude that biofortified beans are a promising vehicle for increasing intakes of bioavailable Fe in populations that consume these beans as a dietary staple.

Key words: Beans, biofortification, iron-bioavailability, in vitro digestion/Caco-2 cell model, broiler-chicken, intestine.

PO058

GROWTH SUPPRESSION AND NON-APOPTOTIC CELL DEATH BY PYRIDOZAL IS DEPENDENT ON P53 IN THE HUMAN BREAST CANCER CELL LINE MCF-7

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Background and objectives: In animal experiments, B6 compound, pyridoxine (PN), has shown anti-tumor action. In vitro experiments have also demonstrated that PN suppresses growth of the feline mammary tumor FRM cells, and human breast cancer MCF-7 cells. Additionally, B6 has been reported to suppress both proliferation-related gene expression. Our previous experiments showed that PN induces expression of insulin like growth factor binding protein-3 (IGFBP-3) to arrest proliferation and induce cell death. of note, this induction was inhibited by the p53 specific inhibitor pifithrin- α. Here, we report that another B6 compound, pyridoxal (PL), is a more potent inhibitor of MCF-7 cell growth than PN. [

Methods: cell culture, real-time PCR, immunoblot and immunocytochemistry.

Results: PL induced the G0/G1 arrest, which is an indicator of inhibition of proliferation. It appears that PL induced cell death is non-apoptotic cell death, because PL treated cells did not increase annexin V positive cells and accumulate active caspase-3 in cells. Because the protein p53 is important for cell-cycle regulation, we evaluated whether PL-induced growth inhibition were associated with p53 function using real-time PCR, immunoblot and immunocytochemistry. Although p53 mRNA was not induced, 0.5 mM PL increased the protein level and nuclear transfer of p53. Thus, we hypothesized that PL activates p53 resulting in accumulation of cells and arrest cell proliferation. Indeed, in line with a role for p53 in PL-induced inhibition of proliferation, cell growth suppression by PL did not occur when p53 expression was knocked-down using siRNA.

Conclusions: PL-induced cell growth suppression is dependent on p53 in MCF-7 breast cancer cells.

Key words: Vitamin B6, Pyridoxal, IGFBP-3, MCF-7, p53

PO059

CHANGES IN BIOCHEMICAL MARKERS OF VITAMINS AND TRACE MINERALS AFTER FORTIFIED MILK CONSUMPTION

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Background and objectives: Micronutrient fortification of commonly consumed foods remains to be practical and sustainable option to fight malnutrition. The study determined the changes in biochemical markers of vitamins and trace minerals after fortified milk consumption among 6 year-old schoolchildren.

Methods: A total of 141 school children were grouped into three: the water group; 1-glass milk group and 2-glasses milk group. Blood was collected at baseline, midline and endline to measure hemoglobin, serum ferritin, serum zinc, serum vitamins A, C, and D. Urine samples were collected at baseline, midline and endline for urinary iodine analysis.

Results: The hemoglobin concentration of study participants was considered borderline anemic (11.5-11.6 mg/dL) at baseline. At midline, the hemoglobin concentration of the 2-glassess group significantly increased. The serum ferritin of the study participants were within the normal values of <12 ug/L at baseline, midline and endline. A significant increase was observed for serum zinc in children fed with 1-glass and 2-glasses but more pronounced for 2-glasses ($P<0.05$).Urinary iodine for all groups was within acceptable levels at baseline, midline and endline. Similar results were observed for vitamin A. All children were vitamin C deficient at baseline (0.2-0.3 mg/dL), and attained normalcy at endline. No vitamin D deficiency was observed among study participants at baseline but a significant increase was observed at endline within acceptable levels.

Conclusions: Fortified milk supplementation among 6-year-old school children is effective for significant changes in hemoglobin and serum zinc and is more pronounced at 2-glasses/day. More studies are needed on the ratio of iron to zinc in fortifying milk to improve iron bioavailability. Drinking 2-glasses of fortified milk among 6-year old school children is recommended for proper nutrition and growth.

Key words: fortified milk, minerals, vitamins, school children

PO060

DIETARY FIBER AND MINERAL AVAILABILITY OF MILLED, BROWN AND OPTIMIZED BROWN RICE OF THE SAME VARIETY

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Background and objectives: Brown rice has greater mineral content than that of milled rice. Its high dietary fiber and phytic acid may suppress mineral absorption.

Methods: Mineral availability, dietary fiber and its fermentability characteristics from milled, brown and optimized brown rice at 0-6 months were determined. Raw and cooked milled, brown and optimized brown rice e.g. Rc160, Rc216, PHB71 and SL8 were used in the study. Freeze-dried samples were analysed for proximate composition, dietary fiber, iron, zinc and calcium. Mineral availability and fermentability of dietary fiber were determined in vitro.

Results: Significant differences in mineral content and availability was observed from raw and cooked rice with raw>cooked ($P<0.05$). The mineral content and availability was not affected by time (0-6 months)except for SL8. All rice varieties have greater zinc content and availability from optimized brown rice than milled rice but not with brown rice. Similar results were obtained for iron and calcium and its availability for Rc216 and PHB71 (iron) and Rc216 (calcium). Dietary fiber and phytic acid of brown and optimized brown rice were significantly greater than that of milled rice and did not show inhibitory effect on mineral availability. The dietary fiber content of all rice samples were fermentable producing greater propionate that showed some protective effect for cholesterol synthesis.

Conclusions: Brown and optimized brown rice have significantly greater mineral content and availability than that of milled rice. All rice varieties were good sources of dietary fiber and produced short chain fatty acids after fermentation with greater propionate. Propionate may have a significant role in the prevention for risk of cardiovascular diseases. A nutrition intervention study is recommended to validate the promising health and nutritional benefits of brown rice varieties used in this study.

Key words: Dietary fiber, mineral, phytic acid

PO061

DOES CARDIOVASCULAR RISK EXISTS IN PREPUBERTAL CHILDREN WITH A HISTORY OF EXTRAUTERINE GROWTH RESTRICTION?

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Background and objectives: Metabolic and inflammatory alterations have been reported in infants with intrauterine growth restriction. Nutritional deficit during perinatal stage may induce significant alterations in adipose tissue and increase the risk of metabolic syndrome and cardiovascular disease in children with a history of extrauterine growth restriction (EUGR). The aim of this study was to describe the nutritional status in neonatal and prepubertal with a history of EUGR, and to analyze anthropometric measurements, blood pressure (BP) and inflammation markers in prepubertal age to establish an association between EUGR and later risk conditions.

Methods: 38 prepubertal children born between 1996-2008 with a history of EUGR and a control group including 123 age-and-sex matched children were selected. Both groups were asked to answer a food frequency questionnaire and BP and anthropometric parameters were measured in both groups. Serum C-reactive protein (CRP) levels, plasma levels of hepatocyte growth factor (HGF), interleukin 6 (IL-6), interleukin 8 (IL-8), monocyte chemotactic protein type 1 (MCP1), neural growth factor (NGF), tumor necrosis factor alpha (TNF-α) and plasminogen activator inhibitor type 1 (PAI-1) were also quantified.

Results: At the prepubertal stage, daily fiber and fatty acid intake in EUGR group were below the recommended intake. This group presented shorter length and lower BMI, and higher BP values compared to controls (P<0,001). Concentrations of inflammatory biomarkers CRP, HGF, IL-8, MCP1 and TNF-α; were higher in the EUGR group as compared to control group (P<0,001). After adjustment for gestational age, birth weight and length, BP and TNFα values remained higher in the EUGR children.

Conclusions: Appropriate nutrition education strategies should be developed for EUGR children to prevent later pathologies. Further investigation focused on these children is needed; this group may be in higher risk for inflammatory or cardiovascular diseases associated with this neonatal condition.

Key words: adipokines, inflammation, growth restriction

PO062

ASSOCIATIONS BETWEEN EATING MEALS, EATING MEALS WHILE WATCHING TV AND WEIGHT STATUS AMONG CHILDREN, 10-12 YEARS: THE ENERGY-CROSS SECTIONAL STUDY

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Background and objectives: Recent research show that energy balance-related behaviors are relevant for obesity prevention among children. The aims of this study were to assess the association of eating meals as well as eating meals while watching TV with weight status among children, 10-12 years, across Europe.

Methods: 7915 children (mean age: 11.5 years) in 8 European countries (Belgium, Greece, Hungary, the Netherlands, Norway, Slovenia, Spain and Switzerland) completed a questionnaire at school. Data on meals eaten the day before questionnaire administration and the frequency of eating meals while watching TV were collected. Height and weight were objectively assessed. Multinomial and binary regression analyses were conducted to test associations of eating meals (adjusted for gender and ethnicity) and eating meals while watching TV (adjusted for gender, ethnicity and total TV time) with overweight/obesity, and to test for country- and socio-demographic differences.

Results: The proportions of children reporting eating breakfast, lunch and dinner were 85%, 96%, and 93% respectively, and 55%, 46% and 32% reported to never watch TV at breakfast, lunch and dinner respectively. The children who ate

breakfast (OR = 0.6 (95% CI 0.5-0.7)) and dinner (OR = 0.4 (95% CI 0.3-0.5)), had lower odds of being overweight compared to those who did not. The children who watched TV at lunch (OR = 1.3 (95% CI 1.2-1.5)) and dinner (OR = 1.3 (95% CI 1.1-1.5)) had higher odds of being overweight compared to those who did not watch TV at the respective meals.

Conclusions: The odds of being overweight was lower for children who ate breakfast and dinner compared to those who did not eat the respective meals. The odds of being overweight was higher for children who reported watching TV at lunch and dinner compared to those who did not.

Key words: children, obesity, meals, TV viewing

PO063

PPARA GENETIC VARIANT MODIFIES THE RESPONSE AFTER CONSUMPTION OF SKIMMED OR SEMI-SKIMMED MILK ON CARDIOVASCULAR RISK BIOMARKERS

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Background and objectives: Genetic studies of population may represent a step forward in understanding the response to dairy foods, depending on genetic variations, with the aim of improving cardiovascular health. The aim of this study was to explore the role of genetic polymorphisms within lipid metabolism on change in cardiovascular risk biomarkers after consumption of skimmed or semi-skimmed milk in moderate cardiovascular risk volunteers.

Methods: This work is a part of a previous placebo-controlled and double-blind study in moderate CV risk volunteers (age range: 25-65 years). Subjects were randomly assigned into two groups: semi-skimmed milk and skimmed milk consumers as part of their usual diet. Blood samples were taken at 0 and 12 month to determine cardiovascular risk by TC/HDL and LDL/HDL ratios. Fourteen polymorphisms in nine genes related to lipid metabolism and inflammation were selected. Genomic DNA was isolated from total blood and genotyped by Taqman OpenArray Genotyping Platform and the 7900HT Fast Real-Time PCR System. Interactions were tested with R statistical package through repeated measures analysis in dominant model.

Results: Subjects with TT variant for PPARA rs 135549 had decreased TC/HDL and LDL/HDL ratios [mean (95%CI)]: [-0.29 (-0.63 - 0.05) and -0.31 (-0.58 - -0.03)] after skimmed milk intake and increased after semi-skimmed milk intake [0.52 (0.19 - 0.86) and 0.47 (0.16 - 0.79)] (adjusted p value <0.05), whereas no differences were observed in C carriers.

Conclusions: Determining PPARA rs135549 genotype may be useful in identifying individuals who are most likely to benefit from skimmed milk consumption in the prevention of cardiovascular disease. These genotype differences might help to explain some of the discordant results in studies evaluating the effect of milk fat on cardiovascular risk.

Key words: PPARA, skimmed milk, cardiovascular risk, nutrigenetics

PO064

EFFECTS OF RESVERATROL ON OBESITY-RELATED INFLAMMATION IN ADIPOSE TISSUE OF OBESE ZUCKER RATS

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Background and objectives: Obesity increases the amount of pro-inflammatory cytokines produced either by adipocytes or by recruited macrophages. Consequently, obesity has been considered as a chronic low-grade inflammatory state. The aim of this study was to examine whether resveratrol could represent a promising molecule to reduce adipose tissue chronic inflammation in a model of genetic obesity.

Methods: Twenty fa/fa Zucker rats were assigned to two experimental groups and orally treated with resveratrol (15 mg/kg body weight/d) or saline (control group) for 6 weeks. Commercial kits were used for the assessment of serum cytokine concentrations and Nuclear Factor-KappaB (NF-κB) activation. Gene expressions were analyzed by RT-PCR.

Results: Resveratrol reduced internal adipose tissue weights (-15%). With the exception of interleukin 6, which remained unchanged, serum concentrations of the pro-inflammatory

markers were reduced: tumor necrosis factor a (-15%), monocyte chemoattractant protein 1 (MCP1) (-25%) and C-reactive protein (-7%). These effects were quite well mirrored by changes in adipokine gene expression in adipose tissue. This reduction in cytokine expression and production in adipose tissue might be due to a decrease in the number of macrophages, as suggested by the reduction in MCP1 expression, and to a direct effect of resveratrol on inflammatory pathways in both macrophages and adipocytes. The expressions of toll-like receptor 2 and toll-like receptor 4 were not modified, but the activity of the transcriptional factor NF-kB was reduced (P<0.05).

Conclusions: Resveratrol modulates plasma cytokine concentrations by reducing macrophage infiltration in adipose tissue and by reducing NF-kB activity. Consequently, the use of resveratrol represents a promising new therapeutic approach to reducing the low-inflammatory state associated to obesity.

Key words: Resveratrol, adipose tissue, inflammation

PO065

GENETIC VARIANTS IN LIPID METABOLISM AND ASSOCIATION WITH CARDIOVASCULAR RISK IN THE CANTOBLANCO PLATFORM OF FOOD AND NUTRITIONAL GENOMICS (GENYAL)

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Background and objectives: Cardiovascular disease is influenced by many environmental and genetic factors. The aim of this study was to determine the association between variants in candidate genes an increased cardiovascular risk (CVR) at GENYAL population.

Methods: Sixty-four polymorphisms (SNPs) in genes related to lipid metabolism, inflammation and oxidative stress were determined in 114 participants. Genomic DNA from each subject was isolated from total blood. Genetic variants were analyzed using Taqman OpenArray Genotyping Platform and the 7900HT Fast Real-Time PCR System. TC/HDL and LDL/HDL cholesterol ratios were determined as indicators of CVR. A logistic regression model was applied to estimate the OR and 95% CI, adjusted for: sex, age and waist circumference and Bonferroni was applied to correct for multiple testing.

Results: Among the GENYAL population 18.42% of the participants displayed greater CVR according to LDL/HDL ratio. 114 participants (29 men and 85 women), mean age: 37.5±12.5 years and BMI: 24.22±4.24 kg/m2 were genotyped for lipid metabolism-related genes, finding that common homozygote variants for APOB rs10199768, rs512535, rs1367117 and rs520354 were associated with an increased OR (95%CI): 13.58 (1.57-117.61) p=0.020; 30.2 (1.96-4838.85) p=0.020; 53.53 (2.7-1059.89) p=0.013; 8.38 (1.09-64.31) p=0.030. In addition, heterozygote variant for PPARα was associated with increased CVR OR (95%CI): 42.13 (5.09-1064.3) p=0.001, association that was maintained after adjustment for multiple testing (p=0.019). Thus, though ORs data shows a strong association of these polymorphisms with CVR, additional studies increasing the number of participants are still necessary for a more precise estimation.

Conclusions: Determination of genetic variants in APOB and PPARA might be useful for identifying young population with increased risk of cardiovascular disease. GENYAL Platform opened to research groups and enterprises, is a high-level tool for Nutrigenomics and Nutrigenetics studies within nutrition and health.

Key words: nutrigenetics, cardiovascular risk, lipid metabolism

PO066

APPETITE ASSESSMENT IN HEMODIALYSIS PATIENTS

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Background and objectives: Malnutrition is highly prevalent and strongly associated with higher mortality risk in the hemodialysis (HD) population. Poor appetite is an important barrier to adequate nutrition among hemodialysis patients and may be influenced by many factors. The present study aimed to assess appetite in HD patients and to define the factors associated with appetite.

Methods: The study was conducted on 102 hemodialysis patients (33 women, 69 men). Anthropometric measurements and some biochemical parameters were analyzed. Appetite was assessed by 8-item Council on Nutrition Appetite Questionnaire (CNAQ). Responses are scored by using a 5-point verbally labeled, likert-type scale. The total CNAQ score was the sum of scores on the 8 items, with lower scores indicating deterioration in appetite. Possible scores range from 8 (worst) to 40 (best). All data was evaluated by SPSS 13.0 for Windows.

Results: The mean age of the patients was 54.3±15.81 years. The percentages of the patients who were underweight and

obese were 10.8% and 32.3%, respectively. The mean duration of chronic renal failure was 11.7±7.53 years and the mean duration of undergoing hemodialysis was 113.2±86.81 months. The mean CNAQ score was 27.4±3.88. There were no relationships between appetite and patient demographic (age, gender, education, health insurance) or medical (cause of renal failure, years on dialysis, number of co-morbid conditions, URR) characteristics. The mean appetite score was lower in patients with a BMI<18.5kg/m2 than the patients with a BMI between 18.5-24.9kg/m2 ($p<0.05$). There were significant positive correlations between serum hemoglobin, albumin levels and appetite scores ($r=0.220$, $p=0.026$; $r=0.265$, $p=0.007$, respectively).

Conclusions: As a conclusion poor appetite is prevalent in hemodialysis patients. Many factors are related with appetite in these patients. Patients who report poor or very poor appetites should be monitored, and they should receive more comprehensive nutritional assessments.

Key words: Malnutrition, appetite, hemodialysis

PO067

CASEIN PHOSPHOPEPTIDES AND CALCIUM BIOAVAILABILITY: AN EXAMPLE OF FUNCTIONAL FOOD

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Background and objectives: a prerequisite for a "functional food" is the retention or acquisition of a specific biological activity after the digestion process. Caseinphosphopeptides (CPPs), derived by casein proteolysis, have the ability to bind and maintain in solution calcium ions. In vitro studies using human intestinal cell models have demonstrated the involvement of CPPs in cell calcium uptake, depending on the formation of CPP-calcium aggregates and on the degree of differentiation of the intestinal cells. The present study has verified i) the persistence of the CPP-calcium aggregates ii) the maintenance of the ability by the CPP-calcium aggregates to induce intracellular calcium increase during and after the digestion process.

Methods: a calcium enriched CPP preparation of commercial origin was subjected to in vitro digestion by means of intestinal proteases and bile acids. The supramolecular structure of the CPP-calcium complexes was studied by laser-light and X-ray scattering. The bioactivity of the pre and post digested CPP-calcium complexes was analyzed monitoring the intracellular calcium increases in differentiated Caco2 cells (VideoImaging experiments using Fura-2).

Results: the supramolecular structure of the CPP-calcium aggregates is resistant to digestion, although a decrease in the size of the complexes was evidenced. The administration of the digested CPP in Caco2 cells gives rise to a higher percentage of cells that respond with an increase of intracellular calcium concentration than that due to the administration of not digested CPP ($p<0.01$ t-student, ÷2 test). In these cells CPP interacts with TRPV6 channel, which is localized in the duodenum, where the transport of calcium is active, vitamin D-dependent and triggered by low quantities of the mineral.

Conclusions: These results show that digestion renders the CPP-calcium complexes more bioavailable for transcellular calcium absorption and claims for a recognized role of CPPs as functional foods.

Key words: caseinphosphopeptides, intestinal cells, calcium, in vitro digestion.

PO068

EXPERIMENTAL ASSESSMENT OF DIETS WITH VARIOUS LEVELS OF CALCIUM AND VITAMIN D

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Background and objectives: The solution of the alimentary calcium deficiency problem is connected with increase in bioefficiency of calcium in functional foods. This study aimed to assess and analyze the optimum level of enrichment of food calcium and vitamin D.

Methods: In work Wistar rats which were on diets with the various content of calcium and vitamin D were used: from deficiency to several physiological levels. Indicators of mineral balance were exposed to the analysis: the weight of tibiae, levels of calcium, phosphorus, zinc and alkaline phosphatase in serum of blood, calcium and zinc in urine. Safety of enrichment was estimated on dynamics malonic dialdehyde (MDA) in erythrocytes.

Results: The diets which have been at the same time enriched with calcium and vitamin D at the level of two physiological norms appeared the most optimum. The most essential increase in weight of a body, and also relative and absolute weight of tibiae, in comparison with control was thus noted. At the animals receiving diets with double norm of calcium and vitamin D it wasn't noted zinc losses with urine. At the same time the increased intake of calcium without parallel enrichment of a diet by vitamin D led to reliable increase - for 81,7% ($p<0,05$) calcium losses with urine. At a combination of high level of vitamin D and low level of calcium in a diet were observed the increase: in activity of alkaline phosphatase on 124% ($p<0,05$),

removal of zinc with urine on 180% (p<0,05) and MDA in erythrocytes on 48% (p<0,05) in comparison with control.

Conclusions: The ratio of double norm of calcium and vitamin D in a diet most effectively supports mineral balance, without leading to zinc and calcium losses with urine.

Key words: calcium, vitamin D, zinc, functional foods

PO069

THE INSULIN SENSITIVITY MARKER LEVELS IN NEONATES IS ASSOCIATED TO THEIR MOTHER'S FTO GENE POLYMORPHISMS

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Background and objectives: Fat Mass and Obesity (FTO) gene shows very strong association with obesity and fat mass. To the best of our knowledge the influence of maternal FTO polymorphism on neonatal insulin sensitivity/resistance biomarkers has not been tested.

Methods: We analyzed the association between the common FTO rs9939609 polymorphism and neonatal anthropometrical measurements and hormone concentrations and insulin sensitivity at birth. Population. 63 at term, normal-weight Caucasian newborns from the Mérida cohort.

Results: 22 (34.9%) mothers were genotyped as TT, 32 (50.8%) as TA, and 9 (14.3%) as AA. 30% of neonates presented high insulinemia (>quartile 75 for insulinemia according to Gesteiro et al Eur J Ped 2009; 168: 281-288). Non-significant mother gene-influence was found for neonatal bodyweight, BMI or ponderal index. However, mother FTO gene polymorphisms were associated to significant differences in glucose, insulin, HOMA-IR (resistance), HOMA-IS (sensitivity) and glucose/insulin and insulin/cortisol ratio (all p<0.05) at birth. Neonates whose mothers were AA carriers showed at birth lower glucose, insulin and HOMA-IR, but higher HOMA-IS that neonates whose mother were TT carriers. 90% of neonates presenting high insulinemia were delivered by mothers carrying the T allele, while only 10% in their AA mother homozygote counterparts.

Conclusions: These findings suggest that mother FTO polymorphisms affect neonatal glucose homeostasis. The lower insulin and the higher insulin sensitivity of neonates from the mother AA group, suggests that these neonates would develop obesity later in life, as it is known for small-for-gestational-age-children, if they consume inadequate diets (e.g. rich in energy and/or SFA, non-Mediterranean profile).

Key words: FTO gene, neonates, insulin, HOMA, sensitivity/resistance markers.

PO070

ADOLESCENT ABILITY TO SELECT HEALTHY FOOD USING TWO DIFFERENT FRONT-OF-PACK FOOD LABELS: A CROSS-OVER STUDY

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Background and objectives: Potentially, food labelling is a valuable tool to help consumers make informed decisions about their diet in order to improve health and prevent chronic diseases. Our objectives are to compare two models of front-of-pack GDAs in terms of a) consumer friendliness and acceptance, and b) the ability of the consumer to choose a diet closer to nutritional recommendations in adolescents.

Methods: A randomized crossover study was designed to compare two simplified front-of-pack GDA nutrition labels. Eighty-one healthy adolescents aged between 14 and 16 years were recruited. Participants were randomly exposed to two experimental non-real food-choice conditions using multiple traffic-light or monochrome nutritional labels. Participants had to choose options from a closed menu for five days on the basis of the experimental front-of-pack labelling. For each meal, three food options with different nutritional compositions were given to the participants. The total energy and fat, saturated fat, sugar and salt of the chosen options were calculated.

Results: There were no significant differences in baseline socio-demographic and anthropometric characteristics between individuals regardless of the experimental condition in which they started. There were no carryover effects between the experimental sequences. It was observed that when participants used the multiple traffic light system they chose significantly less total energy (-29.4±50.4 kcal; p<.001), sugar (-4.5±4.6 g; p<.000), fat (-2.1±4.5 g; p=.006), saturated fat (-1.0±1.9 g; p=.002 and salt (-0.4± 0.5 g, p<.000) than when they used the monochrome GDA system.

Conclusions: Compared to the monochrome GDA front-of-pack nutritional label, the multiple traffic-light system helped adolescents to differentiate between healthier and less healthy food, making it theoretically possible for them to choose a diet closer to dietary recommendations.

Key words: Front-of-pack food label, traffic-light, consumer preference, adolescent.

PO071

EFFECTS OF UNDERNUTRITION DURING DEVELOPMENT ON POST-DEPRIVATION FOOD INTAKE AND BODY WEIGHT ON WISTAR RATS

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Background and objectives: Experimental and epidemiological studies demonstrate the relationship between the organism development period and factors such as the environment, diseases, stress and maternal diet. These factors influence the intrauterine environment and have a relationship with changes on feeding behavior. Studies that examined malnutrition effect on feeding behavior and body weight reported an increase in water and food consumption per unit of body weight, retarded growth and a lower body weight even after a free access stage to food. This study determined the feed restriction effects during development on body weight and food intake of rats in a free access period following water and food deprivation.

Methods: Eighteen Wistar rats were exposed to one of three food restriction programs (50% relative to controls): pregnancy restriction, pregnancy and lactation restriction, and restriction from gestation to day 60 of age, another group was under open access to food and water condition throughout their life. On day 60 of age were deprived of food and water for 72 hours. At the end of the period of deprivation, water and food were available. Body weight and food consumption was recorded throughout the experiment.

Results: Results suggest that there aren´t big post deprivation food consumptions. There was a small loss and a faster recovery of body weight in food-restricted groups. Furthermore, there was a greater impact of food restriction on males body weight.

Conclusions: Maternal food restriction duration is related to the loss and recovery of body weight and feed intake of pups.

Key words: Undernutrition, deprivation, food intake, body weight, rats

PO072

LOW BIRTH WEIGHT CHARACTERIZATION AND RELATED FACTORS, COLOMBIA 2004-2008

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Background and objectives: Birth weight is an indicator of public health, gestational, fetal and neonatal conditions. Through vital statistics it is possible to analyze low birth weight and some related factors. The purpose was to describe the trend and association with variables of birth vital statistics and guide strategies to control.

Methods: Descriptive analytical study of births (Colombia 2004-2008). Records include birth weight defined as dependent variable. The association was studied by a multivariate binary logistic regression. Three categories of analysis were made: total, preterm and term cases. Birth weight was recategorized based on gestational age.

Results: National average of births 710,000; of those 90% born at term; 78% in urban areas. 66% were of mothers from 20 to 34 years. Between 73-81% of pregnant women attended +3 prenatal visits. Pregnancies were single (97%) and (42%) was the first child. Low birth weight increased from 7.3% to 8.8%; it was higher in premature (56%) and girls (9.6%), the 50% were in term births. Girls low birth weight could be attributed mainly whose mothers were <20 and >35 years old OR1.10 (IC1.08-1.13), who delivered by cesarean OR1.68 (IC1.64-1.61) and did not attend prenatal care OR1.32 (IC1.29-1.36). This same condition, although higher, was presented in children born at term. Women who gave birth to their first child, had greater risk. With birth weight adjusted by gestational age, the association increased in girls OR1.36 (IC1.33- 1.39).

Conclusions: Low birth weight has increased and is higher than national and international surveys. There was association with female, primiparous and attending +3 prenatal visits, being a teenage mother, living in rural area, being unmarried and having basic education level; when prematurity was controlled, sex, maternal age and education level showed better associations.

Key words: birth weight, vital statistics, live births, Colombia

PO073

ILSI PERSPECTIVE – ILSI EUROPE MARKER INITIATIVE: WHAT MAKES A MARKER A VALID MARKER?

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Background and objectives: Nutrition science seeks to understand how what we eat impacts our health. For various reasons, aspects of health often cannot be directly measured, therefore there is the need to seek criteria for the validation of markers, which can be anything that is measurable and 'marks' a health endpoint.

Methods: The first step of the activity was to review generic criteria markers validation. In parallel with this, experts in several health domains discussed and documented the empirical criteria used in their domain of nutrition research. Subsequently, a workshop in Lisbon in June 2012 sought to integrate these two approaches into one set of criteria by comparing the empirical reality with the current theoretical framework.

Results: The following criteria were identified during the workshop: -Analytics Method of measurement must be valid according to recognised guidelines. This may include robustness, analytical sensitivity, reproducibility, accuracy, quality assurance and standardization. -Marker must reflect a health endpoint a. There must be a statistically significant association between marker and health endpoint. This must be observed in a population representative where the marker is to be used. b. Across intervention studies on the impact on both the putative marker and the health endpoint it supposedly marks, one must see an association between the impacts on the marker and on the endpoint. The marker must change consistently with a change in the endpoint. This can be supported by observational human studies, and animal and in vitro studies. Additional mechanistic understanding of how the marker may reflect the endpoint should be also provided.

Conclusions: The next step of the activity will be to develop a system for grading and weighing the evidence for validity of markers. This system will be elaborated taking into account diverse areas in nutrition research.

Key words: Markers, criteria, nutrition, validation

PO074

CORRELATIONS BETWEEN BODY FAT AND BODY MASS INDEX IN AUSTRIAN CHILDREN

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Background and objectives: For the assessment of overweight and obesity in children measurement of BMI is recommended. Although there is evidence that BMI correlates with body fat, especially in childhood there are age-related variances, which are due to growth-related changes in the proportion of muscle and bone mass to fat mass. So the question arises: is the measurement of BMI alone an adequate indicator of body fat? We aimed to identify the correlation between body fat and BMI among Austrian children.

Methods: 188 girls and 198 boys aged between 7 and 14 years participated in the study. BMI was calculated from measured data of body height and body weight. Body fat (in %) was measured using bioelectrical impedance. For the definition of overweight and obesity the 90th and 97th BMI percentiles were used, for the classification of body fat standard values using the 90th percentile as a cut-off point.

Results: The prevalence of overweight and obesity calculated using BMI was 21.7% in girls and 26.1% in boys. While, 24.5% of the girls and 10.9% of the boys were found to be above the 90th percentile of body fat. Although the correlation between BMI and body fat was significant in both, girls (rho=0.793; $p<0.001$) and boys (rho=0.682; $p<0.001$), especially among boys there is a big discrepancy between these values.

Conclusions: The increase of BMI during adolescence in boys is mainly based on an increase in LBM whereas girls gain mainly body fat mass. In girls body fat contributes more than LBM to overweight. So it is useful to measure both, BMI and body fat, for the assessment of overweight and obesity.

Key words: body fat, bmi, children

PO075

EFFECT OF COOKING ON PHYSICAL PROPERTIES, SENSORY EVALUATION, ANTHOCYANINE, AND POLYPHINOLIC CONTENTS OF PIGMENTED RICE GRAINS

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Background and objectives: The economic value of rice depends on its cooking and processing quality. During cooking, rice was changed in physical propertiesand nutritional qualities. The objectives of this research were to study effects of three cooking methods on four pigmented rice grains as boiling, steaming and rice cooker.

Methods: Physical properties such as colour, amylose content,sensory attributes,total anthocyanine (TAC) and phynolic contents (TPC).

Results: Steaming cooked black rice (Oryza sativa L. indica) was the most darkness with L* value of 39.63, while black rice was the best lowest stickiness in all cooking methods as (5.31, 4.18 and 4.08 N) for boiling, steaming and rice cooker, respectively. Black rice (23.76%) which was classified as intermediate amylose rice (20-25%) before cooking kept intermediate after cooking by rice cooker as (21.56%). Waxy rice belonged to moist and sticky rice's after cooking as amylose content (7.24%). Steamed black rice was the most preferred appearance (8.59),black rice which cooked by rice cooker scored the highest accepted texture (8.04), while boiled black rice was the most accepted taste as (9.04). Steamed Egyptian jasmine white rice was the highest accepted aroma (8.69). Black rice contains the highest naturally occurring (TAC) as (235.68 - 290.78 mg/100 gm)after cooking. That indicated that cooking rice by steaming is the preference cooking method caused the lowest loses in (TAC).(TPC) differed significantly between the varieties. All methods of cooking rice caused a significant decrease in total polyphenols. Cooking rice by steaming also was the best way for decreasing loses of (TPC) for all rice varieties as (25.54, 47.61, 71.22 and 29.34 mg GAE/g), respectively.

Conclusions: Guides in using steaming which was found to provide the mostdesirable quality for rice cooking in terms of physical quality, sensory properties with enhanced antioxidants compounds.

Keywords: Pigmented-rice,cooking, amylose,anthocyanins, phenolics.

PO076

PROTEIN QUALITY OF HIBISCUS SABDARIFFA L. (ROSELLE) SEEDS CULTIVATED IN TWO AGRO ECOLOGICAL AREAS IN CAMEROON

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Background and objectives: Protein malnutrition is real in most developing countries because of the low level animal protein intake. There is a need to diversify protein sources. Roselle seeds have been found to contain high protein value. This study investigated the bioavailability of three sets (raw, boiled, toasted) of Roselle proteins seeds.

Methods: Seeds were harvested in the North (area I) and West (area II) regions of Cameroon. Raw seeds were processed by sun-drying, boiled seeds were boiled for 50 min and toasted seeds were toasted for 7 min. 48 rats of 21 to 25 days were used and fed for fourteen days with 10% (w/w) protein from raw (RRSI, RRSII), boiled (BRSI, BRSII), and toasted (TRSI, TRSII) Roselle seeds of area I and II respectively where egg white was used as standard protein (S). The nitrogen balance parameters and transaminases were measured. Results were reported as mean ± SD and statistical analysis was done using one way ANOVA and Bonferroni tests. A P value of less than .05 was considered statistically significant.

Results: Results show that crude protein content of boiled seeds was slightly high. There was significant difference ($P<0.05$) in food intake of all groups of rats compared with S, except for BRSI and BRSII. The weight gained, protein efficiency ratio (PER), net protein ratio (NPR), growth rate (GR), efficiency of food utilization (EFU) and true digestibility (TD) of rats fed with boiled seeds diet were significantly higher ($P<0.05$) than raw and toasted seeds diets.

Conclusions: These findings show that Roselle proteins seeds cultivated in Cameroon are bioavailable especially for boiled seeds. Proteins seeds quality is not influenced by the agroecological area. No toxic effect was observed as far as transaminases are concerned except for raw seeds which shown significant hepatotoxicity effect.

Key words: Roselle seeds, proteins, bioavailability, rats.

PO077

SAMBUCUS EBULUS FRUIT EXTRACTS REDUCE TNFÁ AND IL6 EXPRESSION ELEVATED IN ETHANOL-TREATED 3T3-L1 PREADIPOCYTES

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Background and objectives: It is well known that ethanol (EtOH) consumption is linked with development of many pathological conditions. Studies focused on EtOH effect find out that it can cause oxidative stress, inflammation and related diseases. Sambucus ebulus L. (SE, Dwarf elder) is a plant with fruits rich in polyphenol compounds including anthocyanins and phenolic acids, which explains its antioxidant and anti-inflammatory potential. In traditional medicine of the Balkans, Anatolia and Middle East it is applied for immunostimulation and treatment of inflammatory related disorders. Tumor necrosis factor alpha (TNF) and interleukin 6 (IL-6) are cytokines which elevated levels are involved in inflammation. This study aims to examine the effect of SE fruit ethyl acetate fraction (EAF) on TNFá and IL-6 gene expression in EtOH treated 3T3-L1 mouse preadipocytes.

Methods: 3T3-L1 cells were treated with SE EAF dissolved in EtOH and with EtOH as a control in different concentrations. Real Time quantitative polymerase chain reaction (RT qPCR) was performed to measure TNFá and IL-6 gene expression levels. Relative gene expression levels were calculated using 2-ÄÄ Ct method. All measurements were performed in triplicates.

Results: EtOH treatment caused an elevation of TNFá and IL-6 gene expression in 3T3-L1 preadipocytes. In cells treated with SE EAF in EtOH, TNFá and IL-6 expression was lower. Concentration of SE EAF 0.02% w/v in the culture medium caused 64% ($p<0.01$) lower expression of TNFá gene and concentration of SE EAF 0.01% w/v caused 71% ($p<0.01$) lower expression of IL-6 gene, as compared to controls.

Conclusions: Results from this study testify for anti-inflammatory potential of SE fruit extract and suppose a possible therapeutic action in case of EtOH induced inflammation and related disorders.

Key words: Sambucus ebulus, ethanol, IL-6, TNFá, 3T3-L1

PO078

EFFECT OF HEMODIALYSIS AND PERITONEAL DIALYSIS ON MALNUTRITION, INFLAMMATION AND ATHEROSCLEROSIS (MIA) SYNDROME IN CHRONIC RENAL FAILURE PATIENTS

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Background and objectives: Malnutrition, inflammation and atherosclerosis (MIA) syndrome are common in patients with chronic renal failure (CRF) and are associated with an increased risk of cardiovascular disease (CVD). The aim of this study was to compare MIA syndrome components in two dialysis modalities.

Methods: A cross-sectional study was carried out in 80 patients divided into 3 groups: moderate CRF (n = 28), hemodialysis (HD; n = 40) and peritoneal dialysis (PD; n = 12). Serum albumin was measured by standard techniques using an automatic analyzer (HumaStar 600). Pre-albumin and transferrin were measured by nephelometric immunoassay (MINI-NEPHTM human transferin kit: ZK070.R). Tumor Necrosis Factor (TNF-α interleukin-1 β (IL-1β interleukin-6 (IL-6) and C-reactive protein (CRP) were analyzed by assay kit (ELISA) (Cayman Chemical's ACETM EIA kit), tHcy was determined by fluorescence polarization immunoanalysis (HPLC, PerkinEmer 200 series).

Results: Compared to CRF and DP, we noted a significant decrease ($p<0.001$) in serum transferrin (1.86 ± 0.39g/l), albumin (41.40 ± 4.48g/l) and pre-albumin (0.32 ± 0.11g/l) concentrations in HD patients. Whereas, significant increase in TNF-α(16, 38 ± 5.52pg/ml), IL-1β (9.63 ± 3.50pg/ml), IL-6 (11.05 ± 3.59pg/ml) and CRP (18.17 ± 6.38mg/l) concentrations were noted in HD ($p<0.001$). Similarly, a significant increase In tHcy was observed in HD and PD compared to CRF ($p<0.001$), with mean values: (32.27 ± 12.08µmol/l) in HD, (28.37 ± 4.98µmol/l) in DP and (8.05 ± 2.43µmol/l) in CRF.

Conclusions: Renal replacement therapies have a strong effect on the increased concentration of homocysteine and cytokines, which leads to an increase in the spread of inflammation and risk of atherosclerosis leading to a decrease in appetite which explains malnutrition.

Key words: Pro-inflammatory cytokines, homocysteine, nutritional status, Renal replacement therapies.

PO079

COMPARISON OF COMPONENTS OF DIET OF MOTHERS WHO DELIVERED FULL-TERM BABIES, PRETERM BABIES, AND SMALL FOR GESTATIONAL AGE INFANTS

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Background and objectives: Numerous studies have shown that an inadequate supply of certain dietary components in pregnant women's diets can lead to their children having health problems, both before and after birth. The aim of our study was to determine whether the dietary microelement and vitamin intake of mothers who gave birth to preterm, and full-term but small for gestational age neonates, differed from the diet of mothers whose children were born appropriate for gestational age.

Methods: The study population consisted of 103 women divided into three groups. Group A (n = 50): healthy mothers of full-term neonates. Group B (n = 30): mothers who gave birth prematurely – between 35-37 weeks. Group C (n = 23): mothers who gave birth to full-term but small for gestational age neonates. The women's eating habits and dietary composition were estimated based on the monthly dietary questionnaire designed by the National Food and Nutrition Institute in Warsaw, Poland.

Results: There were no statistical differences in levels of any of the studied vitamins between the three groups. Amongst the microelements studied, calcium was the only component which varied in level between groups. The difference in levels of calcium concerned mothers in groups A and B. The average daily calcium intake of mothers in group A was 1235 mg; 955 mg in group B, and 1022 mg in group C. The calcium intake of mothers in groups A and C represents an adequate calcium intake. The group B findings represent a lower than expected calcium intake.

Conclusions: The microelement and vitamin intake of mothers was similar across the three groups studied and were all found to be within the normal range. Calcium was the only dietary component which varied significantly in level between groups, being significantly lower in group B – mothers who gave birth prematurely.

Key words: Microelements, vitamins, pregnancy

PO080

DETERMINANTS OF SEVERE MALNUTRITION OF CHILDREN AND OBSTACLES OF ITS MANAGEMENT AT OUAGADOUGOU (BURKINA FASO)

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Background and objectives: Children malnutrition is a public health problem in sub-Saharan Africa particularly in Burkina Faso where the mortality rate is always high compare to international recommendations. Poverty, difficulties to access health centers and ignorance are the main constraints for eradication of morbidity and mortality due to malnutrition. The general objective of this study is to describe the route followed by children during malnutrition management and know the different obstacles between admission and recovery. It help to detect probably causes of children malnutrition, types of interactions, eating behaviors and the family context associated to appearance and evolution of children illness.

Methods: A longitudinal study was carried out on 60 severely malnourished children aged 6 to 59 months admitted at nutritional and rehabilitation unit (CREN) of Centre Medical Saint Camille Ouagadougou. Weight, height/length, age and MUAC were taken for each child. A structured questions focused to socio economic, clinical, environment, health facilities and history parameters were been asked to parents or care givers.

Results: It appears that 80% of mothers did not have a job or access to a regular income. The duration of malnutrition is around 28 ± 6 days with an efficacy of 86,7%. Analysis by correlation indicated interaction between the economic situation of the family and the household food insecurity ($r = 0,257$; $p = 0,007$). There is a strong interaction between the status of the child in the siblings, maternal isolation, and the role of health facilities to the child ($r = 0,356$, $p = 0,000$).

Conclusions: These results indicated that a better knowledge of the social environment, food history, access to care and food, the purchasing power and the improvement of parents' education must be integrate into malnutrition management in order to alleviate high prevalence of malnutrition.

Key words: malnutrition, determinants, children, Burkina Faso

PO081

NOVEL STRATEGY FOR PREVENTING POSTPARTUM DEPRESSION

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Background and objectives: Postpartum depression (PPD) is the most common complication of childbearing with a 13% prevalence rate. Currently there are no routinely available

Methods of prevention besides antidepressant medication. Tyrosine, tryptophan and tryptophan containing proteins have potential for preventing PPD as they are precursors for the mood supporting neurochemicals serotonin, norepinephrine and dopamine. This is the first study investigating whether oral intake of tyrosine and tryptophan influences their concentrations in breast milk.

Methods: 48 healthy breastfeeding women were randomly assigned to one of 8 conditions. These were administration of single oral doses of 2, 5, and 10 grams of tyrosine, 2 and 4 grams of tryptophan, 20 and 40 grams of alpha-lactalbumin; or a control condition of no supplement. Five breast milk and 7 blood samples were obtained over the subsequent 8 hours. Free tyrosine and tryptophan was also measured in common infant formulas (12 formulas tested, n=6 samples per formula)

Results: There was no rise in total tyrosine and total tryptophan in breast milk with any dose (RM ANOVA: p=0.321, p=0.787 respectively). A significant rise in maternal plasma tyrosine and tryptophan occurred (p<0.005, p<0.005). There was a significant rise in free tyrosine and free tryptophan in breast milk in each group (p<0.005, p<0.005). Free tyrosine and tryptophan levels in breast milk were similar to the infant formulas.

Conclusions: Tyrosine, tryptophan and alpha-lactalbumin administration did not change total tyrosine and tryptophan and the free levels were within the range of what is observed in approved infant formulas. Also, free tyrosine is less than 1/200 of the total tyrosine in breast milk; and free tryptophan is less than 1/1000 of total tryptophan in breast milk. The negligible effect of these supplements upon breast milk creates further opportunity to develop this novel prevention strategy for PPD.

Key words: Postpartum Depression, Prophylaxis, Supplements

PO083

DOCOSAHEXAENOIC ACID INHIBITS TNF£\-INDUCED ICAM-1 EXPRESSION VIA ATTENUATING EARLY GROWTH RESPONSE-1 EXPRESSION IN EA.HY926 CELLS

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Background and objectives: Tumor necrosis factor-alpha (TNF£\), a potent inflammatory mediator, has multiple effects on the pathogenesis of atherosclerosis. Early growth response-1 (Egr-1), a zinc finger transcription factor, participates in cell growth and differentiation. Recently, Egr-1has emerged as a key regulator in the development of atherosclerosis. Docosahexaenoic acid (DHA), an omega-3 fatty acid (n-3 FA), has potent anti-inflammatory effect. It is demonstrated that G protein-coupled receptor 120 (GPR120) functions as an n-3 FA receptor. In our previous study, we have demonstrated that DHA inhibits TNF£\-induced intercellular adhesion molecule 1 (ICAM-1) expression via enhancing HO-1 expression. In this study, we try to identify the role of Egr-1 in DHA inhibition of TNF£\-induced ICAM-1 expression in EA.hy926 cells.

Methods: In this study, we used EA.hy926 endothelial-like cells as cell model, and used Western blotting, real-time PCR, shRNA, and adhesion assay to explore the anti-inflammatory activity of DHA.

Results: TNF£\ markedly induces the phosphorylation of ERK1/2, p38 and Akt. Treatment with ERK inhibitor, PD98059, or PI3K inhibitor, LY294002, abolishes TNF£\-induced Egr-1 expression; however, ICAM-1expression is only blocked by PD98059. Transfection with shEgr-1 knocked down Egr-1 expression, and blocked TNF£\-induced ICAM-1expression. Transfection with shGPR120 knocked down GPR120 expression, and reversed the DHA-mediated inhibition of TNF£\-induced ICAM-1 expression. In addition, TNF£\-induced adhesion of HL-60 to EA.hy926 cells was abolished by PD98059 or SB203580.

Conclusions: Taken together, the anti-inflammatory effect of DHA is partially via GPR120, and followed by down- regulation of ERK-1/2-dependent Egr-1 and ICAM-1 expression.

Key words: DHA, Egr-1, ERK1/2, Inflammation, EA.hy926

PO085

CULTURAL INFLUENCES, VITAMIN D STATUS AND CARDIO-METABOLIC HEALTH IN EAST ASIAN ADULTS LIVING IN AUSTRALIA

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Background and objectives: The East Asian population represents one the most rapidly growing in Australia and is relatively young. Few studies have addressed the relationship between culture transition, vitamin D status and cardio-metabolic risks, despite a large influx of Asian migrants in the past decade. Objective: To investigate vitamin D status and markers of cardio-metabolic health in East Asian community-based individuals living in Canberra, Australia; and to explore the association between acculturation and cardio-metabolic risks.

Methods: The study group consisted of 100 East-Asian Australians (i.e. with a Chinese, Korean or Japanese ancestry) with age ranging from 20-80 years. Data were collected on a range of measures of sun exposure, physical activity and diet. Acculturation was measured using a short form of an acculturation rating scale for Asian migrants. Measurements of height and weight (to calculate body mass index), waist circumference and blood pressure were taken during a face-to-face interview. Serum 25-hydroxyvitamin D (25(OH)D) concentration and fasting blood glucose, lipids (triglyceride, high-density lipoprotein cholesterol, low density lipoprotein cholesterol and total cholesterol) and hsCRP were measured. Participants were categorized into three groups (Traditional, Bicultural, Acculturated) based on the acculturation score, using cluster analysis. Descriptive statistics were used to describe relevant health behaviours, serum 25(OH)D levels and concentrations of cardio-metabolic markers in each group. Ordinal logistic regression models were fitted to assess the association between acculturation level and vitamin D deficiency (<50nmol/L) using the traditional group as reference. Pearson's correlation was used to assess the correlation between Serum 25(OH)D level and each cardio-metabolic markers.

Results: Data collection for the Asian Australian Health Study is ongoing. Study results will be presented at the conference.

Conclusions: Our results will allow us to better understand the influence of culture on cardio-metabolic health in a multicultural community.

Key words: Acculturation, Vitamin D, East Asian, Cardio-metabolic health

PO086

A STUDY OF DEVELOPMENT THE SERVING SIZE OF FOOD AND NUTRIENT RICH INDEX IN TAIWAN

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Background and objectives: According to the daily food guides, proper food intake means proper quantity and quality of food selected by energy density and nutrient density, but the standard of serving size for proper food intake is not established yet. The problem in practice is that the difference of definition and standard of serving size and nutrition facts between market commodities and the exchange list could make the consumer confused to choose proper food. Therefore, it is necessary to establish a convenient and unified standard of serving size and nutrition rich food index for the public to choose proper food and nutrients.

Methods: We used a Taiwan food nutrient database for 837 foods. The serving size was defined by the Taiwan new daily food guide, and we calculated the weight of 837 foods. The nutrient rich food 9.2 indexes (NRF9.2) was defined as the food values for 11 nutrients, based on serving size and 100 cal of food.

Results: Significant result of this study was found that the one serving size of rice and vegetables were 50 g and 100 g that defined by the food exchange list was different from the definition of the new daily food guide. The one serving size of rice and vegetables defined by the new daily food guide were 38 g and >100 g. On the other hand, we used a Taiwan food nutrient database for 837 foods, including 136grains, 304 meats, 160 vegetables, 101fruits, low fat dairy, and 71fat and nuts. The NRF9.2 index defined as the serving size was different from that defined as 100 kcal.

Conclusions: The NRF9.2 index defined as the serving size could be readily expected to rank foods based on nutrient density.

Key words: diet, serving size, dietary behavior, nutrient density, nutrient profiling

PO087

ANTIOXIDANT STATUS OF ALLIUM SCHOENOPRASUM TISSUE CULTURE ORGANS

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Background and objectives: This study was designed to examine Allium schoenoprasum tissue culture organs antioxidant and scavenging activity. Cultured plant cells synthesize, accumulate and sometimes exude many classes of metabolites. Medicinal compounds are of particular interest and much effort has been devoted to obtaining some of the most active and precious therapeutics. Numerous compounds which possess antioxidant activity have been reported from in vitro cultures.

Methods: This study reports the results on the root, stalk and leaf antioxidant enzyme activities (superoxide dismutase, catalase, guaiacol peroxidase and glutathione peroxidase), total phenol content, different radical (DPPH, $NO^{\bullet}$, $O_2^{\bullet-}$ and $HO^{\bullet}$) scavenging capacities and also H_2O_2 scavenger capacity. In Allium schoenoprasum tissue culture organs the total antioxidant capacity was determined by the FRAP method.

Results: The present results indicated that the crude extract of Allium schoenoprasum tissue culture exhibited antioxidant and scavenging abilities in all investigated plant parts. Antioxidant enzyme activities and radical scavenging capacities (except $NO^{\bullet}$) showed the highest values in the roots and therefore the lowest lipid peroxidation. The highest values of $NO^{\bullet}$ and H_2O_2 scavenging capacities were in the leaves. Therefore the leaves of Allium schoenoprasum tissue culture could be used as a source of natural antioxidants in the pharmaceutical, cosmetic and food industries for manufacturing untoxic products with potent medicinal and antioxidant activity.

Conclusions: Our investigation could be a starting point for further phytochemical investigations of Allium schoenoprasum tissue culture organs. The present results could be also beneficial for conventional herbalism and the possible future use of in vitro cultures as remedies.

Key words: antioxidant; Allium schoenoprasum; tissue culture; FRAP, DPPH

PO088

MATERNAL EMPLOYMENT AND NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN RESOURCE LIMITED SETTINGS OF OYO-STATE,NIGERIA

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Background and objectives: Childhood nutrition is known to have a considerable impact on children's health. The objective of the present study is the relationship between maternal employment and nutritional status of pre-school children from resource limited settings in akunfo, a rural area located in iddo local government of oyo-state, Nigeria.

Methods: A total of 950 pre-school children were studied to assess anthropometric measurements of height,weight,mid-upper arm,head and chest circumferences for each pre-school child using standard procedures together with structured questionaires which sought information on maternal daily working time,income,education and use of substitute care givers.

Results: The findings showed that maternal education and working time are the two most important intervening factors in the relationship of maternal employment to child's nutritional status in many of the variables considered.variations in time mothers spent with their children daily were found to be significantly ($p<0.05$)related with their occupational status. Using weight for age parameters, 27.8% had mild protein-energy malnutrition (pem), 20.1% were moderately malnourished and 12.8% were severely malnourished. The level of malnutrition was 41.2%, 24.8% and 14.8% for mild, moderate and severe respectively using height for age. However level of wasting was 28.3% for mild pem,while 16.6% and 10.6% for moderate and severe respectively.

Conclusions: Maternal education and working time are the two most important intervening factors in the relationship of maternal employment to child's nutritional status in many of the variables considered.variations in time mothers spent with their children daily were found to be significantly ($p<0.05$)related with their occupational status.

Key words: pem, nutritional status, maternal employment, resource limited settings, pre-school children.

PO089

ASSESSMENT OF DIETARY HABITS IN OBESE PATIENTS

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Background and objectives: A key factor in the progressive increase in the prevalence of obesity is poor dietary habits. Treatment of obesity with regular diets often fail, so knowing the specific habits of can be very useful to individualize treatment. We aimed to evaluate the dietary habits of subjects consulting for obesity.

Methods: We conducted a survey of eating habits for obese patients who consulted for this reason during previous two months.

Results: Data from 68 patients were collected.Mean age:52.8+/-17.5years,34.4% males.64.7% had diabetes,50% were hypertensive and 58.8% dyslipidemic.Mean BMI at first visit was 39.77+/-5,45 and BMI at the time of the survey 37.62 +/-7.24(66.7% between 25 and 40 and 33.3% over 40). Mean weight:112.0+/-24.36kg initially vs 105.1+/-21.77 kg finally,with a mean follow-up of 2.5 +/-2.1 years.81,3% had received dietary advice by a dietitian.28.5% of patients responded correctly to more than 75% of questions,39,% between 50 and 75% and 32,1% responded adequately to less than 50%. Subjectively,patients thought their diet was poor,fair,good,very good and excellent in 3.6%,53.6%,32.1%,10.7% and 0% respectively.There was a significant association between subjective scores and dietary questionnaire:subjects who responded appropriately to more than 75% felt their diet was poor,fair,good or very good in 0%,25%,50% and 25% of cases and subjects who responded correctly to less than 50% of questionnaire felt that their diet was poor in 11.1%,fair in 77.8% and good in 11,1%(p 0.007).Presence of adequate habits(over 75% correctly responses) was significantly associated with instruction by the dietitian(34.8% in instructed vs0% in subjects not instructed,PO.047)but there was no association to any other features studied:BMI(22.2% in morbid vs23.5% in no morbid),sex(35.3% in women vs 18.2% in men),age(31.6% in > 40 years vs 22.2% in<40years),diabetes(25% in diabetics vs 33.3% in non-diabetics),hypertension(35.7%vs21.4%)or dyslipidemia(28.6 % vs 28.6%).

Conclusions: Although dietary education improves eating habits of obese patients,a high percentage remain with inadequate dietetic costums,which could be a key factor in the failure of obesity treatment.

Key words: obesity, dietary customs

PO090

ALIMENTATE SANO: AN INTERNET TOOL TO EVALUATE AND PROMOTE HEALTHY LIFESTYLES FOR PREVENTION OF CHRONIC DISEASES

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Background and objectives: Web-based programs offer good potential for health education. Aliméntate Sano (AS, www.alimentatesano.cl) is an internet tool developed in Spanish to promote and educate on healthy lifestyles -including Mediterranean Diet (MD)- as strategy to prevent chronic diseases in adult population (> 20 years old).

Methods: AS has two sections: 1) Education on healthy lifestyles (MD, physical activity and no-smoking) and chronic disease prevention; and 2) Fitbook: personal and private evaluation and follow-up of lifestyle and disease risk. Lifestyle was assessed through a MD Score (MDS, ranging from 0 (very-unhealthy diet) to 14 (very-healthy diet)) as well as questionnaires of physical activity (IPAQ short Spanish version), smoking, and resting and eating habits. Health condition was measured by self-reported metabolic syndrome (MS) components and body mass index (BMI). Based on evaluation, users received recommendations and periodical reminders to improve their lifestyle.

Results: After 2 years of operation, AS has over 55,000 users. Data from 30,000 Chileans who completed all their records were analyzed. 61% were women, 72% young adults (20-40 years old), and 80% had higher education. To reduce biases, lifestyle and health data were weighed by age and sex. In this sample, only 11% of Chilean adults eat healthy diet (MDS ¡Ý 9), 46% have low physical activity and 37% smoke. With regard to health status, 65% show overweight or obesity and 25% have MS. Adults with bad lifestyle have 4-fold higher prevalence of MS than those with excellent lifestyle. Users who maintained at least one year adherence to AS, improved their diet from 6.0 to 6.9 in MDS (p value <0.0001).

Conclusions: AS is a feasible approach for education and promotion of healthy lifestyles and it can improve dietary intake in users. Website-based strategies may have significant impact in chronic disease prevention.

Key words: Mediterranean diet, lifestyles, e-learning.

PO091

NUTRITIONAL FACTORS INFLUENCE BONE MICROARCHITECTURE DURING GROWTH. SHAHMORADI N, IULIANO-BURNS S, WANG XF, GHASEM-ZADEH A, ZEBAZE R, WANG Q AND SEEMAN E DEPTS OF ENDOCRINOLOGY AND MEDICINE

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Background and objectives: High resorptive modeling (not followed by formation at the same location) and remodeling activity excavate the medullary canal determining cortical thickness together with periosteal apposition during growth. At the ends of long bones, endochondral apposition and condensation of growth plate trabeculae form the metaphyseal cortex with varying degrees of porosity determined by the differing tempo of longitudinal and appositional growth. We hypothesized that a higher intake of calcium, vitamin D and protein during childhood are associated with attainment of a more robust appendicular skeleton; thicker and less porous cortices and a smaller medullary canal.

Methods: We measured tibial macro- and micro-architecture using high-resolution peripheral quantitative computed tomography (HR-pQCT). Dietary intakes: using 3-day weighed-food diaries.

Results: Cross-sectional study of 62 healthy boys and girls aged from 6 to 18 years (mean 11 years) of whom 53.2% were prepubertal, 27.4% peripubertal and 19.4% postpubertal. Intakes were calcium (803 mg, range 216 to 1623), vitamin D (2.89 ug, range 0.6 to 9.9) and protein (82 g, range 25.9 to 208). Results were expressed as mean, 95% confidence interval (CI). In a General Linear Model multivariate analysis, the effect size (ES) estimated from the partial beta2 is greater between cortical volumetric bone mineral density (vBMD) and calcium intake (ES= 0.025%, 95% CI, -0.095 to 0.022) and vitamin D intake (ES= 0.054%, 95%CI, -18.5 to 0.72). Protein intakes explained the greatest effect size (ES= 0.054, 95 % CI, 0.107 to 3.206%) on total cross sectional area of the tibia compare to other bone macro- and microarchitecture results.

Conclusions: Two factors limit the power of this study, the small sample size and the range of nutritional intakes which may be above those defining 'insufficiency'. Within these constraints we infer that ensuring adequate protein intake may benefit the attainment of peak bone microstructure during growth.

Key words: HR-pQCT, modelling, remodelling

PO092

EVALUATION OF AVAILABLE ENERGY OF SEVERAL DIETARY FIBER MATERIALS BASED ON THE FERMENTABILITY FROM BREATH HYDROGEN EXCRETION IN HEALTHY SUBJECTS

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Background and objectives: Dietary fiber is fermented readily or poorly by intestinal microbiota. Short-chain fatty acids, which are the product of fermentation, are utilized solely as the energy source of the host. However, the method used to evaluate the available energy (AE) of nondigestible and fermentable carbohydrates has not been established. The objective was to evaluate AE of major dietary fiber materials (DFMs) based on the fermentability from breath hydrogen excretion (BHE) in healthy subjects.

Methods: Fructooligosaccharide (FOS) which is not digested and fermented completely by intestinal microbes was a positive control. Experimental design: Within-subject, repeated measures design

Results: After DFM ingestion, end-expiratory gas (750-mL) was collected at 1-h intervals for 8 h, as well as 2-h intervals between 8 h and 14 h. After a sleeping, breath gas was collected 30 min after waking up and 24 h after DFM ingestion. Hydrogen concentration in breath gas was assessed with gas chromatograph. AE of DFMs tested was evaluated based on the area under the curve (AUC) of FOS. AE of polydextrose, partially hydrolysed guar gum, resistant maltodextrin and partially hydrolysed alginate was 1 kcal/g, and that of glucomannan, heat-moisture treatment and high amylose corn starch and cellulose was 0 kcal/g, based on the ratio of AUC for 8 h. However, AE of all tested materials was 1 kcal/g in the calculation based on AUCs for 14 h and 24 h.

Conclusions: We tried to evaluate AE of nondigestible and fermentable carbohydrates using the fermentability based on BHE for >14 h, and found that the collection period 8 h after ingestion of the test material is too short to evaluate AE. AE of tested dietary fiber materials including cellulose and glucomannan was 1 kcal/g, based on the fermentability from BHE for 14 h in healthy subjects.

Key words: fiber, expiratory gas

PO093

AN ASSESSMENT OF DIETARY FACTORS IN JAPANESE NON-ALCOHOLIC FATTY LIVER DISEASE PATIENTS AND THE RELATIONSHIP WITH BLOOD PARAMETERS

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Background and objectives: The number of non-alcoholic fatty liver disease (NAFLD) and steatohepatitis (NASH) patients have been increasing along with the increase in life-style related diseases throughout the world. However, little is known about the actual eating habits of NAFLD/NASH patients, especially in Japan. In this study, we assessed the dietary intake of Japanese NAFLD/NASH disease patients, and investigated the relationship between the dietary factors and blood parameters.

Methods: A cross-sectional study was conducted involving 91 Japanese NAFLD/NASH patients (42 males and 49 females, diagnosed by liver biopsy) aged 16-85 years over a 1-month period with a self-administered diet history questionnaire. Assessment of the dietary factors intake was performed using the Dietary Reference Intakes and National Nutrition Survey in Japan. The correlations between the dietary factors and the blood parameters were analyzed using a stepwise multiple regression analysis method.

Results: The results showed: (1) a high-level consumption of sugar and confectionery and a low intake of cereals and potatoes, (2) a low intake of vitamins, minerals, and dietary fiber, probably due to a low consumption of vegetables, mushrooms, and/or algae, (3) the hepatic dysfunction and dyslipidemia-related parameters showed a significant correlation with animal food intake, (4) HbA1c and the hepatic dysfunction-related parameters demonstrated a significant correlation with the intake of fat, vitamins, minerals, and dietary fiber, and (5) female subjects showed a high intake of fat as well as a significant positive correlation with HbA1c and the carbohydrate energy ratio.

Conclusions: This study showed that Japanese NAFLD/NASH patients were biased in the selection of high carbohydrate foods, with a high-level intake of fat and a low intake of vitamins, minerals, and dietary fiber. Moreover, the results suggested a relationship between the dietary factors and the development of disease in NAFLD/NASH patients.

Key words: NAFLD/NASH, Dietary reference intakes, Dietary habits, Japanese

PO094

IMMUNOCYTIC PROFILES AND RESPONSES OF HYPERURICEMIC RATS FED WITH CASEIN OR SOY PROTEIN COMBINED WITH PALM OR SAFFLOWER OIL

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Background and objectives: Uric acid (UA) is one of the antioxidants in the plasma; however, the pro-oxidant and free radical features of UA may activate proinflammatory response. Previous study revealed that ingestion of soy protein with safflower oil may lower serum UA and ingestion of casein with safflower oil may attenuate hyperuricemia-associated renal damage. In this study we further investigated the effects of these protein and oil combinations on immunocytic profiles and responses in hyperuricemia.

Methods: Male Wistar rats administered with oxonic acid and UA to induce hyperuricemia were fed with casein or soy protein plus palm or safflower oil for 8 weeks. Normal rats fed with conventional diet composed of casein plus corn oil were included.

Results: Hyperuricemic rats had significantly decreased serum albumin and increased UA, leukocyte numbers, and spleen weights compared to normal rats (one-way ANOVA, $p<0.05$). In hyperuricemic rats, casein was the factor to increase plasma interferon-£^, soy protein was the factor to increase B-splenocytes, palm oil was the factor to increase plasma nitrite/nitrate, and safflower oil was the factor to decrease plasma UA and to reverse changes in T-cytotoxic splenocytes and B-leukocyte (two-way ANOVA, $p<0.05$). In peripheral blood leukocytes, spontaneous and Con A-stimulated decreases in interleukin-10 production were significantly reversed by the four different combinations and lipopolysaccharide-stimulated increases in interleukin-10 production were significantly decreased by the combination of soy protein and safflower oil in hyperuricemic rats. In splenocytes with and without Con A or lipopolysaccharide stimulations, soy protein with palm or safflower oils significantly decreased tumor necrosis factor-£\ and increased interleukin-10 productions in hyperuricemic rats.

Conclusions: These results suggest that ingestion of soy protein and safflower oil may alleviate hyperuricemia and splenocytic pro-inflammatory response and may elevate leukocytic and splenocytic Th2 responses in hyperuricemia.

Key words: hyperuricemia, immunocyte, cytokine, soy protein, safflower oil

PO095

CARDIOMETABOLIC RISK IN RELATION TO OBESITY GRADES AMONG EGYPTIAN SCHOOL STUDENTS

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Background and objectives: Childhood obesity is a risk factor for developing cardio metabolic diseases in adulthood. Objective: Studying the association of cardio metabolic risk factors in students (7 - 16 years) with different obesity grades.

Methods: Cross-sectional study including 169 student: 72 obese [body mass index (BMI) > 95th percentile] and 97 extremely obese (BMI > 97th percentile) for age and gender based on Egyptian Growth Reference Charts. Interrelationship between risk factors prevalence: hypertension, high waist circumference (WC), impaired fasting glucose, hyperinsulinieamia, insulin resistance, and dyslipideamia (abnormal TC, LDL-C, HDL-C, and triglyceride), according to age groups and degree of obesity were assessed. A set of cardio metabolic risk factors were defined for each individual, ranging from 0 (no risk factors) to 9 (all risk factors).

Results: In younger age group (7 - 11 years), extremely obese students were proven to have higher frequencies of cardio metabolic risk factors in comparison to obese group, with highly significant differences regarding fasting glucose level and WC. Older students aged 12- 16 years recorded insignificant differences in the frequency of cardio metabolic risk factors between obese and extremely obese ones. For both age groups, elevated total and LDL-Cholesterol were significantly linked to disturbances of carbohydrate metabolism; indicated by fasting glucose level. Highly significant positive interrelationships between WC and triglycerides for children, and diastolic blood pressure for adolescents were detected. Among extremely obese students, 81% of younger and 60% of older had a cluster of at least three risk factors or more in comparison to only 56.7% and 48.7% of obese.

Conclusions: Cardio metabolic risk factors are associated with degree of obesity in young age (7-11 years), but not in those aged 12-16 years. Elevated triglycerides are the most common risk factors in both age groups.

Key words: Obesity; risk factors; children, adolescents.

PO096

ROLE OF SLOW DIGESTING CARBOHYDRATES DURING PREGNANCY FOR IMPROVING LEARNING AND MEMORY IN OFFSPRING OF OBESE RATS. (NIGOHEALTH STUDY)

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Background and objectives: Maternal obesity and accompanying obesogenic dietary intake prior to and throughout pregnancy and lactation program offspring physiological system predisposing to a high risk of developing metabolic syndrome and reduced cognitive performance later in life. We examined the effects of two mixtures of carbohydrates (CHO) consumed by pregnant rats, exposed to high fat diet, on cognitive abilities of the adult offspring.

Methods: Virgin rats were assigned to one of three experimental groups: control (C) dams fed a standard rodent diet before mating and throughout pregnancy; dams fed a high fat 6 weeks before mating and then fed a HF diet containing either CHO with high (HF/HC) or low (HF/LC) digestion rate throughout pregnancy. At delivery all the animals were fed with the standard rodent diet for the remainder of the study (13 weeks). Morris water maze and novel object recognition (NOR) were performed to test learning and memory.

Results: In both paradigms, HF/LC rats performed better than HF/HC rats and more similar to control rats. In watermaze, HF/LC rats learned quicker the location of the platform and 24h after last training trial, they were able to remember its location once removed, while HF/HC rats were not. Regarding NOR, both control and HF/LC rats differenciated between the novel and the familiar objects while HF/HC rats did not distinguished between them.

Conclusions: These data demonstrate that the selected CHO mixture is effective in improving cognitive abilities in the offspring later in life.

Key words: Early programming, adiposity, dietary carbohydrates, cognition.

PO097

ROLE OF SLOW DIGESTING CARBOHYDRATES DURING PREGNANCY FOR PREVENTING ADIPOSITY PROGRAMMING IN OFFSPRING OF OBESE RATS. (NIGOHEALTH STUDY)

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Background and objectives: Maternal obesity and accompanying obesogenic dietary intake prior to and throughout pregnancy and lactation program offspring physiological system predisposing to a high risk of developing metabolic syndrome later in life. We examined the effects of two mixtures of carbohydrates (CHO) consumed by pregnant rats, exposed to high fat diet, on body adiposity either in the pregnant mothers or in the offspring.

Methods: Virgin rats were assigned to one of three experimental groups: control (C) dams fed a standard rodent diet before mating and throughout pregnancy; dams fed a high fat 6 weeks before mating and then fed a HF diet containing either CHO with high (HF/HC) or low (HF/LC) digestion rate throughout pregnancy. At delivery all the animals were fed with the standard rodent diet for the remainder of the study (13 weeks). Body composition was analyzed longitudinally by using Magnetic Resonance Imaging technology. Plasma biochemical analysis was performed by using Pentra autoanalyzer.

Results: HF/HC dams had significant lower body weight gain compared to C and HF/LC dams. Litter size and sex ratios were not significantly different among the groups. Only HF/HC offspring had significantly higher fat mass accretion at adolescence than the C offspring group (t-test; $p<0.05$). HF/HC offspring adiposity was paralleled to high levels of plasma glucose, leptin, triacylglicerides and cholesterol ($p<0.05$). In contrast, HF/LC offspring exhibited similar adiposity than the C offspring group. Ingenuity pathway analysis associated obesity to HF/HC rats compared to C and HF/LC.

Conclusions: These data further reinforce the importance of maternal nutrition during this critical window of development and clearly show that altering the carbohydrate profile of maternal diet has the potential to influence metabolism in offspring preventing the susceptibility to adiposity-related complications later in life.

Key words: Early programming, adiposity, dietary carbohydrates

PO098

DEMISPAN MAY BE A BETTER INDICATOR OF NUTRITIONAL STATUS AMONG THE AGED IN THE GREATER ACCRA REGION

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Background and objectives: Dietary intake and nutritional status are important determinants of health throughout the life cycle of human beings. Alterations in physiological structure and function that occur with age may be as a result of disease and disability as well as diet deficiency in nutrients intake. No study has been carried out on the nutritional status of the aged in Ghana and there was the need to fill in the knowledge gap. The objective of the study was to compare the nutritional status of the aged using demispan and body mass index and to determine the dietary patterns of the aged in the Greater Accra Region of Ghana.

Methods: A cross sectional study was carried out in 2006 using semi-structured questionnaire comprising socio- demographic characteristics, dietary patterns (food frequency questionnaire (FFQ) and 24 hour recall), and anthropometry.

Results: The analysis showed that 41% males and 59% females were deficient in energy intake while 53% of males and 57% of female respondents exceeded their requirement for protein. The FFQ and 24-hour recall showed that dietary pattern of the respondents was monotonous, mostly carbohydrate based. Nutritional status of the respondents was computed using body mass index (BMI) from height and weight and Demispan (from finger web to sternal notch). The BMI revealed that 28% males and 23% females were overweight, and 15% females were obese. The demispan also revealed that 72% males and 35% females were underweight, 6% males and 17% females were overweight and 18% females were morbidly obese. BMI and Demispan were significantly correlated ($r = 0.91$ and 0.75) for females and males respectively and majority of the respondents had negative energy balance.

Conclusions: Demispan was more effective in determining the nutritional status of the aged.

Key words: Demispan, Aged, Nutritional Status.

PO099

MEASURING FRUIT AND VEGETABLE CONSUMPTION – USE OF COMBINED OR SINGLE BIOMARKERS

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Background and objectives: A high intake of fruits and vegetables (FV) is associated with reduced risk of chronic disease. Blood biomarkers offer an objective indicator of FV intake. A valid biomarker of overall FV intake would be able to confirm population intakes, more precisely evaluate the association between intakes and health outcomes and confirm compliance in FV interventions. Several substances have been proposed as biomarkers of FV intake: vitamin C, the carotenoids, and polyphenols. Certain biomarkers are strong predictors of single FV, however, proposed single biomarkers of FV consumption are only modestly predictive of overall FV consumption. A number of studies have suggested that summing individual urinary flavonoids correlates better with FV intake than individual flavonoid excretion. It may therefore be possible to combine potential biomarkers of FV intake and better predict intake with a combined biomarker approach rather than using single markers or a panel of single markers.

Methods: The FAVRIT study was an 8 week FV intervention study in mild hypertension. Participants were randomised to consume 1, 4 or 7 portions FV/d, and received weekly deliveries of FV. Compliance was encouraged during weekly phone calls from the research team. Participants (n=132) completed 7 day food diaries at baseline and week 8, while plasma vitamin C and serum carotenoid concentrations were assessed at the same time points.

Results: Change in vitamin C was most closely associated with change in self-reported FV intake (r=0.29; p=0.006), but when the changes in six carotenoids (lutein, zeaxanthin, β-cryptoxanthin, α-carotene, β-carotene and lycopene) were added to the model, the percentage of variation explained in self-reported FV intake increased from 8.4% to 36.6%, which represents a 4.4-fold increase.

Conclusions: Therefore this study shows that a combined biomarker approach may better predict FV consumption than single biomarkers.

Key words: fruit and vegetables; vitamin C; carotenoids; biomarkers

PO100

CONTRIBUTION OF NUCLEAR TECHNIQUES TO NUTRITION PROGRAMMES IN LATIN AMERICA

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Background and objectives: Over the past 15 years, the International Atomic Energy Agency, through its technical cooperation programme has supported 10 regional and 7 national projects in Latin America, to apply nuclear techniques in assessing aspects of the double burden of malnutrition.

Methods: Stable isotope techniques were used in eighteen countries to assess body composition, human milk intake, energy expenditure, micronutrient bioavailability and micronutrient status, H.pylori infection, and the health consequences of obesity. Traditional techniques such as dietary recall, anthropometry, bioelectrical impedance and anti-H.pylori antibodies were validated against isotopic techniques.

Results: Adequacy of intake, total energy expenditure and low levels of physical activity were identified. Energy requirements of children were measured. Prediction equations for body fat for school children and elderly, were generated and validated. Human milk intake by other Methods, appeared to be overestimated. No association between anaemia and H.pylori infection was identified. Body fat accretion in children was associated with parents' overweight, higher blood pressure, poor nutrition, inflammation, and glucose intolerance.

Conclusions: Stable isotope techniques have been used as reference Methods for validation of simpler methodology to be used in evaluation of nutritional interventions in Latin America.

Key words: isotopic techniques, nutrition, Latin America

PO101

POMEGRANATE EXTRACT SUPPLEMENTATION INFLUENCES BLOOD PRESSURE AND HOMA-IR IN HUMAN VOLUNTEERS: A 4-WEEK RANDOMISED, DOUBLE-BLIND, PLACEBO-CONTROLLED PILOT STUDY

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Background and objectives: Interest in antioxidant polyphenol-rich pomegranate (Punica granatum L.) products has increased in recent years with growing reports of potential health benefits (Borges et al, 2010). Pomegranate polyphenols have been noted to lower systolic blood pressure (SBP) and insulin resistance in several trials involving participants who are hypertensive or normotensive volunteers (Carpenter et al, 2010; Tsang et al, 2012). The aim of this research was to investigate the effect of a new pomegranate extract (PomeGreat PurePlus) supplementation on blood pressure and insulin resistance (HOMA-IR) in human volunteers.

Methods: Ethical approval was granted by the Divisional Ethics Committee at Queen Margaret University. Volunteers (7 males and 22 females) participated in a randomised, double-blind, placebo-controlled parallel study (Mean BMI was 25.05± 3.91kg/m^2 ranged from 18.57 to 32.46 kg/m^2; Mean age was 34.5±13.7years (range19-62). After randomization, participants consumed either one pomegranate extract or placebo capsule daily for 4 weeks. Each capsule weighed 1.2g and contained either 370mg of pomegranate extract or inert substance. Dietary history and anthropometric measures were also recorded to assess confounding factors. Fasting blood samples were obtained at baseline and after 4 weeks for glucose, insulin and insulin resistance assessment.

Results: The pomegranate extract group exhibited a significant decrease in SBP from 120.3±13.3 to 115.6±13.1mmHg (P=0.012). Diastolic BP was slightly reduced but not significant (p=0.192). There was also a significant reduction in the HOMA-IR levels from 2.22±2.6 to 1.61±1.9 (P=0.045). For those receiving the placebo, no significant changes were recorded.

Conclusions: These results suggest that if pomegranate extract consumption in normotensive volunteers reduces blood pressure, it may ameliorate recognized cardiovascular risk factors in overweight and obese populations. The concurrent ability to decrease insulin resistance could be of benefit to those who suffer from type2 diabetes, metabolic syndrome or obesity.

Key words: Pomegranate; Blood pressure; Insulin resistance; Obesity; Polyphenols.

PO102

ROLE OF SLOW-DIGESTING CARBOHYDRATES DURING PREGNANCY FOR IMPROVING ADIPOSE TISSUE GLUCOSE TRANSPORT AND INSULIN SIGNALING IN OBESE RATS' OFFSPRING (NIGO-HEALTH STUDY)

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Background and objectives: Maternal obesity and accompanying obesogenic dietary intake prior to and throughout pregnancy and lactation program offspring physiological system predisposing to a high risk of developing metabolic syndrome later in life. We examined the effects of two mixtures of carbohydrates (CHO) consumed by pregnant rats, exposed to high fat diet, on adipose tissue glucose transporters and insulin signaling in offspring at weaning and adolescence.

Methods: Virgin rats were assigned to one of three experimental groups: control (C) dams fed a standard rodent diet before mating and throughout pregnancy; dams fed a high fat 6 weeks before mating and then fed a HF diet containing either CHO with high (HF/HC) or low (HF/LC) digestion rate throughout pregnancy. At delivery all the animals were fed with the standard rodent diet for the remainder of the study (13 weeks). Lysates from adipose tissue were used to analyze glucose transporters, insulin signaling and glycolytic and adipogenic enzymes by western blot.

Results: HF/LC offspring had significant higher GLUT4 and phosphorylated PKB/Akt than C and HF/HC groups at weaning. At adolescence, both remained higher in the HF/LC compared to HF/HC rats. Moreover, it is noticeable that HF/HC group had higher levels of adipogenic enzymes, such as pyruvate carboxylase, phosphoenolpyruvate carboxykinase and acetyl-CoA carboxylase, which is consistent with an increase in adipogenesis.

Conclusions: Data support the importance of CHO profile during pregnancy to modulate the glucose transport in the offspring. The high level of GLUT4 in slow digesting CHO rats may lead to increased sensibility to insulin. Even keeping an obesogenic diet during pregnancy, this CHO system given to the pregnant rat was able to reduce the expression of adipogenic enzymes in the adipose tissue of the offspring.

Key words: Early programming, adipose tissue, dietary carbohydrate.

PO103

BODY MASS INDEX AND ITS RELATIONSHIPS WITH VISCERAL AND SUBCUTANEOUS ADIPOSITY IN CUBAN CHILDREN AND ADOLESCENTS

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Background and objectives: The rising prevalence of obesity in children and adolescents is an important public health problem in both developed and developing countries; this situation has given a new urgency to understand the relations between body mass index -which is considered the most useful indicator of obesity in clinical practice - and visceral and subcutaneous adiposity, that have not been fully defined in these ages. We aimed to determine the associations of body mass index and visceral and subcutaneous adiposity indicators in this population.

Methods: Weight(W), height (H), waist circumference (WC) and triceps (TS), subscapular (SS) and suprailiac (SIS) skinfolds were measured in 4564 randomly sampled Havana children and adolescents aged 7,5 and 18,5 years. The associations between body mass index (BMI), visceral adiposity -using WC - and subcutaneous adiposity -using TS, SS, SIS and the sume of them (SUS) - were assessed through Pearson´s correlation coefficients and linear regression. Receiver-operating characteristic analysis was employed to derive optimal age-adjusted sex-specific BMI thresholds for predicting high adiposity (> 90 percentil of WC and SUS).

Results: All anthropometric variables studied were positive and significantly correlated but the most striking result was the stronger association displayed of BMI with indicators of adiposity compared to the relations between WC and SUS. Age-specific cutoff BMI values in boys/girls to identify high visceral and subcutaneous adiposity were established. Mechanisms related with adipose tissue biology and fat distribution were explored.

Conclusions: Visceral fat plays a major role in the obesity assessment by BMI in this population whereas subcutaneous fat has a lesser role. Increasing understanding of the mechanisms involved in adiposity at these ages may potentially improve our ability to understand the role of excess weight and adiposity in health risks.

Key words: visceral fat, subcutaneous fat, BMI

PO104

GENETIC CHARACTERISTICS OF ANTIOXIDANT ENZYMATIC DEFENSE IN MEXICAN POPULATION WITH OVERWEIGHT AND OBESITY DEGREES I TO III

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Background and objetives: Oxidative stress is associated with obesity and their principal comorbidities. The Manganese Superóxido Dismutase (MSD) and the Glutathione Peroxidase (GPX) are important antioxidants enzymes. The gene of MSD has a single nucleotide polymorphism (SNP) at codon 16 (Ala16Val; rs4880) and the GPX has a SNP at codon 198 (Pro198Leu; rs1050450). In both cases the SNPs abrogate the activity of corresponding enzymes. The objective of the study was to evaluate the association of SOD-Ala16Val and GPX-Pro198Leu in Mexican population with normal weight, overweight and obesity.

Methods: An observational, transversal and comparative study was conducted with mestizo Mexican population at the Nutrition Clinic of the Universidad Iberoamericana Ciudad de México. The study included 50 participants with normal weight, 36 with overweight, 26 with obesity grade-I, 20 with grade-II and 23 with grade-III (OB-III). ADN was isolated from peripheral blood. The identification of SNPs was done by Polymerase Chain Reaction technique follows of Restriction Fragment Length Polymorphism technique using the Apa I enzyme to SOD-Ala16Val and Bsa WI to GPX-Pro198Leu. The results were analyzed by Xi square and a $p<0.05$ was accepted as statistical difference.

Results: The frequencies of mutated alleles of MSD-Ala16Val and GPX-Pro198Val (homozygotes plus heterozygotes) were 0.34 and 0.48 in control (CG); 0.50 and 0.69 in overweight; 0.65 and 0.59 in obesity (OB) grades I-III groups, respectively. There were only statistical differences between CG and OB grades I-III ($Xi2=10.1$; $p=0.001$; O/R=3.6; I.C. 95% 1.6-7.8) and between CG and OB-III ($Xi2=6.6$; $p=0.009$; O/R=4.4; I.C. 95% 1.5-12.8) for SOD-Ala16Val.

Conclusions: Mexican people with obesity included in the study show higher frequency of SOD-Ala16Val mutated allele in comparison with persons with normal weight. People with morbid obesity (IMC>40) account the higher prevalence of before mentioned mutation between obesity group.

Key words: Obesity, Overweight, Superoxide dismutasa, Glutation Peroxidase, Polymorphisms

PO105

LEPTIN, VITAMIN D AND CARDIORESPIRATORY FITNESS AS RISK FACTORS FOR INSULIN RESISTANCE IN EUROPEAN ADOLESCENTS; SEX-DIFFERENCES IN THE HELENA STUDY

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Background and objectives: The number of risk factors for insulin resistance increased in the last decade and Vitamin D emerged as pleiotropic regulator of many cells. We sought to identify the relevance of a complete set of risk factors for insulin resistance in adolescents from Europe and to consider their possible gender-specific associations.

Methods: The Healthy Lifestyle in Europe by Nutrition in Adolescence Cross-Sectional Study (HELENA-CSS) was conducted in European adolescents aged 12.5 to 17.5 years from nine countries. A total of 1053 participants with valid body mass index (BMI) homeostasis model assessment (HOMA) index data were included in the study. HOMA was used as marker of insulin resistance. Three markers of body fat were used based on anthropometric measurements. A dietary index was calculated and total energy intake estimated from questionnaire. C-reactive protein, leptin and vitamin D were assessed and physical activity, cardiorespiratory fitness and muscular strength were measured. Center, socioeconomic status, pubertal status and season were controlled.

Results: In males, leptin was the only risk factor for insulin resistance after adjusting for confounders including markers of body fat (Odds ratios; ORs from 1.49 to 1.60). In females, leptin, vitamin D, and cardiorespiratory fitness were the remaining independent risk factors for insulin resistance after adjustments (ORs 2.11, CI. 1.29 to 3.45; 0.50, CI. 0.31 to 0.80; and 0.54, CI. 0.33 to 0.87, respectively).

Conclusions: Our observations suggest a gender dimorphism in the identification of risk factors for high insulin resistance. Preventive strategies should focus, in addition to control leptin level, on improving modifiable factors such as cardiorespiratory fitness and ensuring vitamin D sufficiency. Randomized control trials are necessary to warrantee their efficacy.

Key words: leptin, vitamin D, fitness, adolescence, insulin resistance.

PO106

FOCAL NUTRITION LEARNING CENTER: DOES THE USE OF LOCAL FOODS AND PRACTICES IMPACT CHILD MALNUTRITION? A CASE OF BURUNDI

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Background and objectives: Chronic malnutrition is a serious public health problem in Burundi. Nationally 58% children are stunted and nearly 45% of them are anemic. To reduce the impact of malnutrition WV designed a community based nutrition program called, FARN (Foyer d'Apprentissage et de Réhabilitation Nutritionnelle - Nutrition Education and Rehabilitation Centers). The purpose of this study is to share the impact of local foods and practices to improve complementary feeding practice and child growth.

Methods: A critical nine steps were used to discovery (nutrition status, local foods, practices), mobilize the community, conduct 12 days nutrition education sessions and two weeks home follow up. Children were monitored for their growth in admission. Follow up weight was taken at 12 days and end of one month to check the graduation criteria. Background, anthropometric and attendance data were collected excel based software and analysis was conducted manually.

Results: between 2011-2012 2052 children, nearly half of them were between 6 – 23 months, participated. On 12 days 76% of children gained 200 gms and discharged from the sessions for home follow up. By the end of 30 days 78% of children had gained 400gms meeting the graduation criteria. The average weight gain of children was 373gms and 689gms on 12

and 30 days respectively. Based on the national classification of growth rate by the end of 30 days, 92.1% of children achieved accelerated growth, 6% achieved adequate growth and the rest, 1.9%, inadequate growth. Further analysis showed reduction in severe form of under nutrition by more than 50%. Care givers and parents observed change in nutrition status of the children.

Conclusions: use of appropriate nutrition promotion approach is essential for effective contribution of local foods in reducing the burden of malnutrition in resource poor settings.

Key words: weight gain, local foods and practices, FARN, graduation

PO107

PROJECT ENERGIZE: REDUCING CHILDHOOD OBESITY; TRANSLATION FROM A RANDOMISED CONTROLLED TRIAL TO AN EFFECTIVE REGIONAL HEALTH SERVICE

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Background and objectives: Globally, and in New Zealand, the prevalence of childhood obesity continues to rise. An urgent public health need is effective physical activity and nutrition interventions for children. In 62 control and 62 intervention primary schools a 2004-2006 randomised controlled trial (RCT) of the Energize through-school Programme demonstrated favourable changes in body size and the programme was rolled out as a health service to all 244 regional schools.

Methods: Effectiveness evaluation in 2011 included measures of height, weight, waist and run speed of 2665 7 year-old and 2589 10 year-old children (36% Mâori, the indigenous people). An economic model was used to extrapolate the programme effects, initial costs, lifetime health treatment cost structures, quality-adjusted-life-years gained and increased life expectancy to the general and Mâori child population of New Zealand.

Results: Adjusted for age, gender, ethnicity, socioeconomic status and school cluster effects, the 2011 children younger and older children had combined prevalence of obesity and overweight 31% and 15% lower compared with unEnergized children measured in the 2004-2006 RCT. Compared to children from another region the time to complete a 550 m run was quicker by 13•7% and 11•3% for younger and older children respectively. These effects were seen for boys and girls, both indigenous Mâori and non-Mâori children, and across socioeconomic status. In 2010 there were 42,067 children attending Energize schools and in the same year NZ$1891175 was spent to deliver the programme; a cost of $44.96/child/year. Incremental cost/quality-adjusted-life-year gained was $30438 for the younger and $24690 for the older children, and lower for Mâori (younger $28241, older $22151).

Conclusions: Project Energize may lead to a regional reduction in overweight and obesity prevalence and gains in physical fitness that may reduce the risk of obesity and Type 2 diabetes in later life.

Key words: children, obesity, prevention

PO108

THE THYROID HORMONE T3 IMPROVES ANTIOXIDANT CAPABILITY AND SURVIVAL OF HEPG2 DURING IN VITRO CULTURE

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Background and objectives: Thyroid hormone (T3) has a profound influence on normal development, differentiation and metabolism. However antioxidant properties of thyroid hormone is poorly understood. Aim of our study was to analyze whether T3 could have an antioxidant effect on cultured HepG2 cells undergoing oxidative stress

Methods: To develop a model of oxidative stress, human hepatoma HepG2 cells were incubated in serum-free DMEM with different concentrations of H2O2 (10 ¦ÌM, 50 ¦ÌM, 100 ¦ÌM and 200 ¦ÌM) for 4 h. Then, cellular reactive oxygen species (ROS) levels and cell proliferation were analyzed. In the antioxidant studies, cells were plated in 6-or 96-well plate, and after 24 h the thyroid hormone T3 or vehicle alone were added to culture medium; the cells were then exposed to H2O2 (100 ¦ÌM) for 4 h in the presence or absence of the thyroid hormone, T3 10-7M. Viable cells were harvested, and the cell proliferation, ROS level, glutathione (GSH) and glutathione disulphide (GSSG) content, malandialdehyde (MDA) level, superoxide dismutase (SOD) and catalase CAT activity were assayed with the appropriate test kits.

Results: H2O2 elevated the ROS production and reduced cell proliferation in a dose-dependent manner in the basal glucose condition. Preincubation with T3 (10-7M, 24 h) inhibit the100 ¦ÌM H2O2-stimulated cell apoptosis. Moreover, T3 reduced the ROS and MDA generation induced by H2O2 via regulation of the GSH/GSSG ratio and enhancement of antioxidant enzymes SOD and CAT activity.

Conclusions: These findings indicates that T3 could be considered a antioxidant factor protecting HepG2 cells from oxidative damage. Acknowledgements: the present study was

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Key words: thyroid hormones, T3, cell survival, antioxidant capacity, human HepG2 cell

PO109

ACCEPTABILITY AND EFFICACY OF READY-TO-USE THERAPEUTIC FOOD IN 6-24 MONTHS OLD CHILDREN WITH SEVERE ACUTE MALNUTRITION IN BANGLADESH

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Background and objectives: Severe acute malnutrition (SAM) defined as weight-for-height <-3Z-score or having bipedal-nutritional-edema is an important cause of childhood-death globally.Approximately 600,000 under-5 children in Bangladesh are suffering from SAM. Provision of energy- and nutrient-dense food is essential for successful management of SAM. Although ready-to-use-therapeutic-food (RUTF) has been found to be effective in Africa, but yet to be evaluated in South-East Asia, where the global burden of SAM is the highest. The current study was conducted to assess the comparative acceptability and efficacy of commercial RUTF (plumpy nut) and rice-lentils based traditional-diets (khichuri and halwa).

Methods: It was a randomized, unmasked, controlled clinical trial conducted during 2009-2012 in the Nutrition Rehabilitation Unit of icddr,b. 6 -24 mo old, 224 SAM children were randomly and in equal numbers were allocated to traditional diets or RUTF and managed according to the standardized protocol. Children were discharged upon achieving edema-free 15% weight gain from admission.

Results: The study children's age was 12±4.7mo, where half of them were female. Clinical and nutritional characteristics of the study participants did not differ between groups both at admission and discharge. Overall 82% children completed the treatment successfully. Median (IQR) rate of weight gain was 9.3 (7, 14) vs. 9.2 (6, 12) g/kg.bwt/d,and duration of hospital stay was 15 (11,19) vs 14 (11, 19) days,in RUTF and traditional diet groups and respectively. Water intake (527 ± 292 vs. 250 ± 87 ml/d;$p<0.01$) and diarrheal episodes were higher in RUTF group than traditional diets (45 (40%) vs. 21 (19%), $p<0.01$).

Conclusions: Traditional diets were more acceptable and efficacious as RUTF. Diarrheal episodes were more evident in RUTF group. Where cooking facilities are available rice-lentils based diets would be a better option for nutritional rehabilitation of SAM children in countries like Bangladesh.

Key words: Severe Acute Malnutrition, RUTF, khichuri, halwa.

PO110

NUTRITIONAL CONTRIBUTION OF STREET FOODS TO THE DIET OF PEOPLE IN DEVELOPING COUNTRIES

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Background and objectives: Due to rapid urbanization in many developing countries, street foods (SFs) have become increasingly important as an income generating strategy and as a fast and economical meal option. There is however, a paucity of data on the nutritional contribution of SFs to the diet. The aim of this study was to review studies which had determined the nutritional value of street foods (SFs) and their contribution to the diet of consumers in developing countries.

Methods: The electronic databases of Pubmed/Medline, Web of Science, Proquest Health, and Science Direct were searched according to predetermined search criteria.

Results: From a total of 639 articles, 23 studies were retained since they met the inclusion criteria. In summary, daily energy intake (EI) from SFs in adults ranged from 13%EI to 50.3%EI and in children from 13%EI to 40%EI. Although the amounts differed from place to place, even at the lowest values of the percent energy range, energy contribution from SFs made a significant contribution to the diet. Furthermore, the majority of studies suggest that SFs contribute significantly to the daily intake of protein, often at 50% of the recommended dietary allowance) (RDA). The data on fat and carbohydrate intakes are of some concern because of the assumed high contribution of SF to the total intake of fat, trans fats, salt and sugar in numerous studies and their possible role in the development of obesity and non-communicable diseases. Few studies have provided data on the intake of micronutrients, but these tended to be high for iron and vitamin A, but low for calcium and thiamin.

Conclusions: Street foods make a significant contribution to energy and protein intake of people in developing countries and their use should be encouraged if they are healthy traditional foods.

Key words: Street food; urbanization; dietary intake; macronutrients

PO111

INFLUENCE OF A COLD-PRESSED RAPESEED OIL ON SERUM LIPOPROTEINS IN RELATION TO 75G/A APO AI GENOTYPE- PRELIMINARY STUDY

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Background and objectives: Metabolic benefits of MUFA have been noticed, but relation between MUFA consumption, occurrence of specific genetic variants and serum lipoprotein levels has not been clarify. Influence an adenine to guanine mutation in the promoter of the apolipoprotein AI gene(apoAI) on HDL levels has been reported. We investigated the effect of high-MUFA diet on lipoproteins in women with different 75G/A apoAI genotypes.

Methods: The study group consisted of 27 healthy, nonsmoking, premenopausal women aged 47±8 years, who replaced virgin oil in the diet with the cold-pressed rapeseed oil (RO) for 4 weeks (40g/day). The oil has been obtained from selected varieties and the patented technology of the production provided a maximum content of bioactive compounds (80% of oleic fatty acid;1.2:1 n6/n3 ratio). Blood samples were collected at baseline and after 4 weeks of RO consumption. Serum lipids and apolipoproteins AI and B concentrations were analyzed and 75G/A apoAI polymorphism was performed by PCR with MspI enzyme.

Results: After 4 weeks of RO diet total cholesterol decreased by 9mg (4%) and LDL-cholesterol by 8mg (6%) in all participants. The effect of RO on HDL-cholesterol and apoAI concentration was analyzed in relation to 75G/A variants of apoAI gene. Among AA homozygotes (n=6) the strongest positive effect of MUFA diet was observed. The concentration of HDL-cholesterol increased by 5mg (9%) and apoAI by 11mg (8%) and was accompanied by a reduction in triglycerides (22mg-24%). No changes in these parameters were observed in GG homozygotes. The small number of participants may be a cause of non-significance of our results, and further study are needed to confirm our preliminary observations.

Conclusions: The present study indicate an interaction between 75G/A variants in apoAI gene and MUFA consumption and its influence on HDL-cholesterol and apoAI concentrations.

Key words: dyslipemia, cholesterol, genetics

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PO112

THE EFFECT OF APPLE JUICE RICH IN CHLOROGENIC ACID ON MMP-9 SECRETION BY LPS-STIMULATED NEUTROPHILS- PRELIMINARY REPORT

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Background and objectives: Dietary polyphenols are known to possess antioxidant and anti-inflammatory properties, and their protective effects on the cardiovascular system and cancer have been reported. Chlorogenic acid (CGA) has been found to be a main phenolic compound present in apples, coffee or peers. Matrix metalloproteinase (MMP) enzymes are released by inflammatory cells and smooth muscle cells and regulate the vascular remodeling process. MMP-9 has been shown to be involved in vascular elastin degradation, collagen remodeling, atherosclerosis plaque formation, and play an important role in pathogenesis of cardiovascular disease. The aim of the study was to evaluate the effect of lyophilized apple juice on the MMP-9 release by LPS-stimulated neutrophils in relation to chlorogenic acid as a positive control.

Methods: Neutrophils were isolated from venous blood of healthy adult volunteers by dextran sedimentation prior to hypotonic lysis of erythrocytes and to centrifugation in a Ficoll- Hypaque gradient. Cells were incubated with apple juice and CGA following the LPS-stimulation (100 ng/ml) for 24 h. The effect on MMP-9 production was measured using ELISA method.

Results: HPLC analyses of the commercially available cloudy apple juice used in this study revealed CGA as its main polyphenolic compound occurring at the concentration of 90.29 μg/ml. Pure CGA (10-100 μg/ml) was found to inhibit MMP-9 production by LPS-stimulated neutrophils dose-dependently. It inhibits the MMP-9 release by 30% at the concentration of 50 μg/ml. At the same concentration the apple juice rich in CGA inhibits MMP-9 release by 25%. However, no clear dose-dependent MMP-9 inhibition by apple juice was observed. Compared to stimulated neutrophils, in untreated cells after chlorogenic acid supplementation 50% decrease of MMP-9 production was found.

Conclusions: This study revealed that both pure CGA as well as apple juice rich in CGA inhibited MMP-9 production by neutrophils.

Key words: MMP-9, apple juice, LPS

PO113

URINARY VITAMIN C EXCRETION IN 24-HOUR URINE SAMPLE COLLECTIONS AS A COMPLIANCE BIOMARKER IN FRUIT AND VEGETABLE INTERVENTION STUDIES

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Background and objectives: Observational evidence consistently indicates rich fruit and vegetable (FV) diets may protect against non-communicable diseases. Progression of research on the FV-disease risk relationship is hindered by inaccuracies involved in traditional dietary intake assessment

Methods: Accurate, reliable, independent, objective nutritional biomarkers are therefore crucial to modern epidemiological research. Plasma vitamin C concentrations are widely used as indicators of fruit and vegetable (FV) intake, however little attention has focused on use of urinary vitamin C as a biomarker of FV intake. Thus, using data from a randomised FV intervention, we examined the use of 24-hour urinary vitamin C as a potential novel objective biomarker of compliance of participants in FV intervention studies. Subjects were aged 40-65 years and hypertensive (blood pressure of 140-179/90-109mmHg). Following a one portion FV/day four-week run-in-period, participants were randomised to 1,3 or 6 portions FV/day for eight-weeks. Fasting plasma and 24-hour urine samples were collected at the start and end of the intervention. Vitamin C was measured using a fluorimetric method on an automated Cobas Fara centrifugal analyser.

Results: A total of 117 subjects completed the 12-week study. Across the intervention groups plasma vitamin C increased, but plateaued between 3 and 6 portions/d, and the test for linear trend across the groups did not reach statistical significance (p=0.06). In contrast, urinary vitamin C concentration significantly increased with increasing FV consumption (comparison between 1, 3 and 6 portions/day groups (p-value for linear trend <0.001)).

Conclusions: Urinary vitamin C (24 h) increased linearly with increasing FV consumption, in contrast to plateauing plasma vitamin C concentration. This suggests 24-hour urinary vitamin C is a potential non-invasive biomarker of compliance in FV interventions.

Key words: Urinary vitamin C, biomarker, fruit, vegetables, novel

PO114

LEVEL OF ADHERENCE TO A MEDITERRANEAN DIET AND RELATIONSHIP WITH COGNITIVE FUNCTION IN AN AUSTRALIAN SAMPLE

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Background and objectives: A Mediterranean diet (MedDiet) is reported to reduce mortality, reduce cognitive decline and Alzheimer's disease. In a cross-sectional study with 1183 Australians, aged 40-65 years, we calculated the level of adherence to a MedDiet, determined the major foods characteristic of a MedDiet and subsequently examined relationships with MedDiet adherence and self-reported cognitive function and psychological well-being.

Methods: Mean intakes of foods typical of a MedDiet and typical of an Australian diet were calculated from a validated food frequency questionnaire. Adherence to a MedDiet was determined based on an 11-point scale, 11 being maximal adherence to a MedDiet. Measures of cognitive function and psychological well-being included self-esteem, anxiety, stress, memory functioning, cognitive failures, general health and physical function. MedDiet scores were divided into tertiles to define level of MedDiet adherence. Relationships between MedDiet adherence, intakes of food groups representative of a MedDiet and cognitive function were examined using standard linear regression controlling for confounders.

Results: 20% (8-11 points), 72% (4-7 points) and 8% (0-3 points) of the Australian sample had a high, medium and low adherence to a MedDiet, respectively. Intakes of total plant foods (fruit, vegetables, nuts, legumes), dairy products and breads/cereals was 6.3±2.9, 1.0±0.9 and 5.2±2.5servings per day, respectively, while meat, fish and poultry was 0.1±0.1, 0.2±0.3 and 0.1±0.2 servings per day, respectively. Overall MedDiet adherence was not related to cognitive function, however intakes of plant foods was positively associated with measures of physical function (P=0.021) and general health (P<0.001), and negatively associated with depression (P=0.012), perceived stress (P=0.016) and trait anxiety (P=0.015).

Conclusions: A substantial proportion of the diet in this Australian sample came from foods uncharacteristic of a MedDiet resulting in medium adherence, which is a major limitation when attempting to compare adherence to a MedDiet across populations.

Key words: Mediterranean diet, adherence, cognition

PO115

THE ASSOCIATION BETWEEN SIRT1 GENE AND KOREAN CHILDREN OBESITY: SEOUL-KURO COHORT STUDY

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Background and objectives: Sirtuin 1 (SIRT1) is the longevity gene protected cells against oxidative and genotoxic stress. The association of SIRT1 polymorphism with Korean childhood obesity is not reported. The purposes of this study are confirming whether SIRT1(rs7895833) would be related to the children obesity and reducing the prevalence of adult obesity based on 3 years of the follow-up study.

Methods: The subjects were 3rd grade elementary school students 491 (boy: 246, girl: 245) at 2007 and we measured anthropometries, blood chemistry and dietary intakes. The 6th grade students on 2010, the obesity risk factors were re-examined. 219 (boy: 101, girl: 118) subjects were followed and the follow-up rate was 44.24%.

Results: Anthropometric parameters increased, however, biochemical and nutrient intake decreased after 3 years. Most of children, 88% of normal children and the 85% of obese children, kept their BMI for 3 years. That means it was hard to change BMI in children because of many environmental reasons. However, it was focused that 15% of normal children became obese. The relative frequencies of GG wild type, GA heterozygote and AA mutant type of SIRT1 were 57.1%, 38.8%, and 4.1%. In obese girl, the number of GA/AA variants were significantly higher than that in normal (64.0% vs 38.7%, respectively, $P<0.05$). Although the energy and cholesterol intakes were remarkably higher in the GG type than in GA/AA types, children with GG tend to decrease BMI and WC. Moreover, the more carbohydrate intakes, the less plasma TG and HOMA-IR was shown in obese girls with GG in particular.

Conclusions: SIRT1 polymorphism was associated with obesity in Korean children. GG wild type might protect hypertriglycemia and insulin resistance in obese children

Key words: SRIT1, children obesity, cohort study

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PO116

EVALUATION OF POLYPHENOLS AND ANTIOXIDANT ACTIVITY OF COFFEE AND COFFEE BEVERAGES

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Background and objectives: Coffee is one of the most popular beverages. Beside caffeine as bioactive ingredient other nutritional-physiological active compounds may contribute to the valuable properties of coffee beverages. Coffee has been identified as a rich source of polyphenols which are well-known for their antioxidant properties and health benefits. Green and roasted coffee beans from different origins (Coffea Arabica from Nicaragua, Brazil and Ethiopia and Coffea Robusta from Ecuador) as well as coffee beverages prepared by commonly used procedures as espresso and filter coffee were analyzed in regard to their content of polyphenols and their antioxidant properties.

Methods: Total polyphenols were determined using the Folin-Ciocalteu assay. Antioxidant activities were determined with the DPPH* radical scavenging method as well as with the ABTS-radical assay in terms of their Trolox Equivalent Antioxidant Capacity TEAC.

Results: In the different coffee beans and coffee beverages the content of total polyphenols was determined in the range of 39,6 to 55,8 mg/g with the highest amounts in Robusta coffee from Ecuador followed by the Arabicas in the order Ethiopia, Nicaragua and Brazil. The same trend was observed with the corresponding coffee beverages with higher amounts in espresso (32,6 - 39,7 mg/g) than in filter coffee (26,4 - 29,2 mg/g). All the coffee beans and coffee beverages possessed high antioxidant capacity in the same order and in correlation to the content of polyphenol compounds with TEAC-values of 0,15 - 0,41 mmol TE/g.

Conclusions: In conclusion the highest antioxidant activity was observed in Robusta from Ecuador, green coffee beans showed higher antioxidant activity than roasted coffee beans and espresso better radical scavenging capacity than filter coffee. The results of this study indicate that coffee beverages have high antioxidant and radical scavenging properties in correlation with the content of polyphenols and are a good source of dietary antioxidants.

Key words: coffee, polyphenols, antioxidant activity

PO117

INFLUENCE OF MATERNAL ALIMENTATION ON OUTCOME OF PREGNANCY AT CONSTANTINE (ALGERIA)

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Background and objectives: Pregnancy and its outcome events are sensitive to environmental exposure. To characterise the impact of food intakes of pregnant women in the child's weight at birth and to examine whether an association exists between the quality of these inputs and pregnancy outcome.

Methods: The epidemiolological investigation and descriptive focused on the monitoring of 808 pregnant women living at Constantine, revised journals, childbirth, anthropopometric data, inputs food and nutrition (estimated by the tables of FAO)have been collected. The socioeconomic status (SES) was assessed according three category such lower, medium, high. The association between variables was studied by analysis of variance.

Results: The mean age of parturients was 30.4 ± 5.6 years, Body Mass Index (BMI) before pregnancy of 24.9 ± 3.3 kg/m2. The term is 39.6 ± 1.6 weeks, the birth weight of 3264 ± 494 g. The SES is low in almost one third of women. The mean energy intake (1584 ± 495 kcal), is relatively low compared with the recommendations but the balance between carbohydrates (64.9% of TEI), protein (14.8%) and lipids (20.3%) is satisfactory. The newborn's (NB) weight is positively related to maternal age ($p = 0.007$), with its initial weight ($p = 0.006$) and its protein intake ($p = 0.03$) only in those with low SES. Our study was to demonstrate that children normotrophes, in term babies of normal weight , this was correlated with the degree of SES and dietary protein intake, which, without being unbalanced or insufficient, has a slight deficit in relation to living conditions.

Conclusions: According to the literature, our analysis highlights the relationship of the child's weight at birth with age, weight and size of the mother. In group NB normotrophes, weight was correlated with the degree of SES, and dietary protein intake.

Key words: Pregnancy, nutrition, SES, birthweight, Constantine

PO118

GLOBAL ACUTE MALNUTRITION (WASTING) IN UGANDA WHAT'S WORKING; WHAT'S FAILING?

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Background and objectives: 2011 Uganda Demographic and Health Survey (UDHS) reports declining childhood malnutrition; stunting, from percentage (%) 39, 38 to 33 in 2001, 2006 and 2011 respectively. Underweight dropped from 23, 16 to 14, while wasting remains stagnant; 4, through 6 to 5. We present the magnitude of complicated wasting, sharing what is making success possible and what is failing the expertise at the national nutrition rehabilitation unit, Mwanamugimu.

Methods: In-depth analysis of reports on the number admitted and performance indicators through the years (2009 to 2012).

Results: Each year, we register higher numbers of the malnourished. Having treated a total of 5211 wasted and complicated malnourished children, annual admissions rose from 1053, 1165, 1455 to 1538 for the period 2009 to 2012 in that order. There is also an exaggerated admission between April to August; a trend that is failing treatment and rehabilitation, to an extent. In that period, there are aggravated cases of malnutrition, often resulting in more deaths than is seen in any other months; a trend that is failing the existing expertise. However on a whole, there is improved average cure rate (%) recorded annually; in that, 58.9, 59.2, 69.9 and 68.3 were cured that period. There are many efforts, not limited to the new approaches, including the integrated management of acute malnutrition (IMAM), in identifying and treating the malnourished. This could be a major reason for the rise in accessing services; in addition to improved performance.

Conclusions: UDHS reports declining malnutrition, but the unit records show otherwise, a problem most felt between April and August; and often failing expertise at the clinic. Even when IMAM may have made treatment possible, thus improving performance, there are still unacceptable levels of deaths during peak.

Key words: Wasting, Uganda

PO119

THE IMPACT OF A SORGHUM BASED COMMERCIAL PRODUCT ON NUTRITIONAL STATUS OF CHILDREN

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Background and objectives: The objective of this paper was to determine the cost of a commercial sorghum based product as well as the impact on the nutritional status of primary school children in an informal urban settlement in Southern Gauteng in South Africa.

Methods: The randomly selected sample consisted of 82 (commercial product) and 60 (control group) primary school children aged 6 to 13 residing in the informal settlement. The measuring instruments included a QFFQ, 24-hour dietary recall, as well as anthropometric and biochemical measurements. Statistical analyses included descriptive statistics [mean and standard deviation (SD)], and independent t-tests to determine statistical significance within and between the two groups.

Results: Pre-intervention results for nutrient intake in both groups indicated that the mean daily energy intake of all the children was below the DRIs for children between ages 7 to 10 years. The post intervention results indicated that the food consumption patterns did not change substantially during the intervention. The anthropometric results for severely underweight children decreased from 10,4% to 7,8% after intervention. The children at risk of being underweight in this group decreased significantly from 39% to 24,7%, and the normal group increased from 37,7% to 51,9%. The results for both vitamins A and E showed an increase from 594,1 µg to 630,1 µg and 5,0 mg to 5,6 mg respectively. The biochemical results indicated that normal values were present for the majority of the parameters

Conclusions: The commercial sorghum based product evaluated in this study proved to be cost effective, and had a positive effect on the nutritional status of the primary school children, thus indicating that these products can be successfully implemented in a school feeding programme for hungry children in this specific community.

Key words: nutrition, school feeding, primary school children

PO120

IMPLICATION OF SELENIUM IN THE METABOLIC SYNDROME PROGRAMMING

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Background and objectives: there is evidence that the nutritional status of mother during pregnancy can impact on progeny metabolism and health. Metabolic syndrome is a new epidemic in developed countries. Selenium is an essential mineral as forms part of 25 selenoproteins with biological properties; the most known one is the antioxidant family: Glutathione Peroxidase (GPx). In this context, some authors defends that Se is increased in metabolic syndrome patients, and that it could alter insulin resistance by the action of GPx in the liver. The aim of this study is to elucidate if a diet rich in fructose provided to dams, induces metabolic syndrome in the progeny, and if these alterations are related to Se levels and GPx activity in liver.

Methods: two groups of pregnant rats were used, one with a diet rich in fructose in order to develop a metabolic syndrome model, and other with normal diet as control. Some risk factors related to metabolic syndrome were measured, such as body mass index (BMI), liver somatic index, thoracic circumference, abdominal circumference, and serum levels of triglycerides, cholesterol and glucose. Selenium in milk and in liver was measured by graphite-furnace atomic absorption spectrometry. Liver GPx activity was estimated by spectrophotometry. All the determinations were analyzed in rats of 21 days old.

Results: the induced metabolic syndrome in dams causes an increase in all the risk factors measured in offspring. Despite that Se in milk was similar in both groups; Se levels and GPx activity in liver were increased in pups from treated dams.

Conclusions: dams with metabolic syndrome make the pups suffer the same symptoms. In this context, we have proved that Se is related with this metabolic disorder, probably increasing insulin resistance via GPx activity.

Key words: selenium, progeny, diet rich in fructose, metabolic syndrome, Gluthatione Peroxidase

PO121

EXCESS WEIGHT AT ANY AGE AFTER BIRTH IS ASSOCIATED WITH OBESITY IN MID-CHILDHOOD: THERE ARE NO CRITICAL PERIODS

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Background and objectives: In Chile, childhood obesity has tripled over the last decades; presently 23% of 6-y olds are obese. It has been suggested that there are critical periods for the acquisition of obesity. Objective: to determine in which periods between birth and 7 y, the incidence and/or prevalence of overweight is associated with general and central obesity at 7 y.

Methods: We have been following a cohort of ¡Ö 1100 low-income children from 0-7 y (GOCS cohort). We defined 5 periods: 0, 0-6, 6-24, 24-48, 48-72; the study sample (N=628) was restricted to children with anthropometric measurements in all periods. We calculated BMI, overweight (BMI 1-2 Z) and obesity (BMI > 2 Z) using WHO references 2006/2007. We calculated incidence and prevalence of overweight in each period by sex and determined the OR (95% CI) of general and central obesity (waist circumference > 75th percentile) at 7 y according to these proportions.

Results: At 7y, 20% of the children presented general obesity while 33% had central obesity. In both sexes, most of the incidence of excess weight concentrated before 24 months (i.e. ~20% 6-24 months vs. 8.0 % 48-72 months). In all the periods, incidence of overweight was not associated with increased risk of general or central obesity (i.e. girls overweight incidence 6-24 months OR= 0.93 (0.51-1.70 for obesity at 7y). Conversely, being overweight from as early as 6 months was associated with twice the risk of being obese at 7y (boys overweight prevalence 6-24 months OR=2.26 (1.30-3.92). For central obesity, an increased risk was only observed for the 48-72 period (boys overweight prevalence 48-72 months OR=2.57 (1.53-4.31).

Conclusions: our results do not support that there are critical periods for the development of obesity in mid-childhood; obesity prevention should start the first year of life.

Key words: children, obesity, critical periods

PO122

EFFECTS OF THE UNSAPONIABLE FRACTION OF POMACE OLIVE OIL ON THE COMPOSITION OF POSTPRANDIAL TRIACYLGLYCEROL-RICH LIPOPROTEINS

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Background and objectives: Alterations in lipid metabolism is one of the side effects of HAART. Pomace olive oil (POO) is obtained by chemical processes from the residues of the mechanical extraction of virgin olive oil. There are nutritional differences between POO and other olive oils. The objective of this study is to show how POO intake affects the postprandial concentration of triacylglycerol, cholesterol, apolipoproteins and fat soluble vitamins in the serum and triacylglycerol-rich lipoproteins (TRL) of HIV patients on HAART.

Methods: 13 HIV-infected male volunteers Costa del Sol Hospital in Marbella (Málaga), aged 40.7 ± 5.0 on HAART received two meals rich in refined olive oil (ROO) or POO. Blood was collected in fasting conditions and after the intake of the meals. TRL were isolated and triacylglycerols, cholesterol were determined using commercial kits, vitamins were analyzed by HPLC and apolipoproteins by electrophoresis.

Results: In serum, after ingestion of POO, triacylglicerol and α-tocopherol were higher in the postprandial period. Retinol concentration decreased. In TRL, POO intake caused a decrease in apo B, apo C- II and apo E comapred to ROO.

Conclusions: The actions of POO show a potential beneficial effect in reducing HIV lipid disorders.

Key words: HAART; Pomace Olive Oil; Triacylglycerol-rich lipoproteins

PO123

LOW BIRTH WEIGHT RATES HIGHER AMONG BANGLADESHI NEONATES MEASURED DURING ACTIVE BIRTH SURVEILLANCE COMPARED TO NATIONAL SURVEY DATA

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Background and objectives: Birth size is an important gauge of fetal and neonatal health. Accurate birth size measure-

ments are challenging to collect in settings such as rural Bangladesh where a majority of births occur in the home.

Methods: Birth size measurements were collected at home within 72 hours of life for a cohort of live born, singleton infants (n=16,290) who participated in maternal and newborn vitamin A trial in rural northwest Bangladesh. Gestational age was calculated based on date of initiation of the last menstrual period collected in early pregnancy. Newborns were classified as small for gestational age (SGA) based on a birth weight below the 10th percentile for gestational age, using three sets of US reference data. Birth size distributions were explored based on raw values as well as after z score standardization in reference to WHO 2006 growth standards.

Results: Mean (SD) birth weight (gm), length (cm), and head circumference (cm) measurements, completed within (median (25th, 75th percentile)) 15 (8, 23) hours of life, were 2,433 (425), 46.4 (2.4), and 32.4 (1.6), respectively. Twenty-two percent were born preterm. Over one half (55.3%) of infants were born low birth weight; 46.6%, 37.0% and 33.6% had a weight-, length- and head circumference below -2 Z-scores of the WHO growth standard at birth; and 70.9%, 72.2% and 59.8% were SGA for weight based Alexander (1996), Oken (2003) and Olsen (2010) references, respectively.

Conclusions: Infants in this typical rural Bangladesh setting were commonly born small reflecting a high burden of fetal growth restriction and preterm birth. Our findings, produced by active birth surveillance, suggest that low birth weight is far more common than suggested by cross sectional, survey estimates. Interventions which improve fetal growth during pregnancy may have the largest impact on reducing SGA rates.

Key words: low-birth-weight, small-for-gestational-age, preterm, pregnancy

PO124

SCOTTISH DIETITIANS KNOWLEDGE AND PRACTICE OF OBESITY AND WEIGHT MANAGEMENT; INFLUENCE OF CLINICAL GUIDELINES.

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Background and objectives: Dietitians, leading practitioners and educators in the management of obesity must remain abreast of developments and be aware of recommendations of national clinical guidelines. This study examined knowledge, attitudes and opinions on obesity and weight management after publication of two obesity specific guidelines.

Methods: Census of dietitians with British Dietetic Association membership resident in Scotland in 1998 and 2012. Individuals were invited to complete a questionnaire to determine knowledge and current dietetic practice in obesity and weight management in 1998 (paper) and 2012 (on-line). Comparisons were made between surveys, and reported practice compared with guidelines.

Results: Response rate for the 2012 survey was lower than in 1998 (30% vs. 72%). A majority of dietitians showed clear understanding of links between obesity and health, though deficits in knowledge persisted. More 2012 respondents vs. 1998 thought people with diabetes should not eat fruit (10% vs. <1%), and that starchy foods were fattening (10% vs. <1%). A higher proportion of respondents (10% in 2012 vs. 2% in 1998) failed to recognise the influence of obesity on cancer risk. Twenty-six percent incorrectly reported that a daily energy intake of 3347-5020 kJ would fail to produce weight loss: 46% believed this to be possible in 1998. Reported readership of key clinical guidelines was lower in 2012 (64% vs. 96%).

Conclusions: Different response rates limit interpretation of these findings. While most dietitians have some knowledge about weight management and obesity, a greater proportion of respondents in 2012 seemed to lack knowledge regarding obesity and links between obesity and health. Knowledge deficits suggest that clinical guideline recommendations cannot be implemented by all dietitians. Training and education is essential to ensure clear and consistent advice to patients and other health professionals.

Key words: dietetic; obesity management; clinical guidelines

PO125

IS THE RISK OF POVERTY A DETERMINANT OF IMPAIRED NUTRITION IN ITALY?

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Background and objectives: Low income people have been reported to be at high risk of developing diet-related diseases. Population at risk of poverty (ROP) consumes unbalanced diets resulting in the presence of malnutrition; furthermore, in Italy social determinants have major influence on health outcomes, and access to preventive services [1]. Data on nutrient intake in ROP groups are very fragmentary. The aim of this study, carried out within the 7FP EU Project CHANCHE, was to identify food consumption patterns and nutritional criticalities in Italian ROP women.

Methods: 300 Italian women aged 24-65y were recruited (200 ROP; 100 affluent-AFF). Anthropometric data were recorded and questionnaires on physical activity and nutritional

evaluation (FFQ, two repeated 24H-recall) were administered. Nutritional data analysis was performed using the Winfood software tool.

Results: The survey showed a lower incidence of overweight and obesity than previously reported in Italy, without any differences between ROP and AFF. No differences were detected between groups in physical activity and in the dietary pattern (from FFQ), although a lower intake of cereal products, fruit and vegetables was found in ROP. The contribution of total fats and total sugars was higher than recommended in about 60% and 30% (respectively) of participants regardless the income; fiber intake was very low in both groups. The intakes of almost all vitamins and minerals were below the AR in high percentages of ROP and AFF, and only folate and iron intakes were significantly lower in ROP than in AFF.

Conclusions: The main nutritional criticalities pointed out in Italian ROP women were the same highlighted in participants with a higher income. These criticalities will be considered as targets in new foods to be formulated within the CHANCE project.

Key words: risk of poverty – nutritional criticalities - health

[1] Minardi et al. Int J Public Health. 2011.

PO126

FECAL CALPROTECTIN AMONG GUATEMALAN PRESCHOOL CHILDREN: ANTHROPOMETRIC AND PARASITOLOGICAL DISTRIBUTION

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Background and objectives: Intestinal parasites such as Ascaris lumbricoides, Trichuris trichiura and Giardia lamblia are reputed to accelerate intestinal transit affecting nitrogen balance through excessive stool losses, in addition to CHO intolerance and nutrient malabsorption, as well as intestinal inflammation. Fecal calprotectin is a neutrophil-derived protein detectable in stools, used as a biomarker of intestinal inflammation. We report here its distribution in a group of pre-school children and its association with parasitic infection and nutrition.

Methods: Fecal samples were obtained from 87 children living in the western highlands of Guatemala (mean age: 54.5±16.4 mo). Height and weight was measured and anthropometric indicators (WAZ, HAZ and WHZ) were calculated using the WHO norms. Calprotectin was measured using a simple enzyme-linked immunosorbent assay (CalproLab™ ELISA kit, Oslo, Norway). Non-quantitative detection of ova and protozoa was done using direct, wet-smear light-microscopy, with intensity of helminthic infection gauged by modified Kato-Katz.

Results: Overall stunting rate was 66%. 30 of 87 children (34.4%) were parasitized by one or another (or both) methods. We obtained a relatively low infection intensity in eggs/g of feces terms among 12 positive subjects. Overall median fecal calprotectin was 57.5 mg/Kg (range: 10.0 to 950.0 mg/Kg), without difference by sex, age-category, WAZ, WHZ or parasite status. In exploring interactions, the respective calprotectin medians were: 55.0 mg/Kg (normal-HAZ, non-parasitized); 62.5 mg/Kg (normal-HAZ, parasitized); 57.5 mg/Kg (abnor-HAZ, non-parasitized); and 57.5 mg/Kg (abnor-HAZ, parasitized). No significant differences were found among groups (p=0.61).

Conclusions: Median fecal calprotectin values were not different from those reported in other studies for free-living children of the same age in developed or developing countries. We find no evidence for protozoan or helminthic infections or nutritional status influencing the fecal calprotectin levels.

Key words: Calprotectin, Feces, Parasitic infection

PO127

INVESTIGATION OF THE USE OF IODIZED SALT IN BREAD PRODUCTION FOR THE PREVENTION OF IODINE DEFICIENCY IN THE RUSSIAN FEDERATION

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Background and objectives: Universal Salt Iodization (USI) is the most cost-effective measure to prevent and control iodine deficiency. Russia suffers from iodine deficiency, and iodized salt is consumed by less than 30% of households. Bread is estimated to account for 20% of daily salt intake. Researchers tested the effect of iodized salt on Russian bread baking technology, bread quality, growth of Bacillus subtilis and mold fungi, and iodine retention.

Methods: Wheat (white) and wheat-rye (black) breads were produced in the laboratory according to state standards. Tests were done in 3 replications with control samples using non-iodized salt. Rheological properties and gas production were measured using a "Chopin" alveograph and rheofermentometer. Organoleptic properties were evaluated according to state standards. Growth of potato disease-causing bacteria and mold fungi were measured in culture medium and in baked bread. Iodine retention was measured by the anodic stripping-voltammetric method using a PLC-2A anodic stripping-voltammetric analyzer.

Results: Iodized salt reduced wheat dough resilience by 9% and distensibility by 3.8%, however had no influence on gas production (rising). Organoleptic properties were identical for bread with iodized vs. non-iodized salt. Iodized salt slowed potato disease development in white bread by 2-24 hours and mold formation in black bread by 11 days. Iodine losses were 29-33% for white bread and 14-23% for black bread after baking, and 7-14% additionally for black bread after 72-hour storage.

Conclusions: Iodized salt does not significantly change bread baking technology or quality, and helps prevent development of potato disease in white bread and mold formation in black bread. Considering an average per capita consumption of bread in Russia of 200g/day, using iodized salt would provide an additional 50.4 – 68.8ug/day of iodine or 34 - 46% recommended nutrient intake for adults and 23 -31% for pregnant women.

Key words: Universal Salt Iodization, iodine deficiency, bread, Russia

PO128

OBSERVED SUBSTITUTIONS IN A 40-DAY ROTATING MENU ON THREE GOVERNMENT-SPONSORED DAY-CARE CENTERS IN THE GUATEMALAN HIGHLANDS

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Background and objectives: Dietary quality of low-income institutions is determined partly by food service management capacity. We sought to assess the adherence to the strict letter of the prescribed menus in a day-care center network (Hogares Comunitarios), with feeding subsidize by the Secretariat of Beneficial Works of the First Lady of Guatemala (SOSEP).

Methods: he official rotating-menus, with a repeating 8-week cycle, were the pattern of reference. It prescribes a total of 435 items -- 317 food items and 118 beverage items – across a daily breakfast, mid-morning snack, lunch, and afternoon snack, over 40 institutional-days. We defined "non-fidelity" as any instance when the prescribed item was substituted for another (others) or omitted altogether. Daily menu adherence was recorded over 8 weeks in two semi-urban centers (C1 and C3) and one rural center (C2), with monitoring conducted July-November, 2012.

Results: Holidays or other interruptions led to 112 days of observation among a theoretical 120 attendance-days (93%) across all centers. These 112 days would have obligated serving 1217 menu-items. Items not served as planned (non-fidelity) occurred for 169 items (13.8%). Illustrative examples are frankfurter prescribed in the menu substituted with chicken, or noodles substituted for rice. By institution, non-fidelity rates were (4.1%) in C1, (18.1%) in C2 and (20.5%) in C3. Food items suffered non-fidelity 12.6% of the time, and beverages, 17.3%. Across all centers, they occurred most frequently at lunch (45.6%) followed by afternoon snack (33.1%), breakfast (14.8%) and mid-morning snack (6.5%). With respect to food-groups, the three highest percentages of non-fidelity related to sugars/fats (32%) followed by herbs/vegetables (24%) and fruits (17%).

Conclusions: Non-adherence to the SOSEP menu occurred in less than ~1/5 of instances in any center, and most often involved substitutions within the least healthful food-group.

Key words: Menus, beverages, Guatemala

PO129

HOW MUCH FOR DOING IT RIGHT?

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Background and objectives: Parenteral nutrition (PN) is essential for many hospitalized patients; however its use is associated with complications which could be controlled with an appropriate monitoring. The aim is to show that the creation of a nutritional support team (NST) reduces PN complications and increases PN quality standards; and calculate the incremental cost associated to the NST.

Methods: Patients with PN were selected between May-June, the year before and after NST implementation. NST involved the patient nutritional evaluation, daily monitoring of vital

signs and glycemia, analytical control (weekly, at the beginning and end of PN) and management of PN complications. The incremental cost was calculated considering the nutritionist's salary, the cost of analytical control and the incremental cost associated to PN including the cost of preparation (technician): (average cost of PN before NST/patient) – (average cost of PN after NST/ patient).

Results: We obtained 24 and 38 patients before and after NST (Group 1 and 2, respectively). Quality of PN was increased (Group 1 vs 2): PN<7 days 67% vs 22%, analytical control 4% vs 79%, nutritional evaluation 0% vs 100%, daily monitoring 0% vs 100%, individualized calculation of requirements 0% vs 100% (p<0,001 for all). After NST, albumin and prealbumin increased in 66% and 88% of patients, respectively. No patient reached triglyceride>400mg/dl. 34% of patients showed glycemia>140mg/dl (100% were solved adding insulin to PN). 26% of patients showed hepatic dysfunction due to PN (50% were solved using Cyclic PN and Taurine). No refeeding syndrome was reported, thiamine was added in patients at risk (34%). The incremental cost estimated was 559 €/patient.

Conclusions: The implementation of NST improves the quality of PN and reduces its complications. The benefits achieved by NST are associated with an incremental cost of 559 €/patient.

Key words: complications, cost, nutritional support team, parenteral nutrition

PO130

MODERATE AND MILD ANEMIA AS PUBLIC HEALTH PROBLEM IN CUBAN PRESCHOOL CHILDREN.

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Background and objectives: Different intervention programs were designed for anemia prevention for Cuban preschool children. The objective was to assess nutritional anemia, epidemiological factors and iron deficiency in children 6 to 59 month old.

Methods: A cross sectional study with systematic random sampling of 3527 children in 2011-2012 was completed in Eastern, Center and Western of Cuba. Anemia status was assessed by hemoglobin. Iron and vitamin C rich-food intake were evaluated by food frequency questionnaire. Epidemiological factor sex, rural/urban residence, assistance of daycare center (DCC) and previous infections (PI) were collected. In subsample of 6-23 months old additional factors exclusive breast milk, anemia during pregnancy and birth weight were into consideration, nutritional iron status was assessed by serum ferritin and CRP in subsample. Logistic Regression Analysis included residence, group of age (GA)<2SD, DCC no/yes, sex female/male; PI yes/no, and group of foods never+few/frequently intake were evaluated.

Results: The prevalence of anemia (hemoglobin < 11.0 g/dL) was 26.0% (95%CI 24.2-27.8) in Eastern, 12.0% (95%CI 10.0-14.0) in Center and 20.6% (95%CI 17.3-23.9) in Western provinces. Never+few intake eggs (OR=1.53 95%IC1.33-1.77), vegetables (OR=1.25 95%IC1.08-1.44), beans (OR=1.18 95%IC1.03-1.36), and bread (OR=1.63 95%IC1.30-2.04) were significant associated of anemia in Eastern, and never+few intake eggs (OR=1.69 95%IC1.20-2.38) and fruits (OR=1.72 95%IC1.19-2.49) in the Center. No statistic associations with sex, residence or breast milk intake were found. Depleted iron stocks in 54.5% children were found and 27% with adequate ferritin were anemic. Significant variables in logistic regression analysis in Eastern DCC (OR=2.59 95%IC=1.81-3.70), GA (OR=2.61 95%IC=2.11-3.23), earache (OR=1.90 95%IC=1.27-2.84), diarrhea (OR=1.78 95%IC=1.33-2.36), flu (OR=1.31 95%IC=1.03-1.66) and eggs (OR=1.25 95%IC=1.02-1.55); in Center only GA was significant (OR=4.23 95%IC=2.68-6.67).

Conclusions: Anemia is an important public health problem in preschool children in Cuba, and different factors beside food intake should also be considered.

Key words: anemia, preschool-children, food-intake, iron-deficiency

PO131

TASTE AND NUTRITION EFFECT ON THE SUGAR APPETITE OF RATS

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Background and objectives: The appetite of sugars solutions differing in concentration is typically taken as a measure of palatability, but the differences test procedures (short or

long-term) and other variables like time of availability of solutions would be considerate. The objective was to compare the influence of the taste and the nutritional composition of solution on the short- and long-term test intake of a sugar solution.

Methods. Twenty albino rats received a sweet-nutritive solution, sweet-nonnutritive solution, or both in the short and long-term tests. Licking behavior was monitored 30 min/day access.

Results: It showed high licking behavior in sweet-nutritive solution group in comparison with sweet-nonnutritive solution group ($p<.05$) in long –term test. Meanwhile groups did not show differences in licking behavior in short-term test ($p>0.05$). Group that received both solutions preferred sweet-nutritive solution over sweet-nonnutritive solution in long-term test ($p<.05$) and did not show significant differences on preference in short-term test ($p>.05$).

Conclusions: These findings suggest that time and availability of solutions is determinant on sugar appetite of rats.

Key words: Sugar appetite, licking behavior, rats

PO132

EFFECT OF NUTRITION EDUCATION AND BIWEEKLY IFA SUPPLEMENTATION ON ANAEMIA RELATED KNOWLEDGE AND IRON STATUS OF UNDERPRIVILEGED ADOLESCENT GIRLS

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Background and objectives: Biweekly iron and folic acid (IFA) supplementation is an effective strategy for reducing iron deficiency anaemia. This intervention study assessed the effect of nutrition education and biweekly IFA supplementation on anemia-related knowledge and iron status of adolescent girls.

Methods: 140 girls (aged 14-19 years) from outer Delhi were selected randomly. They were divided into - no intervention (control), IFA supplementation (60mg elemental iron + 0.5mg folic acid), IFA supplementation with nutrition education (IFA+NE) and nutrition education (NE) groups. Weight and height were measured to compute BMI and dietary data were gathered by one day 24 hour recall and food frequency questionnaire. Haemoglobin status was assessed by cynmethaemoglobin method and a questionnaire was used to assess the knowledge, attitude and practices (KAP) relating to anaemia both at baseline and after 12 weeks of intervention.

Results: The subjects were out-of-school (64%) and from lower castes (48%). Their family occupation was labour (61%) and monthly family earnings were <INR3,000 (86%). Compared to recommended allowances, their cereal-based and monotonous diets were inadequate in terms of energy (50% to 70%), protein (50% to 75%), iron (28% to 36%) and folic acid (28% to 54%) and all other nutrients except fat and vitamin C. Majority of the subjects were normoweight (87%) but anemic (61%). Mean haemoglobin level was 11.58±0.89, 11.09±1.44, 11.77±1.07 and 11.64±1.23 g/dL for control, IFA, IFA+NE and NE while KAP scores were 34.31±19.38, 54.71±15.38, 40.74±15.46 and 42.65±14.02 percent respectively. Post-intervention, the nutrition education groups (NE and IFA+NE) showed higher increase in KAP score (14.3 and 26.7%, $p<0.05$) as well as hemoglobin level (0.45 and 0.43 g/dL) respectively.

Conclusions: Nutrition education improved anemia-related KAP and effectiveness of biweekly IFA supplementation in reducing iron deficiency anaemia among underprivileged adolescent girls.

Key words: Iron deficiency anemia, IFA supplementation, nutrition education, adolescent girls.

PO133

POLYMORPHISMS IN THE FATTY ACID DESATURASE GENES AND DIET ARE IMPORTANT DETERMINANTS OF INFANT DOCOSAHEXAENOIC ACID STATUS

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Background and objectives: Tissue docosahexaenoic acid (DHA) accretion in early infancy is supported by DHA in breast-milk and may thus decrease once complementary feeding takes over. Endogenous synthesis of DHA from alpha-linolenic acid is low and polymorphisms in the genes that encodes the fatty acid desaturases (FADS) has been shown to have little effect on DHA-status in adults. It is unclear to what extent endogenous DHA-synthesis contributes to infant DHA-status. We aim to investigate the role of diet and FADS-polymorphisms on DHA-status at 9 months and 3 years.

Methods: This cross-sectional study with Danish infants use data from two prospective studies (EFiON and the SKOT-cohort). We measured erythrocyte (RBC) DHA-status at 9 months (n=409) and 3 years (n=176) and genotyped 4 FADS tagSNPs, rs3834458, rs1535, rs174575 and rs174448 (n=401).

Information about breastfeeding was obtained by questionnaires and fish intake was assessed by 7-day pre-coded food diaries.

Results: FADS-genotype, breastfeeding, and fish intake were found to explain 25% of the variation in infant RBC DHA-status (mean±SD: 6.6±1.9% of all fatty acids (FA%)). Breastfeeding was the most important contributor and still being breast-fed at 9 months was associated with 0.8 FA%-points higher DHA vs. no longer breast-fed (p<0.001). Two of the examined FADS-SNPs were highly correlated (rs1535 and rs3834458; r=0.98). Homozygous carriers of the minor allele of rs1535 had an increase in RBC-DHA of 1.6 FA%-points relative to those with wild type, whereas minor allele carriers of rs174448 and rs174575 had a decrease of 0.9 (p=0.017) and 1.9 FA%-points (p=0.001), respectively. Each 10 g/d-increment in fish intake was associated with an increase in DHA-status of 0.3 FA%-points. At 3 years, fish intake was the only significant determinant of DHA-status (0.2 FA%-points/10 g).

Conclusions: FADS-genotype and diet are both important determinants of DHA-status in late infancy.

Key words: fish intake, breastfeeding, child nutrition

PO134

DIET IMPACT ON VITAMIN B12 AND FOLIC ACID CONCENTRATION AS AN ELEMENT OF THERAPY IN PERSONS WITH THE LDL-R GENE MUTATION

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Background and objectives: Family hypercholesterolemia (FH) is a disorder inherited as a dominant autosomal trait caused by the mutation of the LDL receptor gene which belong to the most common genetic defects leading to premature coronary heart disease. Heterozygous FH has 76 000 people in Poland. Aim: assessment of vitamin B12 and folic acid intake in persons with FH with the LDL-R gene mutation before and after dietary intervention.

Methods: 14 persons with the LDL-R gene mutation took part in the study. Blood was taken twice, before and after the application of the B12 vitamin and folic acid. Also before and after the intervention a 3 day diet realization assessment interview was conducted. 14 day menus were prepared with different energy intake requirements in mind: 1500 and 1800 kcal. The level intake of folic acid was 400Âµg and vitaminB12-2,4Âµg/day. The intervention lasted for 6 weeks.

Results: The average concentration of the B12 vitamin before the intervention was 464 (Â±35,3) pmol/l. The lowest was 202 pmol/l, highest 635. After intervention the average concentration was 496 (Â±97,5) pmol/l. The lowest was 199 pmol/l, highest 800 pmol/l. In the case of the folic acid the average concentration was 6,61(ï,± 2,12) nmol/l before the diet. The lowest was 3,34 nmol/l, highest 10,44. After the diet the average concentration was 9,21 (Â±0,57), lowest was 3,83, highest 9,62.

Conclusions: the proposed diet shows beneficial tendencies especially in the case of folic acid, increasing concentration for all the participants of the study. A significant element is to keep the B12 vitamin level constant even when meat, which was an important source in the diet, consumption is decreased. Even though such persons require pharmacological treatment this diet may be an important element in the therapy especially in reference to homocysteine.

Key words: LDL-R gene mutation, vitamin B12, folic acid

PO136

MALNUTRITION-INFLAMMATION SCORE: A PREDICTOR OF MORTALITY IN HEMODIALYSIS PATIENTS

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Background and objectives: Hemodialysis (HD) patients with protein-energy malnutrition frequently present high levels of inflammatory markers, both associated with increased morbidity and mortality. Malnutrition-inflammation score (MIS) is a clinical nutrition assessment tool, which includes 7 components of the Subjective Global Assessment, body mass index, serum albumin and transferrin concentrations. The aim of this study was to investigate the usefulness and clinical relevance of MIS to predict mortality in chronic HD patients.

Methods: In this 36-month longitudinal prospective single-center study, baseline patients' characteristics, biochemical parameters and MIS were obtained and correlated with mortality. We studied 85 prevalent HD patients, with a mean age of 65.3±15.7 years, a mean HD time of 43.3±33.0 months, 46% female and 29% diabetics. Univariate, multivariate and survival analysis were performed, and a p< 0.05 was considered significant.

Results: MIS was positively correlated with age (r=0.36, p=0.001), nPCR (r=0.23, p=0.04) and with mortality (r=0.39, p<0.001) and negatively correlated with serum levels of al-

bumin (r= -0.40, p<0.001), creatinine (r= -0.32, p=0.03) and phosphorus (r= -0.27, p=0.013). Patients that died during the study had significantly lower albumin (p=0.001) and creatinine (p=0.04) and higher MIS (p<0.001) compared with those who didn´t die. Patients were divided into 3 groups according to baseline MIS (between 0-4; between 5-7 and ≥ 8). Patients with MIS ≥8 had a significant lower survival at the end of the study (log rank=11.1; p=0.004) compared with the other two groups. After adjustment for baseline characteristics, such as age, diabetes mellitus and HD vintage, MIS was an independent predictor of mortality (HR: 1.32; 95% CI: 1.17-1.49; p<0.001).

Conclusions: According to these results, MIS is a useful predictor of mortality in chronic HD patients. Therefore, assessing MIS is important to routinely monitor malnutrition-inflammation complex syndrome and also to predict these patients' prognosis.

Key words: hemodialysis, nutritional status, mortality.

PO137

A PUBLIC HEALTH GENOMICS PERSPECTIVE FOR OBESITY

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Background and objectives: It has been repeatedly established that common complex diseases stem from gene–environment interactions (GxE). In light of this experimental evidence, public health measures against common complex diseases should be tailored accordingly. Here we discuss integration of gene-environment data into an existing Public Health Genomics model, namely Public Health Genomics – Common Complex Diseases (PHG-CCD) model [Taneri et al. 2012] in relation to obesity a debilitating public health concern. Obesity is a common complex disease, which has become a major public health burden over the last decades [James et al. 2001]

Methods: We used PHG-CCD, a novel theoretical model developed by Taneri et al. [Taneri et al. 2012], integrating a gene– environment interaction paradigm into public health genomics. In particular, we tailor this model with specific information on GxE implicated in obesity.

Results: We discuss a public health genomics model that incorporates gene–environment interactions within the context of obesity, which could potentially be used when managing the prediction, diagnosis and treatment of this disease.

Conclusions: The public health genomics model presented here enables genome-based predictions and evidence-based behavioral interventions, by utilizing GxE data, which is at the core of common complex disorders. Applications of PHG-CCD serve as a valuable public health measure.

Key words: Obesity, genetics, epigenetics, gene- environment interactions (GxE), public health, public health genomcis

PO138

POSYANDU SWASEMBADA MODEL AS AN EFFORT TO SAVE VICTIM CHILDREN IN MERAPI MOUNTAIN BY LOSS GENERATION

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Background and objectives: Merapi eruption of natural disasters, has resulted in many losses. Losses that occur include the loss of property, damage of environment, decreases community economic. Loss of or damage to property and the environment, especially agricultural land causes family decreases. The food less will result in an increase of protein energy malnutrition (PEM) in children. Based on the cases of nutritional status on the eruption of Merapi mountain, Sleman District, PEM was found in children increased. Children who suffer from PEM at 14.5% and children who otherwise malnutrition 1.3%. Children who suffer from malnutrition due to Mount Merapi disaster if not handled properly can cause the people of Indonesia will be 'lost generation'. The purpose of the research to share knowledge about how to save the children on Merapi mountain from loss generation.

Methods: Preparation the research by using field observation, and interview with Kader Posyandu, and community leaders. Model 'Posyandu Swasembada' is the type of modification Posyandu. Posyandu Swasembada to increase of function Posyandu as community agencies to prevent cases of PEM and malnutrition, child growth monitoring and intervention PEM and malnutrition in the region after the eruption of Merapi mountain. The typical model in Posyandu Swasembada has intervention table. The actions taken at the table of intervention are: nutrition education, supplementary feeding, giving of traditional medicine (herbal medicine) in children is a fussy eater, massage on children, and referral. Model Posyandu Swasembada to save the children from PEM and malnutrition with the

basic are empowerment in community itself.

Key words: Posyandu Swasembada Model, PEM, Lost generation, Merapi Mountain

PO139

THE ASSOCIATION OF SERUM LIPID PROFILE WITH SCD1 DESATURASE INDICES IN RED BLOOD CELL MEMBRANES.

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Background and objectives: To investigate the association of the desaturase index (DI) of stearoyl CoA desaturase 1 (SCD1) in red blood cell (RBC) membranes with atherosclerosis indices such as non-high density lipoprotein cholesterol (non HDL-C) level and the ratio of low density lipoprotein cholesterol to high density lipoprotein cholesterol (LDL-C / HDL-C) which are known risk factors of coronary heart disease (CHD) in Japanese men.

Methods: Healthy male subjects of 140 (74 with waist circumference <85 cm and 66 with waist circumference >=85 cm) were recruited in this study. The serum lipid makers, fatty acid (FA) composition in RBC membranes and genotyping of SCD1 genes of the subjects were measured. The lipid extracts of RBC membranes were methyl esterified with methanol and acetyl chloride. Concentrations of FA methyl esters were detected by GC-FID, and DI of SCD1 was estimated as the ratio of FA product to FA precursor (using C18:1 n-9/C18:0, C16:1 n-7/C16:0). The SNPs of SCD1 gene were genotyped using the TaqMan SNP allelic discrimination method by an ABI 7300 System. Relations between the alleles of SNP and atherosclerosis indices were analyzed by multiple regression analysis to deduct where possible, confounding factors.

Results: We have demonstrated for the first time that the DI of SCD1 is associated with non HDL-C levels and the LDL-C/HDL-C ratio. Moreover, the SNP of the SCD1 gene significantly associated with the DI of SCD1.

Conclusions: The FA composition of RBC membranes is associated with atherosclerosis indices. This suggests that the FA composition of RBC membranes may be an index of CHD risk in Japanese male subject.

Key words: LDL-C / HDL-C ratio, non HDL-C, SCD1.

PO141

EFFECTS OF DIETARY CITRIC ACID ON ENERGY METABOLISM OF THE SKELETAL MUSCLES AND LIVER IN MICE

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Background and objectives: Dietary citric acid is reported to have many beneficial effects such as anti-fatigue activity. Nevertheless, the mechanism underlying these effects has not been elucidated yet. In this study we aimed to investigate the effect of citric acid intake on the energy metabolism in the skeletal muscles and liver in mice that were fasted without exercise.

Methods: C57BL/6J mice were divided into 2 groups. The control or citric acid groups received distilled water or citric acid solution, respectively. Thirty minutes after the administration, mice were dissected and skeletal muscles or liver were removed. After then, we performed DNA microarray global analysis using those organs.

Results: Expression of the genes involved in the tricarboxylic acid cycle, electron transport system, and ƒÀ-oxidation of fatty acids were not affected by dietary citric acid. On the other hand, dietary citric acid increased the level of blood glucose and phosphoenolpyruvate carboxykinase gene. In addition, a modest increase of glycogen content in the liver was observed. This increase might be induced via enhancing the expressions of the glucose-6-phosphatase and glucokinase genes and by suppressing the expressions of the phosphofructokinase and pyruvate kinase genes.

Conclusions: These results suggested that dietary citric acid enhanced gluconeogenesis in the liver. These phenomena may explain the beneficial effects such as anti-fatigue of dietary citric acid.

Key words: citric acid, gluconeogenesis, glycogen, DNA microarray, fatigue

PO142

HUMAN AMYLASE GENE COPY NUMBER VARIATION BETWEEN CAUCASIAN AND ASIAN ADULTS

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Background and objectives: Research has shown that the salivary amylase gene (AMY1) shows wide variation in copy number in the Caucasian American population. Our objective was to investigate the AMY1 copy number variation and salivary α-amylase protein activity in adults from Caucasian and Asian backgrounds.

Methods: Whole blood samples and saliva samples were collected from 150 adults (58 M: 92 F; 105 Caucasians: 45 Asians; age: 29.4 ± 10.4 yr; BMI 23.4 ± 3.4 kg/m2). Genomic DNA was isolated from the blood samples and analyzed using real-time quantitative PCR to determine AMY1 gene copy number relative to a control sample. The salivary α-amylase protein activity was assessed in the saliva samples using a commercial enzymatic assay.

Results: In the population as a whole, AMY1 gene copy number ranged from 2 – 16 copies. The mean AMY1 copy number was significantly higher for the Asian participants (7.8 copies) compared to the Caucasian participants (6.1 copies) ($p<0.001$). The shape and spread of the distribution curves between the two ethnic groups was significantly different ($p=0.002$). A significant positive correlation between AMY1 gene copy number and protein activity was observed ($r = 0.59$, $p=0.0001$).

Conclusions: AMY1 gene copy number varies both within people from the same ethnic background and also between people from different ethnic backgrounds. People from an Asian background were found to have higher average AMY1 copy number, which could help explain higher postprandial glucose responses to starchy foods in this group.

Key words: salivary amylase gene copy number

PO143

INDIVIDUAL CHARACTERISTICS AND ENVIRONMENTAL FACTORS ARE ASSOCIATED WITH SKIPPING BREAKFAST IN JAPANESE MALE UNIVERSITY STUDENTS

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Background and objectives: Skipping breakfast is most common in men and women in their 20s, including university students. Although some studies have examined the factors related to breakfast skipping in female university students, there have been few reports in male university students. This study aimed to clarify the characteristics of breakfast skippers in male university students.

Methods: A questionnaire survey was conducted in a university in Kanagawa prefecture in 2012. A total of 528 student-mother pairs who completed the questionnaire concerning frequency of eating breakfast, lifestyle and dietary awareness (mothers also answered questions about their socioeconomic states and implementation of dietary education when the students were growing up) were analyzed. The students were classified into either breakfast eater (who eat breakfast 7 days per week) or breakfast skipper and examined the factors related to breakfast skipping by logistic regression analysis.

Results: Sixty-two percent of the students skipped breakfast. A positive relationships between breakfast skipping and several factors were observed independently; the students who living alone (Odds ratio, 95% CI: 2.39, 1.43-4.00), who were smokers (2.30, 1.07-4.96), who had a part-time job (1.64, 1.08-2.50), who thought skipping breakfast was harmless (3.50, 1.89-6.49), who habitually went to bed after 1 am (2.46, 1.64-3.69), whose mother skipped breakfast (2.19, 1.11-4.34) and whose mother did not enjoy cooking (1.89, 1.23-2.84). Conversely, breakfast skipping was less common among the students who took more than an hour to go to university (0.58, 0.35-0.95).

Conclusions: Our results suggested that environmental factors such as living alone, commute time and mother's attitude and individual factors such as unhealthy lifestyle and dietary awareness were contributed to breakfast skipping in university students. Modifying lifestyle and reminding the students and their mothers of the importance of breakfast consumption may help students to eat breakfast.

Key words: Breakfast skipping, university students, Japan, mothers

PO144

PHYSIOLOGICAL BENEFITS OF GLUTAMATE AND DEVELOPMENT OF HANDY GLUTAMATE METER FOR FOOD TASTE MANAGEMENT

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Background and objectives: Measurement of umami is not only an issue of Japanese people since the importance of umami physiology has been elucidated in recent studies. The benefits of umami compound namely glutamate ranges from saliva secretion, digestive juice secretion, sodium intake reduction, protection of digestive tract or addition of satiety to foods. However, to date, there was no method to measure the glutamate content in foods which was quick and handy. We hence have been developing a prototype handy glutamate meter and evaluating its capabilities.

Methods: Glutamate meter contains a biosensor was created by micro-planar electrochemical sensor fabrication technique. Enzyme electrode of glutamate oxidase was casted with BSA with glutaraldehyde and sandwiched between fluorocarbon hydrophobic restrictive layer and selective permeable layer, placed on surface of platinum and silver /silver chloride electrodes. Linearity of the sensor was evaluated and a variety of food samples were measured.

Results: The dynamic range of the sensor was found to be between 0.05 and 2% w/v glutamate in neutral condition. Application in food was possible in soup, tomato or any food with prior treatment. The measurement time required was less than 10 seconds with accuracy equivalent to commercial amino acid analyzer.

Conclusions: We have succeeded in development of food use glutamate meter. This meter can be used for raw material quality assurance for kombu, tomato, tea, seasoning, production process control at food and fermentation production, product comparison, product development or used as an educational tool.

Key words: Glutamate, meter, sensor, quantification

PO145

SER/TER LPL GENE POLYMORPHISM, ARG158CYS AND CYS112ARG APOE GENE POLYMORPHISMS ARE DIET EFFICIENCY MARKERS IN OBESE PATIENTS

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Background and objectives: Patients with obesity have dyslipidemia. The lipid metabolism is regulated by ApoE and LPL genes that determine lipid levels in blood. Diet therapy is the main treatment for obese patients.

Methods: 108 patients with obesity, 18-66 years old (males – 24, females – 84) were examined. Diagnosis of obesity was based on body mass index (BMI) and bioimpedance body composition analysis. Thirty-nine patients had 1st grade of obesity (BMI=30-35 kg/m2), 27 patients – 2nd grade (BMI=36-40 kg/m2), and 42 patients had 3rd grade of obesity (BMI>40 kg/m2). Serum lipid status was examined by turbodimetric method on spectrophotometer analyzer Konelab 60i. The Ser/Ter polymorphism of LPL gene, the Arg158Cys and the Cys112Arg polymorphisms of ApoE gene were examined by PCR-Real Time analysis.

Results: Significantly difference in cholesterol levels (M±m) after the diet therapy in people with genotype E3/E3 were revealed (5,54±0,22 mmol/l vs 4,54±0,24 mmol/l; r=0,81; p<0,0001). The reduction of triglycerides levels was 1,59±0,18mmol/l vs1,22±0,07 mmol/l (r=0,79; p<0,0001), the reduction of high density lipoproteins levels (HDL) was 1,40±0,08 mmol/l vs 1,13±0,07 mmol/l (r=0,58; p=0,002), the reduction of low density lipoproteins (LDL) was 3,46±0,19 mmol/l vs 2,91±0,19 mmol/l (r=0,74; p<0.0001). Decreased cholesterol levels in patients with E2/E3 genotype after the diet therapy were revealed (4,61±0,24 mmol/l vs 4,17± 0,17 mmol/l (r=0,97; p=0,012)). LDL levels after the diet therapy were 2,60±0,28 mmol/l vs 2,44±0,15 mmol/l (r=0,96; p=0,021). Patients with Å2/Å2, Å3/Å4, Å2/Å4 and Ser/Ter genotypes did not have any positive dynamics.

Conclusions: The detection of E3/E3 and E2/E3 polymorphisms of ApoE gene is a significant predictor of an effective diet therapy in obese patients.

Key words: polymorphism, obesity, diet therapy.

PO146

COMPARISON OF MACRONUTRIENT AND VITAMIN INTAKE BETWEEN AUSTRIAN VEGETARIAN AND OMNIVORE

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Background and objectives: A vegetarian diet is associated with health benefits. Some micronutrients are only available in animal foods and may therefore be insufficient in a vegetarian diet. The aim of this study was to compare nutrient intake of vegetarian with omnivore adults in Austria and to determine if non omnivore have a higher risk of low nutrient intake.

Methods: The study sample included 419 healthy Austrian adults aged 18 to 64 years. 2.9 % of the sample has been vegetarians, excluding meat and poultry, or even vegans. Food consumption data were collected from October 2010 to February 2012. Dietary intake was measured using two non consecutive 24-h-recalls. Data entry was done with nut.s nutritional software based on BLS 3.01. Under and overreporter where excluded for statistical analysis, results are shown as mean values.

Results: Vegetarians and vegans had a higher intake of sucrose compared to omnivores (13 vs. 10 E %, $p<0.05$) but no significant difference for dietary fibre intake (30 g vs. 21 g) could be observed. Cholesterol, however was lower in vegetarians and vegans than in omnivores (146 g vs. 308 g, $p<0.05$). Vegetarians and vegans had a significantly ($p<0.05$) higher intake of vitamin E (20 mg vs. 14 mg), vitamin K (126 µg vs. 97 µg) and folate (265 µg vs. 210 µg), whereas they had a significantly lower intake of niacin (22 mg vs. 31 mg) and vitamin B12 (1.8 µg vs. 4.6 µg).

Conclusions: Results show that a vegetarian diet provides more of some critical vitamins e.g. folat. Vitamin B12 supply remains a problem in the nutrition of vegetarians.

Key words: nutrient intake, macronutrients, vitamins, vegetarian

PO147

URINARY IODINE EXCRETION LEVEL IS POSITIVELY ASSOCIATED TO PHYSIOLOGICAL STATUS OF FILIPINO WOMEN

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Background and objectives: Urinary iodine excretion (UIE) is currently the most practical biomarker for iodine nutrition. For this biomarker, international groups have recommended school-aged children as useful target group for surveillance because of their high vulnerability, easy access and as acceptable proxy for the iodine status of the general population. But the relevance of this group to others, especially among pregnant and lactating women, is not well established. Objective. To assess the association of UIE levels to the physiological status of Filipino women.

Methods: UIE was measured based on the catalytic effect of iodine on the reaction between cerium and arsenic after sample digestion using ammonium persulfate. UIEs of 442 pregnant and 830 lactating women were compared to UIEs of 1272 age- and BMI-matched non-pregnant, non-lactating women covered in the Biochemical Phase of the 7th National Nutrition Survey conducted by FNRI-DOST.

Results: Among pregnant women, median UIE was 100 µg/L (adequate ≥150 µg/L) with 26.4% having values <50 µg/L. Median UIE among non-pregnant women, on the other hand, was 142 µg/L with 17.5% having values <50 µg/L. Likewise, median UIEs among lactating and non-lactating women were 78 µg/L and 141 µg/L, respectively. Median UIEs for both pregnant and lactating women indicate insufficient iodine status. Further, median UIE levels for the 1st, 2nd and 3rd trimesters of pregnancy were 113, 107 and 89 µg/L, respectively. Iodine nutrition among non-pregnant, non-lactating women was optimal based on median UIE ≥100 µg/L) and the percentage (<20%) of women having UIE <50 µg/L.

Conclusions: Physiological status such as pregnancy and lactation possibly increase the demand and utilization of iodine. In pregnancy, this may also be true as gestation progresses. To achieve optimal nutrition in these vulnerable groups, an increase in dietary intake is recommended. In addition, iodine supplementation during pregnancy and lactation should be considered.

Key words: iodine, pregnancy, lactation

PO148

FIRST FOOD FOR INFANTS

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Background and objectives: Weaning foods may play an important role in the child's health. Studies report that infant feeding practices may influence health also later in life with one aspect being the development of preferences for tastes and textures. Studies find that children who are introduced to a variety of tastes early have higher acceptance of foods like fruits and vegetables in later life, reduced risk of food neophobia and reduced risk of developing obesity. We hypothesize that intro-

ducing kitchen-produced foods give greater variety in taste and consistency than industrial produced baby food in jars. The aim of the study First food for infants is to increase parents' knowledge, skills, and awareness regarding tasty and healthy food for infants to improve the children's diet and weight development and prevent food neophobia. Here we present a brief presentation of the study design.

Methods: First food for infants is a randomized controlled trial where parents in the intervention group participate in two cooking courses on how to prepare a variety of baby food. The control group is only given a brochure about infant nutrition. Recruitment of parents is done through the public health care centers. We plan to recruit 80 parents in both the control and intervention group. Questionnaires of feeding practices and food intake are filled in before the intervention (6 months of age) and at 15 months of age.

Results: This project started autumn 2011 and experience from the first four cooking classes show a positive attitude among the parents and they report awareness of food importance and altered feeding practice.

Conclusions: The project will show whether a practical cooking course to parents will increase homemade food practice resulting in a greater variety in food intake, reduce prevalence of neophobia and reduce risk of obesity at toddler's age.

Key words: infant's food

PO149

PROTEOMIC ANALYSIS OF ARGININE METHYLATED PROTEINS IN RAT BRAIN

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Background and objectives: It has been appeared that arginine methylation of histone and non-histone proteins regulates cell-function and is involved in epigenetics. On the other hand, asymmetric dimethylarginine (ADMA), one of free methylated arginines released into body fluid after in vivo protein breakdown serves as an endogenous inhibitor of nitric oxide synthases (NOSs). ADMA is synthesized by protein arginine methyltransferases (PRMTs) and is degraded by dimethylarginine dimethylaminohydrolase 1 (DDAH1). In this study, to demonstrate the physiological significance of the metabolic pathways for methylated arginines in rat brain, in which ADMA was actively metabolized, we examined the localization of the metabolizing enzymes, DDAH1, PRMT1, PRMT5 and identified unknown arginine methylated proteins from rat brain by proteomic analysis.

Methods: standard.

Results: Several histological compartments were prepared from rat brain and subjected to western blot and immunohistochemical analyses. DDAH1, PRMT1, and PRMT5 were ubiquitously expressed in all regions of rat brain. Additionally, colocalization of PRMT1 and DDAH1 in the spinal cord was demonstrated by immunohistochemical analyses. These results suggest that the metabolic pathways implicated in biosynthesis and degradation of ADMA were driven actively in the central nervous system, including the spinal cord. Further, several arginine methylated proteins were detected by western blot analyses using crude extract of rat brain. of them, fructose bisphosphate aldolase C and ribose phosphate pyrophosphokinase 1 were identified as protein containing ADMA residues and SDMA residues, respectively, in the polypeptide.

Conclusions: Fructose bisphosphate aldolase C is not only a glycolysis enzyme in brain, but also is known to be involved in the expression of light neurofilament. These findings lead us to further examine the implication of the regulated arginine methylation of these enzymes for neurodegeneration.

Key words: asymmetric dimethylarginine, arginine methylated protein, nitric oxide, fructose bisphosphate aldolase C

PO150

FACTORS ASSOCIATED WITH BREASTFEEDING RATES AT BIRTH AND DISCONTINUATION BEFORE ONE MONTH, IN FRANCE IN 2012

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Background and objectives: France is one of the European countries where breastfeeding rates are among the lowest. Using data of the national survey Epifane on feeding practices during the first year of life, our objectives were to describe breastfeeding rates at birth and one month, and to identify factors associated with breastfeeding initiation and with early cessation before one month.

Methods: The Epifane survey was carried out using a 2-stage stratified random sample of infants born between the 16th of January and the 5th of April 2012 in 136 maternity wards in mainland France. Detailed information on breastfeeding and formula use was collected during the maternity stay and at one month. Factors associated with breastfeeding initiation and discontinuation were identified using logistic regressions.

Results: Out of 3366 infants included (participation rate: 81%), more than two third (69 %) were breastfed in maternity unit (60 % exclusively, 9 % partially). At one month, half of them (54 %) were breastfed but only 35 % exclusively. Breastfeeding rates were associated with mother's age, marital status,

education, birthplace, body mass index and smoking during pregnancy. Moreover, attending delivery preparation courses, early skin-to-skin contact and partner positive perception of breastfeeding were positively associated with breastfeeding initiation. Among mothers who have initiated breastfeeding at birth and for whom data were available at one month, 20% have stopped nursing their baby before the end of the 4th week. Factors associated with breastfeeding discontinuation were the same plus exclusive/mixed breastfeeding and various complaints such as mastitis.

Conclusions: Targeted programs should be implemented to support prolonged breastfeeding in young mothers and those from low educational level. Actions should also be particularly focused on the sharp fall of breastfeeding rates after home return, which is sizeable as early as at the first week after delivery.

Key words: Breastfeeding, Cohort, Newborns.

PO151

LOWER BETAINE INCREASES THE RISK OF NON-ALCOHOLIC FATTY LIVER DISEASE IN PATIENTS CARRYING THE CC GENOTYPE OF CHDH RS9001

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Background and objectives: The effect of methyl donors and genetic polymorphisms in metabolic enzymes on the risk of non-alcoholic fatty liver disease (NAFLD is not well understood. The purpose of this study was to investigate the association of homocysteine, choline, betaine levels and the genetic polymorphisms of the related metabolic enzymes with the risk of NAFLD

Methods: By utilizing a population-based study of 371 NAFLD cases and 699 controls, we used HPLC-MS to determine serum betaine, choline and homocysteine; gene mutations of PEMT, CHDH and BHMT were detected by multiplex SNaPshot technology.

Results: The highest tertile of betaine level was associated with a lower risk of NAFLD [OR=0.670; 95% CI: 0.517-0.870] compared with the lowest tertile. A putatively functional single nucleotide polymorphisms of choline-metabolizing gene CHDH rs9001 was found be related to NAFLD risk. Compared with the CC variant genotype, the AA+CA genotype was associated with a decreased risk of NAFLD (OR= 0.817; 95%CI: 0.693-0.962). The BHMT rs3733890 and PEMT rs7946 polymorphisms were also examined but were found not to be associated with NAFLD risk. The CHDH rs9001 CC genotype also had lower betaine concentrations compared with CA+AA genotype (P=0.060), PEMT rs7946 AA genotype had lower choline concentrations compared with GA+GG genotype (P=0.070). Moreover, the gene-gene interaction analysis revealed a significant interaction of PEMT rs7946 and CHDH rs9001 with NAFLD susceptibility.

Conclusions: Our findings identified the CHDH rs9001 variant was associated with an increased risk of NAFLD and suggest that choline metabolism may play an important role in NAFLD.

Key words:NAFLD; Choline dehydrogenase(CHDH); Genetic polymorphism; Choline; Betaine

PO152

FACTOR ANALYSIS OF PATIENTS' SATISFACTION QUESTIONNAIRE TOWARD HOSPITAL FOODSERVICE IN A GOVERNMENT HOSPITAL IN MALAYSIA

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Background and objectives: Accurate and reliable questionnaires are important to measure patients' satisfaction with hospital foodservice. However in Malaysia, there is no published evidence that the tool used is valid and reliable for hospital setting in Malaysia. Hence, the main purpose of the study was to investigate the construct validity and reliability of the developed questionnaire in a local setting.

Methods: An interview-administered questionnaire was used on a sample of 277 hospitalized patients in a government hospital. The questionnaire used in the study was adapted and modified from the Acute Care Hospital Foodservice Patient Satisfaction Questionnaire (ACHFPSQ) by Capra et al., (2005), Hartwell et al., (2007), Hwang et al., (2003), O'Hara et al., (1997) and Dube et al., (1994), in order to suit the local setting, which consisted of 27 statements from 4 dimensions. A factor analysis and reliability analysis was conducted using SPSS version 19.

Results: The principal component of factor analysis revealed that the final questionnaire contained 25 individual statements for four main foodservice dimensions namely food properties, staff and meals service reliability, customisation and physical and social aspects. The reliability analysis also revealed the cronbach alpha value range at 0.55 to 0.84 for the foodservice dimensions. The analysis showed that the alpha value differed from one dimension to another dimension such as food properties α=0.84), staff and meals service reliability (α=0.67), customisation (α=0.69) and physical and social aspects α=0.55). The questionnaire on patients' satisfaction toward hospital foodservice was considered accurate and reliable based on the statistical analysis.

Conclusions: The classification of the four dimensions was

able to provide detailed information of the satisfaction level, relationship of the foodservice dimension and influence of dimension which contributed to satisfaction toward hospital foodservice.

Key words: Factor analysis, hospital foodservice, patients' satisfaction, Malaysia

PO153

EFFECTS OF GLUCOSE AND MAGNESIUM IN WATER SOLUTIONS ON WATER ABSORPTION IN THE SMALL INTESTINE

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Background and objectives: The purpose of the present study was to determine effects of glucose and magnesium in water solutions on water absorption in the small intestine.

Methods: We used 8-weeks-old male SD rats (20 and 36 for experiments 1 and 2, respectively). We prepared 5 types of aqueous solutions containing 2 g/L polyethylene glycol 4000 as a non-absorbable marker and supplemented with 0, 96, 193, 289, 385 mmol/L D-glucose. We infused the aqueous solutions into the stomach in the conscious rat using oral sonde after food deprivation for 24 hours and water deprivation for 4 hours. At 10 minutes of the after infusion, we collected the digesta in the small intestinal lumen for measuring of water absorption and the concentration of glucose, cation and osmotic pressure (Experiment 1). We prepared 9 types of aqueous solutions containing 2 g/L polyethylene glycol 4000, 96.0 mmol/L D-glucose, 43.2 mmol/L sodium chloride, 17.3 mmol/L potassium chloride, and supplemented with 0, 0.25, 0.5, 1, 3, 5, 10, 15, 20 mmol/L magnesium chloride. We infused the aqueous solutions into the stomach in the conscious rat using oral sonde as in Experiment 1. After 10 minutes, we collected the digesta in the small intestinal lumen for measuring of water absorption and the concentration of glucose, cation and osmotic pressure (Experiment 2).

Results: The water absorption in the 96 mmol/L glucose solution was highest in the all groups (Quadratic effect; $p<0.001$, GLM). The water absorption in the 0.5 and 1 mmol/L magnesium solution was highest in the all groups (Quadratic effect; $p<0.001$, GLM).

Conclusions: The present study suggested the water absorption was increased in 96 mmol/L glucose and 0.5 or 1 mmol/L magnesium in the solutions.

Key words: water absorption, glucose, magnesium

PO154

PUPS OF DAMS FED RESTRICTED DIET DURING LACTATION CONSUME LARGER AMOUNT OF FAT TO ACHIEVE OPTIMAL GROWTH AFTER WEANING

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Background and objectives: To investigate the influence of dietary restriction in dams during pregnancy and during lactation on food choice of their pups after weaning.

Methods: Control and restricted groups of dams were given either free access to AIN-93G (CTG) or restricted diet (60% of that consumed by a control group) during pregnancy (PRG) or during lactation (NRG),respectively. After weaning, all pups were placed on a two-choice diet program of a carbohydrate-protein diet (CPD) and a fat-protein diet (FPD) for 4 weeks (self-selection period).

Results: Although no significant difference in body weight at birth and on day 8 after birth was observed among the three groups, at weaning, the body weight in pups of the NRG was lower than that of the other groups. On day 8 after birth, although the stomach weight in the pups of the NRG was lower than that of the other groups, no significant difference in protein, carbohydrate and total lipid concentrations and PFC ratios in the stomach content were observed among these three groups. The ratio of body weight gain [body weight gain (g)/ body weight at weaning (g)] during the self- selection period in the NRG was higher than that of the other groups. The FPD intake ratio [FPD intake (g)/total intake (g)] of the NRG during the self-selection period was also higher than that of the other groups.

Conclusions: It was considered from these results that the pups of the NRG needed a high energy density diet in order to attain a more normal size after weaning. Therefore, they spontaneously consumed a larger amount of the FPD than pups of the other groups.

Key words: dietary restriction, during lactation, self-selection, suckling pups, weaning pups

PO155

THE EFFECTS OF BETA GLUCAN ADMINISTRATION ON IMMEDIATE EARLY GENE IN THE BRAIN DURING EXHAUSTIVE EXERCISE

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Background and objectives: This study was conducted to investigate the effects of beta glucan on immediate early gene in the brain during exhaustive exercise in rats.

Methods: 60 male Sprague-Dawley rats were divided into six groups:control, exercise, exercise and 50 mg/kg beta glucan, exercise and 100 mg/kg beta glucan, exercise and 200 mg/kg beta glucan, and exercise and caffeine(100 mg/kg caffeine). The rats of the beta glucan-treated groups were administrated orally with the respective doses of beta glucan once a day for 7 days. The treatment was administered 60 min prior to the start of exercise. On the 7th day of the experiment, the time to exhaustion during treadmill running was determined for the exercise groups. The time to exhaustion was defined as the time between the commencement of exercise and the first occurrence of failing to keep up with the treadmill for a period of 3 min or more. The speeds used for determination of the exhaustion time were 10 m/min for 5 min, followed by 16 m/min, 18 m/min, 21 m/min, 24 m/min, 26 m/min, 29 m/min, 32 m/min, 34 m/min, 37 m/min for 3 min each and then 40 m/min until exhaustion.

Results: Treatment with 100 and 200 mg/kg beta glucan led to a significant increase in the time to exhaustion in response to running on a treadmill and a significant decrease in c-Jun and c-Fos expression in the dorsal raphe, the hypothalamus and hippocampal region.

Conclusions: The results of the present study demonstrated that the administration of beta glucan increased endurance exercise performance through inhibition of immediate early gene production in the brain.

Key words: beta glucan, gene, exercise

PO156

FUNCTIONALITY OF MILK FERMENTED DRINKS AT BOSNIA AND HERZEGOVINA MARKET

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Background and objectives: It is well known that fermented milks serves as a good source of GRAS bacteria. Depending on type, viable cells of lactic acid bacteria and especially probiotic bacteria must be found in such products. By this way they can inhabit human colon after consumption and thus cause many benefits for host. Therefore, they have to comply with functionality criteria i.e. they have to contain more then 106 cfu/ml. The aim of the work was to test functionality of fermented milks at Bosnia and Herzegovina market.

Methods: 15 samples of yogurt and probiotic drinks were purchased at the market in capital of Bosnia and Herzegovina, Sarajevo. Total count of viable cells, chemical composition and acidity were measured in chosen samples. In order to check functionality, six samples of fermented milks were stored at 4oC up to 21 day and they are tested to the same parameters. ANOVA with two factors without repetion was done to establish if there are differences among producers and time of storing.

Results: Mean value for total count of viable cells in yogurt samples was 207 x 1010 cfu/ml and in probiotics 137 x 1010 cfu/ml and all of them fulfil functionality criteria. At the end of storing at 4oC all samples retained higher count of cells then minimum required except one sample of probiotic. In general, the count was decreasing as the time went by. ANOVA did not show significant influence of storing time (except count of S. thermophilus at probiotics) as well as producer (except L. delbrueckii ssp. bulgaricus at yogurts).

Conclusions: There is real possibility that the count of viable cells decreases bellow minimum required after expiration of lifetime (25-30 days). Thus, consumers should take care of it during purchase of milk fermented drinks.

Key words: probiotics, functionality, viable cells, yogurt

PO157

LEAN VERSUS OBESE: MOLECULAR INSIGHTS AFTER THE INGESTION OF HIGH-FAT MEALS

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Background and objectives: Previous findings in nutrition research indicate that obese people suffer from a metabolic disequilibrium leading to low-grade inflammation and other metabolic disorders whereby the molecular mechanisms are not utterly clarified. Studies that examine postprandially dose-response effects after the consumption of defined composed meals help to provide mechanistic information on these issues. Especially, the comparison of responses from lean and obese subjects should contribute to the understanding of metabolic differences.

Methods: A human intervention study was conducted including seven healthy lean and seven healthy obese volunteers who consumed one high-fat meal in three different caloric doses (500, 1000, 1500 kcal). Besides the determination of classical clinical parameters, also the blood cell transcriptome was measured before and 2h, 4h and 6h after ingestion. Genome wide gene expression was measured using microarray technology.

Results: 45 genes were differently expressed between lean and obese at fasting condition; 16 genes were up-regulated and 29 genes were down-regulated (FDR<0.05). Pathways analysis showed significant differences between the two population groups and included oxidative phosphorylation and other metabolic processes (p<0.001). Geneset enrichment analysis revealed significant caloric dose-dependent changes in gene expression in the lean group, in the obese group and, strikingly, between the two groups reflecting the disability of the obese volunteers to cope with meals of high energy content. Finally, postprandial changes occurred in the lean subjects in a direction that was predictive of the fasting status in the obese volunteers.

Conclusions: A comprehensive analysis of fasting and postprandial parameters comparing the response of lean subjects to the response of subjects with a metabolic deregulation allowed us to identify nutritional health biomarkers that may be used to characterize the interaction between food and the human organism, a strategy that may be of great value to food industry and to medicine.

Key words: obesity, high-fat meal, metabolism

PO158

BENEFICIAL ANTIOXIDANT EFFECTS OF POLYPHENOL-RICH EXTRA-VIRGIN OLIVE OIL IN HEALTHY VOLUNTEERS

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Background and objectives: Several studies show that an increased intake of olive oil phenols influences protection against oxidation processes in chronic diseases. The aims were to study the effects of rich-polyphenol extra virgin olive oil (EVOO) in healthy humans, investigating each mechanism of action.

Methods: The 30-days nutritional intervention period involved 45 healthy volunteers, aged 21-45 years, who consumed daily 50 ml of raw EVOO and avoided a high polyphenolic diet, maintaining their physical exercise habits. Phenolic EVOO composition was analyzed by HPLC-DAD-MS. Anthropometric and body composition parameters, biochemical parameters, plasma total antioxidant capacity (TAC), erythrocyte antioxidant enzyme activity and their lymphocyte gene expression were determined. All data were analyzed by the SPSS 17.0 statistical package (SPSS, Inc.) by the t test and the non parametric Wilcoxon test as applicable.

Results: The EVOO used had an appropriate quali-quantitative composition of phenolics. Nutritional, anthropometric, body composition and biochemical parameters did not significantly changed. We observe that EVOO supplementation significantly increased TAC (p<0,001). A significant increase (p< 0.01) in CAT and GTPX activity was also observed. No significant difference was observed in SOD activity. EVOO supplementation significantly modified (p<0,05) antioxidant enzyme gene expression. Studies with humans have proved that dietary interventions with rich-phenol foods elevate TAC however, most reported changes in these enzymes have not occurred in healthy people.

Conclusions: Daily consumption of EVOO rich in phenolic compounds, by healthy adults, improved their antioxidant status and modified their antioxidant gene expression levels without modifying any physiological characteristics.

Key words: Extra virgin olive oil; polyphenol; healthy; antioxidant enzyme; gene expression

PO159

IMPROVEMENT OF NUTRITIONAL PROPERTIES IN FRANKFURTERS BY FATTY ACID MODIFICATION

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Background and objectives: Frankfurters have a large market especially among a particular sector of the population. Since their fat (quantitatively and qualitatively) normally diverge from dietary goals, our objective in this work was to develop frankfurters with better lipid composition (reduced fat content and improved lipid profile) by replacement the animal fat with a combination of healthier oils (plant and/or marine origin) stabilized in an oil-in-water emulsion, as a strategy of reformulation.

Methods: Control frankfurter was manufactured with fresh post-rigor pork meat, pork backfat, flavouring and additives. In the reformulated frankfurter the pork backfat was partially replaced by an oil-in-water emulsion prepared with a combination of olive, linseed, and fish oils, and using sodium caseinate as emulsifier. Composition analysis and fatty acid profile were determinate.

Results: Fat content of frankfurter was reduced from 18.88% (control frankfurter) to 10.27% (modified frankfurter). Reformulated frankfurters contained 4.10 g/100 g of the combination of oils providing a significant change in the lipid profile. SFA content was lowered by a 56% while PUFA was increased almost 400%. The modified frankfurter provided 190 mg/100 g of long chain n-3 PUFA and 0.9 g/100 g of alpha linolenic fatty acid.

Conclusions: Based in reformulation strategies, an improved fat content frankfurter was obtained. The changes induced in reformulated product composition are such as to allow carrying different nutritional claims: "reduced fat content" and "high omega 3 fatty acid content", according Regulation (EC) No 1924/2006 and No 116/2010 of the European Parliament and of the Council (2006, 2010). Additionally (pursuant to Commission Regulation No 432/2012), the modified frankfurters may carry some cardiovascular health claims. This research was supported by project AGL2011-29644-C02-01.

Key words: Frankfurter/ Healthier oil combination / Fatty acid profile / Oil-in-water emulsion

PO160

HEALTH BENEFITS OF WHOLE GRAIN WHEAT: INTERVENTION STUDY CLARIFYING UNDERLYING MECHANISMS AND THE ROLE OF POLYPHENOLS BOUND TO DIETARY FIBRE

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Background and objectives: Epidemiological studies associate whole grain (WG) consumption to reduced CVD risk, body weight and abdominal circumference. Data obtained by intervention studies were not conclusive. Evidence from animal and few human studies indicated that prebiotic dietary fibre ameliorates metabolic syndrome. Whole grain, especially wheat and rye, present a large amount of polyphenols (mainly ferulic acid) bound to dietary fibre. This study aims to assess the role of dietary fiber polyphenols on health benefits of WG.

Methods: A commercial WG product, was selected. Eighty healthy overweight subjects were enrolled. Forty volunteers replaced equicaloric portions of specific foods with 68 g WG/day for 8 weeks; the other half did not change their diets. At baseline, and after 4 and 8 weeks, body weight, waist and hip circumferences, bioimpedance analysis and blood, urine and feces collection was measured. Markers linked to bioavailability of ferulic acid and several polyphenols (by HPLC/MS/MS), to inflammatory status (several cytokines by multiplexed immunometric assay), to lipid and glucose metabolism as well as to the overall nutritional status and appetite, were measured. Metagenomic analysis of feces was run to evaluate the influence of intestinal microflora composition on the health benefit of a WG-enriched diet.

Results: 63 subjects (34 treated with WG and 29 controls) completed the study. Preliminary results indicate different concentration trends for inflammatory cytokines and ferulic acid-related metabolites in blood collected from subjects who consumed WG compared to control subjects over the study period. Data analysis is still ongoing and all final results will be crossed with metagenomic data to ascertain the role of individual microflora on bioavailability of polyphenols bound to WG dietary fiber as well as on health effect.

Conclusions: Consumption of wheat whole grain might improve inflammatory status in overweigh subjects

Key words: whole grain, ferulic acid, prebiotic, inflammation

PO161

MAINTAINING CHANGE: WHAT DIFFERENCE DOES PARTICIPATING IN AN INTENSIVE DIETARY INTERVENTION MAKE FIVE YEARS ON?

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Background and objectives: Evidence supports cardiovascular disease (CVD) risk reduction through dietary manipulation, however dietary research interventions typically last under 12 months and require high levels of participant support to achieve change. Given the chronic nature of CVD, the long term health outcomes of intensive interventions in free-living individuals are of particular interest. This study sought to determine if participating in an intensive modified DASH intervention significantly impacted CVD risk biomarkers 5 years after participation, compared to standard healthy eating education.

Methods: 40 adults (n=30 DASH, n=10 standard) participated in this cross-sectional follow-up study. The study collected fasting blood samples, dietary data, blood pressure (BP), body mass index (BMI) and 24h urine collections from all participants 5y after the original intervention. Paired T-tests were conducted to examine the effect of time from follow-up to intervention completion and also to baseline status.

Results: Neither group maintained the level of change achieved during the intervention period. The DASH group's BP increased by 9% systolic and 17.3% diastolic ($p<.05$) and the standard group increased their BMI, total cholesterol and BP by 6.8%, 15.8%, 9.5% respectively ($p<.05$) compared to the intervention endpoint. Both groups had raised HDL cholesterol levels (DASH 13.1%, standard 14.7%) ($p<.05$). However when compared to baseline, only the DASH group's blood lipids were improved (total (9.8%) and LDL cholesterol (14.6%) decreased and HDL cholesterol (7.8%) increased) ($p<.05$). Neither group had significant weight gain nor BP change compared to baseline. **Conclusions:** Although long-term dietary change appears to be difficult to maintain, some health gains can be achieved through participating in an intensive dietary intervention, with DASH participants having healthier blood lipid profiles. Both groups were weight and BP stable after 5y, which suggests personalised education supports some dietary change maintenance.

Key words: dietary change, CVD, DASH diet

PO162

INTRACELLULAR METABOLISM OF ISOFLAVONES IN HUMAN ENDOTHELIAL CELLS

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Background and objectives: Soy isoflavones have received much attention because of their potential benefits as phytoestrogens (Patisaul & Jefferson, 2010). Accumulated evidence suggests that their consumption may have beneficial effects on cardiovascular health, including a favourable effect on blood lipids, inhibition of platelet aggregation and improvement of vascular function (Rimbach et al., 2008). Recent studies have shown that genistein and daidzein are metabolized after absorption by Phase-II-enzymes to form mainly glucuronides and sulfate-metabolites (Hosoda et al., 2010). Their metabolism has been well-reported in cell models of the gastrointestinal tract or in hepatic models, but little attention has been given to the potential intracellular metabolism of isoflavones in human umbilical vein endothelial cells (HUVEC), despite being widely used in vitro models for assessing mechanisms of action ofpolyphenols in the vascular endothelium (Andrade et al., 2011). Therefore, the aim is to determine whether HUVEC can metabolize isoflavones, using Hep-G2 (liver cell model) and CACO-2 monolayer (small-intestine model) as positive controls.

Methods: Genistein, daidzein and equol (0-10μM) were incubated with HUVEC, Hep-G2 and Caco-2 monolayer cell lines for 2 hours. Supernatants and cell lysates were collected and processed for analysis. Aglycones were determined by liquid chromatography following the method by Toro-Funes et al. (2012). Isoflavone metabolites were identified with mass spectrometry detection.

Results: In HUVEC, aglycones, methyl conjugates of genistein and daidzein, and a genistein-methyl-sulfate were detected in the supernatant and cell lysates. In Hep-G2 cells, aglycones, glucuronides of genistein and daidzein, a genistein-methyl-glucuronide and a genistein-sulfate were found. In Caco-2 monolayer, glucuronides of genistein and daidzein were detected beside the aglycones.

Conclusions: Genistein and daidzein are metabolized into their methyl conjugates in endothelial cells, while equol metabolites were not detected. These findings may have important implications in the investigation of the cardioprotective mechanisms of action of isoflavones.

Key words: endothelial cells, isoflavones, intracellular metabolism.

PO163

CAN PARENTS BE REACHED THROUGH A SCHOOL-BASED FRUIT- AND VEGETABLE INTERVENTION?

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Background and objectives: Fruit and vegetable consuption is negatively correlated with a number of chronic diseases. One of the greatest nutritional political challenges is to increase the consumtion of fruit and vegetables in the entire population. Increased consumption of fruit and vegetables contributes to the prevention of most prevalent chronic diseases. The consumption of fruit and vegetables in Norway is generally low. Adults eat about half of the recommended daily intake. Several school-based fruit and vegetable interventions include activities that involve parents, but not much is known about the effectiveness of such a parent component on child and parent intake level.

Methods: This study is part of the intervention study Fruit and Vegetable Make the Marks (FVMM). FVMM aimed at increasing fruit and vegetable consumptin among schoolchildren and their parents. The intervention was carried out among 6th and 7th graders from September, 2001 (baseline) to May 2002 (follow-up 1). Six specific newsletters were distributed to the parents during the intervention period. These newsletters aimed at increasing communication between parents and their children concerning fruit and vegetables, and also to stimulate to increased avalibility of fruit and vegetables at home. The projects was also presented at parents´meetings at schoool.

Results: A significant effect of the intervention (the newsletters and the parents´meeting) was observed (p=0.015). The intake of fruit and vegetables decreased from baseline to follow-up 1 for both groups (intervention and control), but the reduction in the intervention group is lower (-0.27 portons/day) than in the control group (-0.62 portions/day). The effect of the intervention is hence 0.35 portions/day.

Conclusions: We conclude that the parents were reaced to a certain extent through the school-based intervention study primarily aimed at pupils. Whether the effect will last over time would demand further study.

Key words: fruit and vegetable, parents, school-intervention

PO164

DIFFERENT SOURCES OF DIETARY LIPIDS: EFFECT ON LIPID PROFILE OF GROWING RATS.

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Background and objectives: The importance of diet in maintaining health is widely accepted and recognized. Diet lipid profile is important to prevent chronic diseases and improve the quality of life of individuals. The objective is to analyze the effect of different sources of dietary lipids with normal and high concentration, on triglycerides (TG), total cholesterol (TC), non-HDL cholesterol and fatty acid profile of growing rats.

Methods: Weanling Wistar rats were fed during 10 days: 15% or 45% dietary fat provided by butter (B15, B45 groups); by olive oil (O15, O45 groups). Control group(C) received normocaloric diet according to AIN´93. Diets fatty acid profiles were determined by gas chromatography (GC); ω6&ω3 and unsaturated/saturated (UFA/SFA) ratios of diets were calculated. Serum levels of TG, TC and chol-noHDL were determined by enzymatic-colorimetric method and fatty acid profile was determined by GC.

Results: ω6&ω3 diets ratio: B=8.7/1; O=15/1; C=9/1; UFA/SFA, B=0.54; O=4.2; C=5.5. Serum (mean±SD mg/dL) TG B15=72.2±24.3, B45=113.0±31.2*; O15=61.5±19.4, O45=77.6±12.1*; C=58.9±15; TC B15=58.7±10.3; B45=89.2±10.1*; O15=66.9±11.9; O45=73.1±7.3; C=62.1±13.9; chol-noHDL B15=28.7±9.3; B45=52.7±9.8*; O15=35.1±10.2; O45=50.9±8.9*; C=36.1±10.3. Fatty acid profile (area%±SD): Oleic: B15=18.2±1.6*, B45=19.1±5.2*; O15=19.4±3.4*; O45=22.0±5.1*; C=10.6±2.0 Linoleic: B15=7.7±1.9*; B45=8.9±1.8*; O15=12.4±1.9*; O45=11.8±2.8*; C=20.0±4.7 α-Linolenic: B15=0.4±0.1*; B45=0.4±0.11*; O15=0.34±0.01*; O45=0.5±0.2*; C=1.0±0.3. (*p<0.01) TG levels in B45 and O45 were statistically higher compared to C while TC level is only higher in B45. Experimental groups showed higher serum oleic acid levels with lower α-linolenic and linoleic acids levels compared to C.

Conclusions: The administration of these diets provoked changes in serum fatty acid profile levels in response to differences in the sources of dietary lipids used, but not in response to the high fat percentage. This fact would exacerbate the route of the ω9 family and decreases essential fatty acids.

Key words: diet, lipid profile, rat

PO165

HIGHT FAT LEVEL DIETS: IMPACT ON FATTY ACID COMPOSITION OF SERUM AND THYMUS OF ADULT RATS.

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Background and objectives: Diet's fatty acids profile has an essential function as immune regulator. The aim of this study was to analyze the effect of diets containing high levels of fat from different sources, on serum and thymus fatty acid composition of adult rats.

Methods: Wistar rats(50 days of age) divided in 3 groups were fed during 40 days with diets containing 1)50Kcal% fat provided by sunflower oil (group S), 2) 50Kcal% fat provided by butter (group B) and 3) normocaloric diet (group C). All diets had 20% protein and were complete in all other nutrients according to AIN´93. Diets fatty acid profile was determined by gas chromatography(GC) and ω6&ω3 and unsaturated/saturated(U/S) ratios were calculated. At the end of the feeding period, animals were sacrificed and thymus was removed. Serum and thymus fatty acids profile were determined by GC. Anova test was performed.

Results: ω6&ω3 diet's ratio: B: 8.7/1, S: 250/1, C: 9/1; U/S diet's ratio: B: 0.54, S: 9.2, C: 5.0. Fatty acid levels were expressed as %area(X±SD). Serum: total saturated: S=29.99±1.75, B=35.91±3.13, C=32.88±1.63; Oleic: S=9,58±2.00, B=17.71*±2.85, C=10.08±1.34; Linoleic: S=21.93*±4.15, B=8.38*±0.79, C=16.39±2.35; Linolenic: S=0.42*±0.09, B=0.43*±0.11, C=0,93±0,18. Thymus' cells: total saturated: S=26.72*±3.24, B=40.53±4.6, C=37.56±2.20; Oleic: S=19.88±2.96, B=23.68±9.54, C=24.29±4.94; Linoleic: S=34.97*±6.73, B=3.84*±0.56, C=12,74±1,90; Linolénic: S=0.27*±0.07, B=0.39*±0.09, C=0.60±0.11(*p<0.01). S had lower serum and thymus' cells levels of ω3 acids and higher linoleic concentration. B showed higher serum oleic acid levels with lower levels of α-linolenic and linoleic compared with control group. Thymus' cells showed lower levels of α-linolenic and linoleic acids.

Conclusions: The differences on fatty acid composition of serum and thymus´ cells in adult rats would be a consequence of the differences in diets' fatty acid profile: altered ω6&ω3 ratio in S group and U/S ratio in group B, and the high percentage of fat in each diet.

Key words: Fatty acids-Thymus-Rat

PO166

BENEFITS OF LEGUME PROTEIN HYDROLYZATES AND AEROBIC INTERVALLIC EXERCISE ON VARIOUS PARAMETERS OF METABOLIC SYNDROME

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Background and objectives: Consumption of protein hydrolyzates from legumes and the regular practice of physical exercise provide important health benefits. This research work aimed to study the influence of consuming crude or hydrolyzed protein from Vigna radiata and its interaction with a program of aerobic exercise on various parameters of metabolic syndrome in an experimental animal model of genetic obesity.

Methods: 80 Zucker rats were divided into 2 experimental groups that consumed raw or sprouted Vigna radiata diet. These two groups were subdivided into 4 experimental subgroups (n=10) according to genetic (lean vs obese) and lifestyle (sedentary vs exercise) factors. The study lasted for 8 weeks, and regular food intake and body weight controls were performed. The protocol of aerobic interval training took place 5 days a week increasing in intensity and duration along the experimental period.

Results: The characteristic hyperfagia of obese Zucker rats was reflected in higher body weight gain of these animals when compared to the lean groups. Significant hepatomegalia and steatosis was observed among the obese rats, whereas the protocol of intervallic aerobic exercise was effective at improving both conditions. Aerobic intervallic exercise was also an efficient strategy to diminish quadriceps atrophy in obese animals and decrease the weight of abdominal adipose tissue, although the later finding was more evident in lean when compared to obese rats. Oral administration of a glucose overload to obese rats led to a significantly smaller area under the curve in rats that followed the protocol of aerobic intervalic exercise when compared to the obese sedentary animals.

Conclusions: The combination of an aerobic intervalic training protocol with consumption of a legume protein hy-

drolyzate based on sprouted Vigna radiata is as an adequate intervention to mitigate the symptoms of metabolic syndrome.

Key words: Metabolic syndrome; protein hydrolyzates; Vigna radiata; aerobic intervallic exercise

P167

THE EFFECT OF IRON/ZINC SUPPLEMENTATION AND ITS DISCONTINUATION ON INTESTINE ANTIOXIDANT STATUS IN RATS FED DEFICIENT DIETS

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Background and objectives: High doses of iron can initiate the process of hydroxyl radicals production, while zinc as an indirect antioxidant can protect against the damage induced by free radicals. Therefore, the effect of iron or simultaneous iron/zinc supplementation on rat intestine antioxidant status was investigated.

Methods: The study was conducted on 6-week male Wistar rats, in 3 stages: 1) 4-week adaptation to the diets (C - control AIN-93 diet, D - iron deficient or R - with 50% reduction of all vitamins and minerals compared to C-diet); 2) 4-week supplementation with 10-fold more iron (CSFe, DSFe, RSFe) or iron and zinc (CSFeZn, DSFeZn, RSFeZn) compared to C diet; 3) 2-week post-supplementation period (the same diets as during the adaptation stage).

Results: After stage II in the intestine: 1)the iron content in supplemented groups was significantly higher than in corresponding non-supplemented groups (the effect was also observed after stage III); 2)catalase activity in RSFe group was higher than in R and RSFeZn; 3)ceruloplasmin activity was higher in RSFeZn group compared to R and RSFe; 4)thiobarbituric acid-reactive substances concentration was significantly higher in DSFeZn group than in D and DSFe; 5)the level of protein carbonyl groups in RSFeZn rats was higher than in R and RSFe (the effect was also observed after stage III). There was not found the effect of applied treatments on zinc status and superoxide dismutase and glutathione peroxidase activity.

Conclusions: Simultaneous iron/zinc supplementation could have negative impact on intestine antioxidant status. The prolonged effect of applied treatments was observed in intestine on iron content and levels of protein carbonyl groups. There is a need for the further analysis to explain observed relationships.

Key words: iron, zinc, antioxidant status, intestine, supplementation

PO168

DNA, PROTEIN AND LIPID OXIDATIVE DAMAGE DURING ANAEMIA RECOVERY WITH DIFFERENT SOURCES AND AMOUNTS OF IRON

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Background and objectives: Fe-deficiency anaemia is one of the major health problems, therefore it is important to supply Fe with high bioavailability during its recovery. The study was designed to assess the effect of several Fe amounts and sources on haematological parameters, DNA, protein and lipid oxidative damage.

Methods: The rats were placed on a pre-experimental period of 45 days and divided into two groups: control group (n=10) receiving normal-Fe diet (45 mg/kg) and anaemic group (n=30) receiving low-Fe diet (6 mg/kg), to induce Fe-deficiency. Subsequently, the rats were placed on an experimental period of 30 days in which they were fed with three different sources and amounts of Fe: FeSO4 (F diet) (45 mg Fe/kg), haem Fe (H diet) (2 mg Fe/kg) or FeSO4 + haem Fe (C diet) (21 mg Fe/kg). DNA damage was assessed using the alkaline comet assay and the brain, liver, erythrocyte and duodenal mucosa lipid peroxidation and protein damage was also assessed.

Results: After supplying the diets, all the haematological parameters were recovered. DNA damage was lower with H diet, compared with F ($P < 0.001$) and C ($P < 0.05$) diet, and similar to the controls. Lipid peroxidation was similar to the controls in all tissues, except in duodenal mucosa, which was lower with H and C diet ($P < 0.001$). The animals fed H and C diets showed lower oxidative protein damage in duodenal mucosa ($P < 0.01$ for H and $P < 0.001$ for C diet) and plasma ($P < 0.001$ for both). Finally, no differences were found in brain.

Conclusions: Fe supplementation with low doses of haem Fe or combined forms of Fe (FeSO4 + haem Fe) are efficient restoring the impaired haematological parameters and prevents the evoked oxidative stress associated to Fe supplements.

Key words: Oxidative damage; Fe deficiency anaemia; Fe repletion; Haem Fe; Ferrous sulphate

PO169

IRON, COOPER AND ZINC BIOAVAILABILITY DURING IRON DEFICIENCY ANEMIA RECOVERY WITH SEVERAL SOURCES AND AMOUNTS OF IRON

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Background and objectives: In the treatment of the anaemia, several Fe salts traditionally have been used and the combination of haem and non haem Fe increase Fe bioavailability. The aim of this study was to elucidate the effects of different amounts and sources of Fe on the nutritive utilization of Fe, Cu and Zn and on haematological parameters in rats with induced nutritional Fe deficiency.

Methods: The control group received the AIN 93 G diet with normal Fe content, and the anaemic group receiving a low-Fe diet (6 mg/kg) for 40 days, to induce Fe-deficiency. During the experimental period of 30 days the anaemic rats received diets with different sources and amounts of Fe: FeSO4 (F diet) (45 mg/kg diet), haem Fe (H diet) (2 mg/kg diet) or FeSO4 + haem Fe (C diet) (21 mg/kg diet).

Results: No differences were found between the three anemic groups in apparent digestibility coefficient and retention/intake of Fe, due to the lower fecal and urinary Fe excretion in the anemic groups fed the H and C diets compared with the group fed the F diet. No differences between the three anemic groups in ADC and R/I of Cu were found. The ADC and R/I of Zn were lower for the anemic rats fed the H diet than for the anemic group fed the F and C diets ($P<0.001$).

Conclusions: Combined forms of haem/non haem in low doses are efficient restoring the impaired hematological parameters and improve the nutritive utilization of Fe and produce no changes in that of Cu or Zn. These findings could provide a basis for similar Fe supplement therapies in high risk populations and represent a promising novel formulation, minimizing the undesirable effects of high doses of Fe.

Key words: Bioavailability; Fe-deficiency; Cooper and Zinc; Haem and non-haem Fe; Haematology

PO170

ESTIMATED 24-HOUR SODIUM EXCRETION AMONG DANISH ADULTS AND THE ASSOCIATION WITH HYPERTENSION

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Background and objectives: Recently we developed a model to estimate 24-hour urinary sodium excretion on a population level based on sodium and creatinine measurements in samples of spot urine. The objective of this study was to use the model to estimate the 24-hour sodium excretion and thus the daily salt intake of Danish adults. Also, we aimed to evaluate the association between estimated salt intake and hypertension.

Methods: We included 3294 men and womenaged 18-69 years from the population based Danish Health2006 cohort. Estimated 24-hour sodium excretion was calculated from measurements of creatinine and sodium in spot urine. The relation between 24-hour sodium excretion and blood pressure was evaluated by linear and logistic regression models.

Results: The mean estimated 24-hour sodium excretion among men was 4.32g (5%/95% percentiles: 3.06g/5.73g) and among women 2.43g (5%/95% percentiles: 2.43g/3.57g), corresponding to daily salt intakes of 10.80g and 7.52g, respectively. High salt intake was associated with high blood pressure ($p<0.0001$, linear regression adjusted for confounding by sex and age). The prevalence of hypertension was 46.1% among men and 34.1% among women in the highest quartile of estimated daily salt intake, while the prevalence was 31.4% and 20.5% among men and women, respectively, in the lowest quartile. The effect of salt intake on blood pressure was markedly attenuated when adjusting for BMI. However, obesity and high salt intake are highly correlated and thus BMI may be considered a mediator more than a confounder when evaluating the association between salt and hypertension.

Conclusions: The daily mean intake of salt estimated from measurements of creatinine and sodium in spot urine is 10.80g among men and 7.52g among women. A high daily salt intake is associated with increased blood pressure – however this association is markedly affected by adjustment for BMI.

Key words: Salt, Hypertension, Spot urine, Adults

PO171

GENETIC VARIANTS IN THE TMPRSS6 GENE AND IRON STATUS INDICATORS: A SYSTEMATIC REVIEW WITH META-ANALYSES

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Background and objectives: No clear overview of the genetics of iron deficiency, iron deficiency anaemia or anaemia in relation to TMPRSS6 gene variants exists. We conducted a study to systematically review the evidence for the associations between single nucleotide polymorphisms (SNPs) in the TMPRSS6 gene and iron status. Where possible, results were analysed using meta-analyses.

Methods: An electronic literature search was conducted using HuGE Navigator for studies published up till 2012, as well as the PubMed and scopus databases to include manuscripts published prior to 2001. All relevant data was extracted. Forest plots were generated and heterogeneity between studies was investigated. Funnel plots as well as Egger's and Begg's tests were used to check for publication bias.

Results: A total of 14 articles were included in the final review. The majority of the studies were either conducted in subjects of Caucasian (n = 12; 86%) or Asian origin (n = 2; 14%). No study was conducted within the African population. High heterogeneity was observed between studies. Differences in directions of associations, beta values as well as minor allele frequencies were observed between ethnicities. In one of the Asian studies, the iron lowering risk alleles of rs855791 and rs4820268 (as determined in Caucasian populations) were significant genetic risk factors for ID and IDA. In a similar study conducted among Danish blood donors neither of the two SNPs were significant predictors of low serum ferritin levels.

Conclusions: We highlight discrepancies in the associations of genetic variants in the TMPRSS6 gene and iron status between ethnicities. Additionally, a critical knowledge gap exists with regard to the investigations on genetic variants in TMPRSS6 and iron status within the African population.

Key words: TMPRSS6, SNPs, anaemia, iron status, systematic review

PO172

PERIPHERAL BLOOD MONONUCLEAR CELLS (PBMC) AS A SOURCE TO DETECT MARKERS OF INTAKE OF DIETS WITH UNBALANCED PROPORTION OF MACRONUTRIENTS

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Background and objectives: Unbalanced proportion in diet macronutrients is associated to alterations in body weight and/or metabolic parameters, and can be related to different pathologies. In order to find markers of intake of unbalance diets we analysed gene expression in peripheral blood mononuclear cells (PBMC). PBMC constitute an easy obtainable biological material which use for nutrition studies is increasing as they can reproduce gene expression of other internal tissues and reflect different pathological status.

Methods: Wistar rats were fed for 4 months with a control (70% Kcal from carbohydrates), a high-fat (HF; 60% Kcal from fats) or a high-protein (HP; 45% Kcal from proteins) diet in isocaloric amounts (pair-feeding). PBMC were obtained and gene expression studied by microarray analysis.

Results: Our microarray data showed that 113 and 323 genes of a total of 21,530 probes changed as a result of the intake of a HF and a HP diet, respectively (Student's t test, $p<0.05$, fold change $\geq \pm 1.2$). Pathways mainly affected by HF diet were: cell cycle, gene expression, immune response, cell communication/signal transduction and energy metabolism. Between genes related to energy metabolism, two key lipolytic genes were affected, Cpt1 and Acox1, whose expression increased as result of the intake of the HF diet. HP diet affected mainly to: cell communication/signal transduction, gene expression and immune response (21 of these genes were related to antigen recognition). Energy metabolism-related genes were also affected by the HP diet, and also in this case an increase was observed in Acox1 expression. Interestingly, 10 genes were simultaneously and equally altered by both unbalanced diets (HF/HP).

Conclusions: Gene expression analysis in PBMC could be useful to detect metabolic deviations of a diet with a proper and equilibrated macronutrient composition.

Key words: PBMC, high-fat diet, high-protein diet

PO173

ELEMENTAL DIETS WITH DIFFERENT FAT COMPOSITION IN EXPERIMENTAL COLITIS

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Background and objectives: Inflammatory bowel disease (IBD) is a chronic condition including ulcerative colitis and Crohn's disease. Nutritional therapy seems to be an alternative for intolerant to potent drugs patients. The role of dietary fat in the therapeutic potential of enteral nutrition remains under investigation. The objective of this study was to evaluate the effectiveness of two isoenergetic elemental formulas with different fat content in a rat model of trinitrobenzene sulfonic acid (TNBS) colitis that mimics human IBD.

Methods: Forty five male Wistar rats were assigned into 5 groups: 1) control group, 2) TNBS-colitis group, 3) TNBS-colitis group fed on a long-chain triglycerides (LCT) rich diet, 4) TNBS-colitis group fed on a medium-chain triglycerides (MCT) rich diet, 5) TNBS-colitis group fed on a baseline diet and administered with infliximab. Nutritional management lasted 12 days prior and 4 days next to rectal administration of TNBS. Subsequently, animals were sacrificed and colon tissue samples were collected for histological, inflammation and oxidative stress assessment.

Results: The MCT-rich diet decreased IL-6, IL-8, ICAM-1 and glutathione-S-Tranferase (GST) activity, while the LCT-rich diet reduced ICAM-1 and GST activity ($p<0.05$). None of the elemental formulas affected IL-10. Infliximab reduced IL-8, ICAM-1 and GST activity levels and increased IL-10 levels ($p<0.05$). No significant differences were detected in malondialdehyde.

Conclusions: A MCT-rich formula seems to exert stronger anti-inflammatory properties than a LCT-rich formula in TNBS-colitis. Further research in humans is necessary to extrapolate the results to human IBD.

Key words: IBD; Elemental Formula; MCT

PO174

CHRONIC MALNUTRITION IN DEVELOPING COUNTRIES: IS THERE A GENETIC DIMENSION?

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Background and objectives: Chronic Malnutrition, also known as stunting, is a serious public health problem affecting 178 million children (32%) under five years in developing countries. It is responsible for 12.6% of total global disease burden in children as measured by disability-adjusted life-years (DALYs). It has been associated with reduced cognitive development, reduced economic productivity and strangely, increased predisposition to cardiovascular diseases in later life stages. Over the years, several interventions to address stunting have not seemed to work, judging by the unchanging prevalence in a country like Nigeria, which is one of the twenty countries responsible for the highest stunting prevalence in the world. Some studies have suggested that genetics might play a role in understanding the mechanism of stunting, which can assist in developing prevention strategies. This paper presents a review of information available in literature, related to chronic malnutrition and genetics.

Methods: A total of 556 journals related to malnutrition and genetics were reviewed using PUBMED. The systematic review was carried out using the following

Results: The review showed that despite the dearth of available information on chronic malnutrition and genetics, some preliminary evidence from different studies suggest that genetics might be involved in chronic malnutrition, especially at critical periods of development.

Conclusions: Mutations in the FTO gene was reported in animal and clinical studies to cause growth retardation, severe psychomotor delay and functional brain deficits, a similar sequelae observed in chronically malnourished children.

Key words: Chronic malnutrition, FTO gene, Genetics, Short Nucleotide Polymorphisms

PO175

RESEARCH ABOUT CHANGES IN NUTRITION AND PHYSICAL ACTIVITY BEHAVIOURS OF IRANIAN STUDENTS WHO LIVES IN ANKARA

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Background and objectives: The aim of this study was to assess the effect of living away from their country on the dietary habits of a group of Iranian undergraduate University stu-

dents (26 female, 24 males) who lives in Ankara, Turkey.

Methods: A questionnaire form has been filled by the students (age: 25.8±3.5 yrs) in order to determine their personal characteristics and changes in their nutrition and physical activity behaviors.

Results: The mean heights of men and women students were determined as 178.3±0.1 and 162.6±0.1 cm, weights were 76.2±7.5 and 58.2±8.2 kg. The mean BMI values were 24.0±3.1 in men, 22.0±2.3 kg/m2 in women. Fifty two percent of the students stated that their nutrition behaviors has changed since they had started to live in Ankara and the most important change (%65.8) has stated to be the decrease in the frequency of meals. Consuming fast foods in two meals, consuming juicy meals with no tomato paste, consuming bread rather than rice, increase in their milk consumption, decrease in the fish consumption, eating meals earlier and having breakfast more regularly have indicated to be the changes in the habits of Iranian students. According to food frequency questionnaire; consumption of milk and dairy products, fresh vegetable and dry fruits and fish consumption of students were low, tea consumption habit and poultry consumption of students were high. Regular exercise ratios of students were 38.0% in Ankara and 64.0% in Iran. Daily energy expenditures of men and women were found to be 3160 and 2316 kcal and exercise durations were found to be 167.6 min/week and 157.8 min/week respectively.

Conclusions: Foreign students may strive to preserve aspects of their original food culture after immigration. Nutrition interventions in this population should be encouraged to promote healthier diets and lifestyles.

Key words: Iranian student, nutrition behavior, physical activity level

PO176

ANTIOXIDANT RESPONSES IN IRONMAN TRIATHLETES INDICATE REQUIREMENTS OF NUTRITIVE ANTIOXIDANTS DURING EXERCISE TRAINING

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Background and objectives: Evidence has emerged that reactive species, produced during strenuous exercise, are not only damaging agents, but also act as signaling molecules to initiate exercise adaptations and to regulate muscle function (3). Studies on antioxidant supplementation during exercise training have been reporting beneficial, detrimental or no physiological effects (2). Instead of an interventional supply with antioxidants, the current study aimed to verify whether an Ironman triathlon (total race time: 10h:51min±1h:1min; mean±SD) modified the need for nutritive antioxidants (1). Furthermore, the effects of exercise-induced changes in the plasma concentrations of endogenous and exogenous antioxidants on indices of oxidatively damaged blood lipids, blood cell compounds and lymphocyte DNA were investigated.

Methods: Blood was collected from 42 well-trained male athletes 2 d pre-race, immediately, 1, 5, and 19 d post-race.

Results: Immediately post-race, vitamin C, alpha-tocopherol, and levels of the oxygen radical absorbance capacity (ORAC) assay increased ($P<0.05$). Exercise-induced changes in the plasma antioxidant capacity were associated with changes in uric acid, bilirubin and vitamin C. ORAC levels and indices of oxidatively damaged DNA correlated inversely ($r=-0.54$; $P<0.001$) Carotenoids and gamma-tocopherol decreased 1 d post-race ($P<0.05$).

Conclusions: Results indicate a protective role of the acute antioxidant responses in DNA stability, but an increased need of nutritive antioxidants in the early recovery phase following ultra-endurance exercise. Furthermore, the data suggest that the requirements of nutritive antioxidants to maintain a physiological antioxidant status in endurance athletes in reference to recommendations can be achieved by consumption of a balanced and well-diversified diet.

Key words: endurance exercise, plasma antioxidant defences, oxidative DNA damage, antioxidant requirements

PO177

HEALTHY AND TASTY MEAT USING MARINADES

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Background and objectives: It is well-known that during heat-treatment of meat, several carcinogens such as heterocyclic aromatic amines (HCAs) may be formed. HCAs are suggested to be one of the mechanisms to explain the association of red meat intake with colorectal cancer. From a health perspective it is important to identify cooking practices that minimize HCA formation in meat. This study examined the effects of marinades with antioxidants and pan-frying temperature on HCA formation and eating quality of pork patties and pork chops.

Methods: As antioxidants, apple puree was added to pork patties, and boneless pork chops were dipped in garlic marinade. The meat was pan-fried (150°C or 220°C) until a core tem-

perature of 70°C was reached. A control without antioxidants was subjected to the same heat treatments. HCAs were analyzed and quantified. A trained sensory panel (n=8) evaluated the meat by descriptive sensory profiling.

Results: Pork patties and pork chops only contained detectable levels of PhiP of all the HCAs measured. The concentration of PhiP was significantly reduced in the pork patties with apple puree (p=0.003) and the pork chops with garlic marinade (p=0.04). In patties, apple puree completely inhibited the formation of PhiP. The content of PhiP increased significantly with higher pan-frying temperature for pork patties (p=0.02) and pork chops (p=0.003). A significant interaction between antioxidants and panfrying temperature was found for pork patties with apple puree (p=0.02) as a larger reduction of PhiP was found at 220 °C. The eating quality of pork patties and pork chops was affected by the addition of antioxidants and pan-frying temperature.

Conclusions: In an attempt to address the health concerns regarding red meat and cancer risk, the use of antioxidants and a low pan-frying temperature have reducing effects on the formation of carcinogenic compounds.

Key words: Heterocyclic aromatic amines, pork, antioxidants

PO178

DIETARY PATTERNS AND WHOLE GRAIN IN SCANDINAVIA. THE HELGA PROJECT

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Background and objectives: In the recent years a trend within nutrition epidemiology has been to assess overall dietary quality, often by identifying dietary patterns. The HELGA study population is based on samples of existing cohorts from the three Scandinavian countries. All three cohorts are part of the EPIC study. The aim of this study is to find a typical whole grain pattern in Scandinavia and see if the pattern is similar in the three countries.

Methods: The associations among the variables were investigated by factor analysis.

Results: Both Norway and Sweden had two breakfast patterns and one dinner pattern. Both the countries had a healthy breakfast pattern including food items commonly considered healthy, such as fruit, yoghurt and breakfast cereals. However, coarse bread was the main item in a more traditional pattern for Norway, while it was a part of the healthy pattern in Sweden. The second breakfast pattern in Sweden included unhealthy items like white bread, cakes, sweets, soft drinks and alcohol. The dinner pattern was almost equal in Sweden and Norway. Denmark differed from the other Scandinavian countries concerning dietary patterns. Only one breakfast pattern was found. This pattern had some similarities with the traditional Norwegian pattern, but scored high on all whole grain items while in Norway only wheat had a high score. Two dinner patterns are seen for Denmark, the healthier one includes fruit and vegetables, fish and poultry, the second includes meat and meat products, ice cream and alcohol.

Conclusions: When comparing dietary patterns from the three Scandinavian countries, we find both differences and similarities. The main whole grain item used in Norway and Sweden seems to be wheat, while rye is more dominant in Denmark.

Key words: dietary pattern, whole grain, factor analysis, Scandinavia

PO179

COMBINING FIBRES AND PROTEINS IN A CEREAL PRODUCT REDUCES APPETITE SENSATIONS WITH SOME EFFECTS ON GASTRIC EMPTYING AND GLUCO-INSULINEMIC RESPONSE

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Background and objectives: There are several data about the effects of single fibres or proteins on satiety but little evidence on their combined effects. The objective of this study was to evaluate the single and combined effects of proteins and fibres in biscuits on appetite sensation, food intake and physiological markers.

Methods: In a crossover randomized design, 56 healthy normal weight women attended the laboratory on 4 days and tested one different biscuit each day at breakfast: control biscuit (C), fibre-enriched biscuit (F), protein-enriched biscuit (P), fibre- and protein-enriched biscuit (FP). Energy intake was evaluated by measuring food consumption during ad libitum

standard lunch, afternoon snack and dinner. They also had to fill in a VAS at regular time intervals in order to evaluate their appetite sensations. Among the 56 volunteers, 16 attended the laboratory on the next day so that different physiological parameters such as gastric emptying, glycemic response and gastrointestinal hormones could be measured.

Results: FP reduced hunger, prospective consumption, desire to eat compared to C, F and/or P. FP reduced the average appetite score vs. P, with a tendency vs. C and F. Moreover, F and FP slowed gastric emptying vs. C. The glycaemia level was lower after FP and P vs. C. Compared to the control, insulinemia after breakfast was lower after FP and F at 90 min and higher after P at 60 min. Active GLP-1 is also increased after P than C.

Conclusions: The interest of combining fibres and proteins in biscuits is shown on satiety feelings, although no effect is observed on gastrointestinal hormones. The mix of fibres and proteins activate mechanisms which are induced by single fibres and proteins. Further work is required to potentially be able to influence food intake reduction.

Key words: combination of fibres and proteins, satiety, physiological markers

PO180

FOOD TAXATION AS A NUTRITION POLICY TOOL – LESSONS FROM THE DANISH CASE OF SUGAR AND FAT TAXES

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Background and objectives: With societies reluctant to introduce structural changes in their food environment and with little effective mass strategies, policy makers are left with few alternatives. Existing evidence suggests that food taxation may reduce consumption of unhealthy foods while tax exemption can increase intake of healthier ones. However most studies rely on willingness to pay approaches and other "artificial" designs. Hence, little is known about taxes implemented in real-life cases or the policy processes behind. Denmark is one of these cases. This paper aims at analyzing the policy process leading to the Danish government's decision to abandon the existing fat tax and to skip the planned sugar tax by January 2013.

Methods: This study evaluates abandoning the saturated fat and sugar taxes (SFST) from a theoretical perspective and gives an account of lessons for future food taxation policies.

Results: The tax on saturated fat was introduced in fall 2011 and was a duty on foods containing more than 2.3 percent saturated fat (dairy, meat and processed foods). The case of abandoning the taxes, introduced in 2011 and 2012 by two Danish Governments has provided insights into the dynamics of food- and nutrition-related policy processes. Food and taxation are hot topics for citizens, politicians, media actors and professional organisations. The case shows that food taxation is highly sensitive, highlights the roles of coalitions, media and storytelling and that scientific evidence is often not enough to inform policy. The influence of strong and weak coalition frameworks plus heavy administrative burden that taxes put on the food industry contributed to the decision of abandoning the taxes.

Conclusions: Future taxations should build on systematic evidence, on broader alliances, involve PHN expertise, be introduced in a "easy-to-administer" way and be followed by well planned evaluation procedures.

Key words: Denmark, Fat tax, Sugar Tax

PO181

VALIDATION AND APPLICATION OF A MICRO-PLATE METHOD FOR THE DETERMINATION OF FERRIC REDUCING ANTIOXIDANT POWER (FRAP) IN URINE SAMPLES

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Background and objectives: The assay of ferric reducing ability of biological fluids as a measure of antioxidant power (FRAP assay) has been extensively used for years(1). The aim of this study was to validate and optimise the FRAP assay onto a 96-well plate in comparison to the published established test tube method and apply it to assess total antioxidant capacity in human urine samples.

Methods: An appropriate 96-well plate was chosen for the FRAP assay. The effects of time of incubation, volume of sample and reagents on assay performance were investigated and optimized. A working reproducible standard cure was obtained (0-1000µmole/L range). The plate assay was then validated for accuracy, reproducibility and correlation with the established FRAP tube method. Subjects (n=32) from Queen Margaret University aged 20-52years were recruited, and asked to provide two 24 hour urine samples at baseline and following intake of 1L cranberry juice. Samples were then analysed by the 2 methods.

Results: An excellent dose response curve was obtained on the 96-well plate with 10µL volume incubated at 37oC for 4 minutes. Intra and inter-assay imprecision data ranged from 0.4-0.7% and 0.5-1.1%CV respectively. Accuracy results were

88-98% over 0.2-0.98mmole Fe(II). Values obtained by the plate method correlated very well with the tube method (R2 = 0.95; p <0.001). Also a Bland Altman plot displayed a high agreement between the values obtained. Cranberry juice intake caused an increase in urinary FRAP values but this was not significant (p=0.08).

Conclusions: Preforming the FRAP assay on the 96-well plate has proved to be a simpler, more convenient, precise, fast and cost effective method for assessing ferric antioxidant power in urine samples.

Key words: FRAP, Antioxidant-power, Plate assay, Methods

PO182

EVALUATION OF THE BIOLOGICAL PROTECTIVE EFFECTS OF DURUM AND KAMUT WHOLE GRAIN COOKIES

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Background and objectives: There is an increased amount of evidence showing that high whole grain intake protects against several diseases. Minor cereals (e.g. Kamut® ancient wheat, barley, spelt, oat) are becoming of nutritional interest because of their better health-related composition in minor components as dietary fiber, vitamins, minerals and phenols (1). In this study the antioxidant protection by cookies made with whole modern grain durum wheat (W) or whole grain Kamut (K) ancient wheat, and fermented using S. Cerevisiae (WC, KC) or S. Cerevisiae and lactic acid bacteria (WL, KL), was evaluated in cultured cells.

Methods: Cookies were in vitro digested and ultrafiltered in order to supplement HepG2 cells with a mix of compounds whose size was compatible with the intestinal absorption. In vitro total antioxidant capacity (TAC) and phenolic profile of not-digested and digested cookies were assessed. The biological protective effect was evaluated by measuring viability, GSH and ROS intracellular content, cytosolic TAC, LDH release and TBARS content in the media.

Results: Digestion caused chemical and structural modifications releasing new structures with scavenging capacity as indicated by the increase in in vitro TAC. Both W and K cookies effectively protected HepG2 cells from the oxidative damage, without any significant differences due to the cereal type or to the type of fermentation.

Conclusions: Although the use of in vitro digestion and liver cell culture reduced the distance to the physiological situation in humans, results in whole organisms may diverge because of bioavailability and metabolism of ingested phytochemicals. Notwithstanding our results further underline the potential health effects of whole grains.

Key words: whole grain, Kamut brand, ancient wheat, in vitro digestion, antioxidant activity.

PO183

INNOVATIVE NUTRITIONAL STRATEGIES TO PRESERVE BONE HEALTH: THE ROLE OF FISH OILS SUPPLEMENTATION IN COUNTERACTING SENILE OSTEOPOROSIS

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Background and objectives: All industrialised countries face a progressive increase in life expectancy leading to a growing prevalence of chronic age-related metabolic complications, including locomotor dysfunctions. Osteoporotic fractures can result in up to 20% excess mortality within one year. Additionally, up to 50% of patients will be disabled, half of them requiring long term nursing home care, while only one third fully recover from hip fracture. Drug-based osteoporosis treatments have clearly demonstrated side effects while modulating specific target functions in the body, diet can help to achieve optimal health. In this study, we aimed at investigating the impact of fatty acid quality on the age related evolution of the locomotor system and to decipher related aging mechanisms.

Methods: The senescence-accelerated prone mouse (SAMP8) was used to mimic senile osteoporosis rather than post-menopausal osteoporosis. The SAMP8 mouse strain was compared to the SAMR1 control strain. Two months old mice were divided in different groups and subjected to the following diets : (a) standard "growth" diet – (b) "sunflower" diet (high ω6/ω3 ratio) – (c) "borage" diet (high γ-linolenic acid) – (d) "fish" diet (high in long chain ω3). Mice were fed ad libitum through the whole protocol. At 12 months old, mice were sacrificed and tissues were harvested for bone studies, fat and muscle mass measures, inflammation parameters and bone cells markers expression.

Results: We demonstrated for the first time that while fatty acids from sunflower origin exacerbated osteoporosis features in this original model of progeria, fish oil diets counteracted bone loss. This preservation of bone health was associated with restored bone mineral density and inhibition of inflammatory parameters.

Conclusions: Our data strongly support that nutritional approaches are relevant regarding osteoporosis and offer promising alternatives in the design of new strategies for preventing aged-related locomotor dysfunctions.

Key words: Osteoporosis, aging, nutrition, lipids, inflammation

PO184

LINKING NUTRITION AND FOOD SECURITY IN HUMANITARIAN CONTEXTS: BENEFITS OF INTEGRATING SMART AND HEA AS A TOOL FOR DISASTER MANAGEMENT

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Background and objectives: Access to food and the maintenance of an appropriate nutritional status are key factors of people´s survival in disasters. The Standardized Monitoring and Assessment of Relief and Transition (SMART) methodology for the assessment of nutritional status and the Household Economy Approach (HEA) for assessing food security, are generally carried out separately Hypothesis: the use of the HEA component developed within SMART ENA delta version provides a better understanding of the causes of malnutrition in crisis situations and improves the decision-making process to plan and implement more effective relief interventions and promote their sustainable impact in a longer term The objective is to provide supporting evidence of the added value by the integrated nutrition-food security assessment and to suggest SMART ENA delta as a standardized method

Methods: A systematic review of nutritional and food security assessments was done. The criteria used in order to compose individual case studies were that the indicators could have been estimated using SMART ENA delta. A Food and Nutrition Security Analytical Framework was used for the qualitative analysis of 17 case

Results: Based on the framework used for the analysis, it was showed that a more complete picture of the crisis, with its causes and impacts, can be obtained with the integrated assessment SMART-HEA than if both sets of information are collected and analyzed separately.

Conclusions: nutritional data by itself is not enough to interpret and draw conclusions leading to appropriate interventions. It is needed to contextualize the data with other type of information on health, food security and livelihoods. Using SMART ENA delta to conduct an assessment provides useful information without huge additional resources and it is highly suitable for small scale surveys. Further research on case studies directly using this tool is strongly recommended.

Key words: nutrition, food security, SMART, HEA, needs assessment

PO185

BODY IRON STATUS AND RISK OF HEPATOCELLULAR CARCINOMA IN A EUROPEAN PROSPECTIVE CANCER COHORT

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Background and objectives: Iron is an essential nutrient but can also act as a catalyst in free radical generation. Higher body iron status may lead to increased oxidative stress, and increased risk of cancer at various sites, particularly the liver which is the main organ of iron storage and metabolism. It has been established that iron overload, e.g Haemochromatosis, is associated with increased risk of hepatocellular carcinoma (HCC). But, it is unclear to what extent mild or moderate excesses in body iron status contribute to HCC etiology. Since iron is an essential nutrient, it can be hypothesized that very low body status is also cancer promotive. These questions were explored within the European Prospective Investigation into Cancer and Nutrition (EPIC).

Methods: EPIC is a prospective cohort of over 520,000 subjects from 23 centers in 10 Western European countries. In a nested case-control setting, serum iron, ferritin and transferrin were measured in 121 (n men=82; n women=39) HCC cases and 242 control subjects matched by age, sex, study center and date of blood collection. Conditional logistic regression models were used to compute odds ratios based on quartiles of serum analyte levels.

Results: Compared to serum iron levels in the 2nd quartile, a significant increased risk of HCC was observed in subjects in the lowest (OR:2.10,95%CI:1.03-4.28) and highest (OR:4.22,95%CI:2.07-8.56) quartiles. For ferritin, subjects in the highest quartile had a significantly higher HCC risk (OR:3.34,95%CI:1.67-6.68) compared to those in the 2nd. For serum transferrin, a similar pattern of results was observed but was not statistically significant.

Conclusions: These findings indicate that serum iron parameters have a J-shaped relationship with HCC risk, and that higher iron status as indicated by serum iron and ferritin is significantly associated with higher HCC risk in this prospective European cohort.

Key words: Iron, Hepatocellular-Carcinoma

PO186

REPLETION OF IRON AND N-3 FATTY ACID DEFICIENT RATS WITH IRON AND ALPHA-LINOLENIC ACID ALONE AFFECTS BRAIN MONOAMINES AND COGNITION DIFFERENTLY THAN COMBINED REPLETION

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Background and objectives: We recently shown that a combined deficiency of iron (ID) and n-3 fatty acids (n-3 FAD) disrupted brain monoamine metabolism and produced greater memory deficits than ID or n-3 FAD alone. Repleting these double-deficient rats with either iron (Fe) or DHA/EPA alone affected monoamine pathways differently than combined repletion and even exacerbated the cognitive deficits associated with double-deficiency. The objective of this study was to examine whether repletion with Fe and alpha-linolenic acid (ALA), alone or in combination, can correct deficits in brain monoamine metabolism and cognition associated with deficiency.

Methods: Using a 2 x 2 design, male rats with concurrent ID and n-3 FAD (ID+n-3 FAD) were fed an Fe+ALA, Fe+n-3 FAD, ID+ALA, or ID+n-3 FAD diet for 5 weeks (postnatal d 56-91). Biochemical measures and spatial working and reference memory (using the Morris water maze) were compared to age-matched controls.

Results: Provision of ALA in combination with Fe synergistically increased DHA concentrations in the hippocampus (Fe x ALA interaction). Similarly, provision of Fe in combination with ALA resulted in higher Fe concentrations in the olfactory bulb (OB) than the provision of Fe alone ($P<0.05$). There were significant antagonistic Fe x ALA interactions on 5-HT concentrations in the OB and frontal cortex. Working memory was impaired in ID+ALA rats compared with controls ($P<0.05$). However, in the reference memory task, there was a significant effect of ALA for improved memory performance.

Conclusions: Consistent with our previous study providing DHA, feeding either Fe or ALA alone to adult rats with both ID and n-3 FAD affected brain 5-HT concentrations differently than combined repletion, and even exacerbated the working memory deficits associated with combined deficiency. However, in contrast to DHA, ALA had a beneficial effect on reference memory.

Key words: alpha-linolenic acid, iron, cognition, monoamines

PO187

FOOD4ME PERSONALISED NUTRITION: WHAT DOES THE CONSUMER WANT?

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Background and objectives: Personalised nutrition and nutrigenomics are innovative concepts that identify individual nutritional needs based on phenotypic and genotypic information. The service, however, will only contribute to healthier food consumption if consumers take up such services and end-users are motivated to follow advice (Ronteltap A. and van Trijp H., 2007). The aim of this study was to establish factors determining uptake and compliance with personalised nutrition.

Methods: Focus group discussants (N 16) were apparently healthy, free living adults recruited through a Northern Irish research agency. Efforts were made to recruit equal numbers of males and females from two age groups (18-65 and 30-65 years). Using a standardised interview schedule, discussion was prompted using personalised nutrition scenarios. Discussions (N 2) were recorded, transcribed verbatim and qualitative data thematically content analysed. NVivo9 was used for data storage and retrieval.

Results: Themes identified suggested that uptake of personalised nutrition would be motivated by perceived need to improve health, body morphology and physical performance. Uptake was also dependent upon the perceived credibility of

service providers which could be conveyed through display of professional certificates and testimonials. Motivation, contact and support of service providers were considered important for compliance.

Conclusions: These data imply that a personalised nutrition service should take into consideration not only phenotypic and genetic information but also the perceived motivation of the user. The implications are that different types of support could be required within the personalised nutrition service.

Key words: Personalised Nutrition; Nutrigenomics; Motivation; Qualitative

PO188

DIETARY IRON AND OMEGA-3 FATTY ACID DEFICIENCIES INDUCE DIFFERENTIAL GENE EXPRESSION PATTERNS IN RAT HIPPOCAMPUS BOTH INDIVIDUALLY AND IN COMBINATION

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Background and objectives: Iron and omega-3 fatty acids (n-3 FAs) are required for normal brain development and functioning. We have previously shown that both, iron deficiency (ID) and n-3 FA deficiency (n-3 FAD) impaired hippocampal-dependent working memory in rats. Furthermore, a combined deficiency produced greater reference memory deficits than a deficiency in iron or n-3 FAs alone. To identify underlying molecular mechanisms, we investigated the effects of iron and n-3 fatty acid depletion, alone and in combination, on gene expression in the rat hippocampus.

Methods: Male rats were fed an ID, n-3 FAD, ID+n-3 FAD or control diet for 5 wks post-weaning, following n-3 FAD induction over 2 generations. The hippocampi of 5 rats/group were dissected for microarray analysis.

Results: Relative to controls, the expression of 138 genes was altered in the ID, compared to only 31 genes in the n-3 FAD group ($p<0.01$ and fold change [FC]>1.2). Only 6 genes were commonly affected by ID and n-3 FAD. In the ID+n-3 FAD group, the expression of 139 genes was significantly altered relative to controls. of these, only the expression of 65 and 7 genes were shared with the ID and n-3 FAD groups, respectively. Four genes were commonly affected in all three experimental groups. Thus, 63 genes were distinct to the ID+n-3 FAD group. The strongest up-regulation was found for the arachidonate 12-lipoxygenase (Alox15) gene in rats receiving ID alone or in combination with n-3 FAD (ID, FC=27.6; ID+n-3 FAD, FC=30.9).

Conclusions: These results suggest that dietary ID and n-3 FAD cause different gene expression patterns in the rat hippocampus, thus, impairing brain development and functioning via different molecular pathways. However, a combined deficiency induced a distinct pattern of gene expression, which may explain the greater cognitive deficits observed in double-deficient rats.

Key words: Alpha-linolenic acid, iron, hippocampus, microarray

PO189

BIOLOGICAL EVALUATION OF RAW AND DIFFERENTLY PROCESSED AFRICAN YAM BEAN SEEDS (SPHENOSTYLIS STENOCARPA) USING RATS

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Background and objectives: The biological values of raw and differently processed Africa yam bean seeds (AYB) were assessed using albino rats.

Methods: Raw AYB seeds were divided into four parts. Three parts were subjected to different processing method namely; roasting, boiling and autoclaving, while the fourth was left unprocessed. The seeds were milled and included separately in rat diets. Six experimental diets were formulated. Diets 1 was nitrogen free, diet 2 contained casein (control), while diet 3, 4, 5, 6 contained roasted, boiled, autoclaved, and raw AYB seeds respectively. 24 albino rats in groups of 8 each were respectively assigned to the 6 experimental diets in a completely randomized design. The rats were offered the feeds and water ad libitum for 21 days.

Results: The results obtained indicated that all parameters assessed were significantly affected by treatments effects. The highest feed intake and daily weight gain were observed in the control (18.65+0.57g and 5.91+0.52g) while the raw AYB diet was least (12.56+0.52g and 3.22+0.60g) respectively. Feed conversion ratio ranged from 3.16+0.27 in the standard (casein) diet to 3.90+0.11 in the raw AYB diet. Protein intake ranged from 3.86+0.05g in the raw AYB to 6.64+0.06g in the control casein diet. There was a comparable and significant improvement in the daily weight gain and feed conversion ratio of rats fed boiled AYB and standard casein diets. Final weight, feed gain ratio, apparent digestibility, biological value (BV), net protein utilization (NPU), net protein ratio (NPR) and protein efficiency ratio (PER) were significantly ($P<0.05$) highest in

rats fed casein diet, but boiled AYB diet competed favourably with the control diet.

Conclusions: It can be concluded that AYB must be boiled before being fed to animal to support growth and health.

Key words: African Yam Bean, Rats, Biological Value.

PO190

RECENT SYSTEMATIC REVIEWS INDICATE ADULTS NEED ≥800 IU VITAMIN D TO REDUCE RISK OF DISEASE

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Background and objectives: In setting dietary recommendations for vitamin D, it should be expected that actions other than bone-related functions would be considered. Vitamin D has both endocrine and paracrine functions, and levels of 25-hydroxyvitamin D needed for the latter have been shown to be higher than the former. However, in 2010 when the Institute of Medicine (IOM) deliberated on new Recommended Dietary Allowances (RDAs), it stated there was not sufficient evidence to set recommendations for functions not related to bone health. Purpose: Therefore in 2012 we conducted a systematic review of the literature to identify quality studies which were either systematic reviews and/or meta-analyses involving adults (> 17 y, excluding pregnancy and lactation) that examined the effect of vitamin D in any disease or condition.

Methods: Published meta-analysis and systematic review studies related to the effectiveness and efficacy of vitamin D dosages/supplementation on any health outcome measures in adult human participants that were published between January 1 2010 and July 20 2012. Further, key journals were also reviewed through this time period. A total of 18 qualified; studies were found.

Results: Key findings were that vitamin D reduces fall risk at intakes over 400 IU/day, although 800 IU/day is more effective; a positive effect of vitamin D on muscle strength is seen when intakes are over 800 IU/d, especially in those previously deficient; vitamin D has no effect on blood lipids or overall cardiovascular disease risk, but does show a reduction in systolic blood pressure; and with supplement use, mortality was reduced in older adults.

Conclusions: There are health conditions in adults positively impacted by vitamin D supplementation, indicating that that the RDA for adults, especially those over 50 y, should be increased to ≥800 IU/day.

Key words: Vitamin D; Recommended Dietary Allowances; falls; muscle strength; systematic review

PO191

MOLECULAR MECHANISMS BY WHICH WHITE TEA INTAKE PREVENTS OXIDATIVE-INDUCED STRESS IN VIVO

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Background and objectives: The flavonoid content of tea (Camellia sinensis) has beneficial properties in the prevention of diseases. Mechanisms by which white tea can protect against oxidative stress remain unclear.

Methods: To shed light on this issue, rats were given distilled water (controls), 0.15 mg/d (dose 1) or 0.45 mg/d (dose 2) of solid tea extract/kg body weight for 12 months. All the animals received an injection of adriamycin (ADR) (10 mg/kg body weight), except half of the control group, which were given an injection of saline solution. In the liver, the expression of the nuclear factor E2-related factor 2 (Nrf2), NAD(P)H:quinone oxidoreductase (Nqo1), glutathione–S–transferase (Gst) and heme oxygenase1 (Ho) was analysed by real-time PCR, and the activity of catalase (CAT), superoxide dismutase (SOD) and glutathione reductase (GR) was measured spectrophotometrically.

Results: ADR significantly increased the expression of Nrf2, Gst, Nqo1 and Ho with respect to the control rats and also increased the activity of CAT, SOD and GR.

Conclusions: The intake of white tea increased the expression of Nrf2, Gst1, Nqo1 and Ho1 in the ADR group compared with the control group and decreased the activity of CAT, SOD and GR in a dose-dependent manner.

Key words: Adryamicin; ARE response; Nrf2; Polyphenols; White tea

PO192

ORAL SUPPLEMENTATIONS WITH FREE AND DIPEPTIDE FORMS OF L-GLUTAMINE: EFFECTS ON GLUTAMINE-GLUTATHIONE AXIS AND HSPS EXPRESSION IN ENDOTOXEMIC MICE

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Background and objectives: Sepsis is a leading cause of death in ICUs worldwide. The availability of L-glutamine during sepsis modulates the oxidative stress and the Heat shock proteins (HSPs) response. In the present study we investigated the effects of oral supplementation with L-glutamine plus L-alanine (GLN+ALA), both in the free form as compared to L-alanyl-L-glutamine dipeptide (DIP), on glutamine-glutathione (GSH) axis and HSPs expression in mice subjected to endotoxemia.

Methods: B6 mice were subjected to endotoxemia (Escherichia coli LPS, 5 mg.kg-1, LPS group) and orally (gavage) supplemented for 48 h with either L-glutamine (1 g.kg-1) plus L-alanine (0.61 g.kg-1) (GLN+ALA-LPS group) or 1.49 g.kg-1 DIP (DIP-LPS group). Glutamine, glutamate, glucose and ammonium were evaluated in plasma. Glutamine, glutamate, GSH, GSH disulfide (GSSG) and Thiobarbituric acid-reactive substances (TBARS) were assessed in skeletal muscle. Muscle HSP70 and HSP27 expression were determined by Western Blot analysis and HSF1 by RT-qPcR.

Results: Endotoxemia depleted plasma (by 71%) and muscle (gastrocnemius, by 44%) glutamine concentrations [relative to control (CTRL) group] which were restored in both GLN+ALA-LPS and DIP-LPS groups (P<0.05). Supplemented groups reestablished GSH content and intracellular redox status (GSSG/GSH ratio). Both supplementations maintained the expression of HSP70 and HSP27 similar to the controls by reducing the mRNA expression of HSF1 in muscle (P<0.05). Tissue lipoperoxidation (TBARS) was 4-fold higher in LPS mice relative to CTRL group, and was remitted by both supplements (P<0.05).

Conclusions: Oral supplementations with GLN+ALA or DIP are effective in reversing LPS-elicited deleterious effects on glutamine-GSH axis by regulating muscle HSPs in mice under endotoxemia. Acknowledgements: São Paulo State Foundation for Research Support (FAPESP) and Brazilian National Council for Scientific and Technological Development (CNPq).

Key words: Glutamine. Sepsis. Oxidative stress. GSH. HSPs

PO193

ORAL SUPPLEMENTATIONS WITH FREE AND DIPEPTIDE FORMS OF L-GLUTAMINE: EFFECTS ON IMMUNE AND INFLAMMATORY SYSTEM IN MICE UNDER ENDOTOXEMIA

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Background and objectives: Sepsis is a leading cause of death in ICUs worldwide. Low availability of L-glutamine, the most abundant amino acid in the body, contributes to the uncontrolled inflammatory pathway and suppresses immune response in sepsis. In the present study we investigated the effects of oral supplementation with L-glutamine plus L-alanine (GLN+ALA), both in the free form as compared to L-alanyl-L-glutamine dipeptide (DIP) on immune and inflammatory response, mediated by NF-κB in muscle tissue of mice subjected to endotoxemia.

Methods: B6 mice were subjected to endotoxemia (Escherichia coli LPS, 5 mg.kg-1, LPS group) and orally (gavage) supplemented for 48 h with either L-glutamine (1 g.kg-1) plus L-alanine (0.61 g.kg-1) (GLN+ALA-LPS group) or 1.49 g.kg-1 DIP (DIP-LPS group). Blood was collected for plasma concentration of glutamine, glutamate, TNFα;, IL-6, IL-1β, IL-10, and T and B lymphocyte proliferation. Gastrocnemius muscle was removed for Western Blot analysis of total NF-κB p65, phosIκB-α/β, and for RT-qPcR of NFKBIA and NFKB1.

Results: Endotoxemia depleted plasma (by 71%) and muscle (gastrocnemius, by 44%) glutamine concentrations [relative to control (CTRL) group] which were restored in both GLN+ALA-LPS and DIP-LPS groups (P<0.05). Supplemented groups exhibit higher T and B lymphocyte proliferation (p<0.05). Expression of total NF-κB p65, phosIκB-α/β; and pro-inflammatory mRNAs of NFKB1 and NFKBIA were higher in LPS group compared to CTRL, GLN+ALA-LPS and DIP-LPS groups. These effects were accompanied by a raise in plasma concentration of TNF-α, IL-6, IL-1β; and IL-10 in LPS group which was attenuated by the supplements.

Conclusions: Oral supplementations with GLN+ALA or DIP are effective in reversing the lower availability of glutamine, attenuating the inflammatory response and stimulating adaptive immune system under endotoxemia.

Key words: Glutamine. Sepsis. Inflammation. Lymphocytes.

PO194

DIET AND PHYSICAL ACTIVITY INTERACT WITH THE 514C/T POLYMORPHISM IN HEPATIC LIPASE GENE ON SERUM LIPID AND FATTY ACID CONCENTRATIONS

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Background and objectives: Polymorphisms in the hepatic lipase gene (LIPC) have been associated with variability in plasma HDL-C concentrations as well as an interaction effect with dietary habits and physical activity (PA). However, hepatic lipase also hydrolyzes fatty acids (FA) of triglycerides and phospholipids. This study assesses whether the 514C/T polymorphism interacts with diet and PA on FA and lipid concentrations.

Methods: The rs1800588 (514C/T) genotype, FA concentrations, triglycerides, cholesterol and lipoproteins were measured in 1155 European adolescents (12.5 17.5 years) from the HELENA study. 577 adolescents had data on diet and 962 on PA (questionnaire and calculation of VO2max). Associations between rs1800588 and outcome variables were assessed with linear regression, corrected for age, sex, BMI, center and total energy intake in analyses with diet.

Results: The minor allele of rs1800588 was significantly associated with higher levels of total cholesterol, HDL-C, ApoA1 and stearic acid (C18:0) and lower levels of palmitic acid (C16:0). Monounsaturated FA intake interacted with rs1800588 on HDL-C (p = 0.07), triglycerides (p=0.08) and palmitic acid (p=0.04) in an additive model. Furthermore, a direct interaction effect was found with linoleic acid intake for arachidonic acid and palmitic acid (p = 0.03; p = 0.04, respectively). The interaction effect between rs1800588 and PA showed that carriers of TT who are less active had higher concentrations of LDL-c, ApoB and stearic acid. In contrast, in adolescents who are more active, PA interacts with the polymorphism resulting in higher HDL-c and ApoA1 and lower palmitic acid concentrations. In line, adolescents with a higher VO2max, carrying the T allele, had higher levels of HDL-c and ApoA1.

Conclusions: These results show that the 514C/T polymorphism in the LIPC gene is associated with serum lipid and fatty acid concentrations, furthermore an interaction effect of diet and PA has been confirmed.

Key words: Hepatic Lipase, Fatty acids, Diet, Physical Activity, Adolescents

PO195

NUTRITIONAL INTERACTION BETWEEN TRANS FATTY ACIDS AND UNSATURATED FATTY ACIDS FROM DIFFERENT SOURCES ON REGULATION OF TRIGLYCERIDE METABOLISM

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Background and objectives: The dietary fat intake modulates the plasma and tissue levels of triglycerides (TG). The aim of this study was to evaluate the effect of diets with different unsaturated fatty acid (UFA) in the presence or absence of trans fatty acids (TFA) on regulation of triglyceride metabolism in mice.

Methods: Male CF1 mice (22 g) were fed (30 days) with a standard diets differing in dietary n-3/n-6/n-9 UFA ratios: Canola (CO: 10.9/19.0/63.2), Maize (MO: 0.9/53.3/31.3) or Olive (OO: 0.8/9.7/76.3) Oils containing 0.75% of TFA (COt, MOt and OOt, respectively) or not. Serum and liver TG content, hepatic TG-pre-â-lipoproteins secretion rate (TGSR), and lipoprotein lipase (LPL) activity from adipose tissue and muscle were determined.

Results: TFA induced hepatic steatosis (+100% OOt vs. OO and COt vs. CO) and increased TGSR in OOt and COt groups (+260% in OOt vs. OO and +160% in COt vs. CO). However, an increasing LPL activity in adipose tissue was observed (+200% in OOt vs. OO and +167% in COt vs. CO), leading to a normal levels of serum TG in these groups. In animals fed MOt, no changes were observed in the evaluated parameters.

Conclusions: TFA altered TG metabolism depending on the type of dietary UFA. Adipose tissue could play a key role in the plasma TG regulation, however the TGSR did not normalize the hepatic TG levels.

Key words: trans fatty acids – unsaturated fatty acids – triglycerides – hepatic metabolism.

PO196

NATURAL AND COMMERCIAL RELATIONS OF CONJUGATED LINOLEIC ACIDS DIFFERENTIALLY AFFECT FATTY ACIDS SYNTHESIS IN LIVER OF MICE

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Background and objectives: c9,t11-CLA (Rumenic Acid-RA-) is the prevailing conjugated linoleic acids (CLA) in dairy fats, while RA and t10,c12-CLA in similar amounts (Mix-CLA) are the major CLA in commercially used supplements. Both CLA have bioactive properties; however, the Mix-CLA, but not RA, produces liver steatosis. The purpose of this study was to compare some mechanisms that might be involved in liver steatosis induced by Mix-CLA in animals fed with different types of dietary fats.

Methods: Male CF1 mice (22.0 ± 0.1g) were fed diets containing 7% olive (O), 7% maize (M), or 7% canola (C) oils, supplemented or not with 1% of RA rich oil (c9,t11-CLA: 60,53%; t10,c12-CLA: 17,85%) (O+RA, M+AR and C+RA) or 1% of Mix-CLA rich oil (c9,t11-CLA: 38,99%; t10,c12-CLA: 38,76%) (O+Mix, M+ Mix and C+Mix). TG secretion rate (TGSR), lipogenic enzymes and FA composition in liver were determined.

Results: Compared to O, M and C groups, O+Mix and M+Mix, but not C+Mix, increased (71%, 33% and 11 % -NS-) the hepatic triacylglycerol (TG) levels. Even FA synthesis measured by FAS and Malic enzyme were raised by both types of CLA in the 3 fat dietary sources (increase; FAS: 48–177%; ME: 19–272%), as well as FA markers of lipogenesis tended to increase, a higher hepatic TGSR in O+AR (91%), M+AR (53%), C+AR (49%) and C+Mix (99%) modulated the hepatic TG levels. Moreover, LC-PUFA biosynthesis was inhibited (30-60%) by AR and Mix-CLA in the 3 different fat sources.

Conclusions: Both CLA increased the FA synthesis; however Mix-CLA, but not RA, induced hepatic steatosis. Steatosis produced by Mix-CLA showed dependency on the dietary fat source. The prevention of hepatic steatosis by RA was due to an increase of the VLDL-TG secretion rate.

Key words: CLA – Rumenic Acid – hepatic steatosis – hepatic metabolism.

PO197

DOES DIET ENERGY DENSITY IS CORRELATED WITH DIET QUALITY?

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Background and objectives: Energy density (ED) is hypothesized to be a proxy for nutritional diet quality, since a low ED diet is based on plant and low fat food. Our aim was to investigate the relationship between ED and the Health Eating Index formerly adapted to Brazilian food habits (BHEI-R).

Methods: The sample comprises 1162 individuals: adolescents (n=560), adults (n=585) and elderly (n=517) from the cross-sectional Health Survey of São Paulo (ISA-Capital), conducted in 2008. To assess dietary intake it was collected two non-consecutive 24-hour dietary recalls using the Multiple-Pass Method. ED was calculated using the "foods only" protocol. The Multiple Source Method was applied to provide the usual intake of BHEI-R and its components, and the ED. Mutiple linear regression was used to assess the associations between usual ED and the final BHEI-R and their components. This model was adjusted by age, sex, religion, race and education of the head of household.

Results: Usual ED was correlated with BHEI-R (B=-10,93; p <0.01), adjusted by age, sex, religion, race and education of the head of household. The components of BHEI-R that were correlated with ED, adjusted by the same variables were: Whole grains (B=-0.30; p <0.01);Total fruits (B=-1.65;p=0,000); Whole Fruits (B=-1.39;p=0,000); total Vegetables (B= - 0.17; p <0.01); Oils (B=-0.25; p=0,022); Saturated fat (B=-2.70; p <0.01); SoFAAs (calories from solid fat, added sugar, alcohol) (B=-5.08; p <0.01). The other food groups did not show significant correlation with ED.

Conclusions: The ED presented negative and significant relationship with diet quality and maybe used as a surrogate for diet quality.

Key words: Energy density; health eating index; diet

PO198

INCREASED VITAMIN K LEVEL IN LDL-/- AND APOE-/- MICE

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Background and objectives: Vitamin K and triglycerides share common metabolic pathways. After absorption, vitamin K can be found in all lipoprotein fractions; vitamin K1 being mainly found in chylomicron remnants and VLDL whereas vitamin K2 is mainly distributed by LDL. Interaction of apolipoprotein E (ApoE) with the LDL receptor mediates cellular uptake. We investigated the cellular uptake of vitamin K in mice deficient of apoE and LDL receptor (LDL-R).

Methods: Male, 8 week old wildtype, ApoE-/- and LDL-R-/- mice were fed a diet supplemented with 5 g/kg vitamin K1 and 500 mg/kg vitamin K2 (MK4) for 4 weeks. After sacrifice, contents of vitamin K1 and MK4 were determined by isocratic reversed-phase HPLC in liver, kidney, aorta and pooled serum.

Results: After 4 weeks of vitamin K diet, vitamin K1 content in liver from wildtype mice was not different to ApoE-/- mice ranging between 11-45 ng/g. Vitamin K1 content significantly increased in LDL-R-/- mice (104.8 ± 10.01 ng/g). Hepatic MK4 content was ranging from 50-848 ng/g independent of the genetic background. LDL-R-/- mice also had significantly higher vitamin K1 concentration in kidney compared to wildtype. Notably, 9-fold increase of tissue content of vitamin K1 and 170-fold of MK4 were found in aortas of ApoE-/- mice (K1: 36.6 ± 12.4 vs 4.0 ± 2.1; MK4: 2600 ± 330 vs 125.7 ± 70.3 ng/g). This was paralleled by increased MK4 serum levels in ApoE-/- and increased vitamin K1 serum levels both in ApoE and LDL-R-/- mice.

Conclusions: Despite absence of proteins regarded to be relevant for vitamin K uptake like ApoE and LDL-R, tissue contents of vitamin K isoforms are not reduced but in part even largely increased in knockout mice. The mechanisms leading to these results and functional implications are subject of actual research.

Key words: Vitamin K, Metabolism, lipoproteins, ApoE, LDL-Receptor

PO199

EFFECTS OF TRANS FATTY ACIDS ON BRAIN OXIDATIVE STATUS IN AN EXPERIMENTAL ANIMAL MODEL OF ESSENTIAL FATTY ACIDS DEFICIENCY

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Background and objectives: Partial essential fatty acids deficiency (EFAD) as well as the presence of trans fatty acids (TFA) could alter the balance between the generation of reactive oxygen species and cell content of free radical scavengers. Therefore, EFAD could modify vulnerability of cells to oxidative injury and affect the tissue. Glutathione (GSH) that may be oxidized to glutathione disulfide (GSSG) plays a central role in the defense against oxidative damage and signaling pathways. Concentrations of GSH, GSSG and its molar ratio are indicators of oxidative stress. The objective was to evaluate the effect of TFA on the brain oxidative status in animals with and without EFAD.

Methods: Male Wistar rats were fed (60 days) with a Control (CD), CD+TFA (CDT), EFAD (DD) and DD + TFA (DDT) diets. Fatty acids incorporation into the brain was measured by GC. The brain GSSG and GSH content by capillary electrophoresis with a P/ACE 5010 (Beckman) with UV detection and the lipoperoxidation (LPO) degree by Ohkawa method were determined. Results were expressed as the mean ± SEM. Data was compared by Two-Way ANOVA, followed by Duncan´s test. $p < 0.05$ was considered statistically significant between groups.

Results: TFA showed a low incorporation into the brain (< 0.5%), independently of the EFA status. EFAD, but not the TFA supplementation, altered the brain lipoperoxidation (CD: 70.2±3.8; CDT: 60.7±3.8; DD: 70.3±1.8 and DDT: 61.0±1.3) and TFA significantly increased the GSH content (CD: 1.46±0.03; CDT: 1.24±0.08; DD: 1.47±0.02 and DDT: 1.25±0.08).

Conclusions: Even though TFA showed a low incorporation in a short period of exposition, GSH content was altered. A longer exposure of TFA could lead to an increase in the oxidative damage in brain, independently of EFAD.

Key words: Trans Fatty Acids –Essential Fatty Acids Deficiency – Lipoperoxidation – brain.

PO200

BODY COMPOSITION, PHYSICAL ACTIVITY SCORE AND METABOLIC SYNDROME IN URUGUAYAN SCHOOL AGE CHILDREN

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Background and objectives: The increase in overweight and obesity among children in Uruguay predict that more children are likely to develop Metabolic Syndrome (MS), rising the risk to suffer cardiovascular disease and type2 diabetes mellitus. The objective was to study body composition (%fat mass-%FM), the prevalence of MS components, and physical activity score (PAS) in overweight/obese (OW/O) and normal weight (NW) Uruguayan children.

Methods: Descriptive study of 77 children aged 6-9y of public schools in Montevideo. Measurements: BMI, waist circumference (WC), blood pressure (BP), fasting blood glucose (G), serum lipids, body composition by deuterium oxide dilution, and physical activity (Godard-Score). Diagnostic criteria for MS were: WC≥P90, BP≥P90, triglycerides (TG)≥110mg/dL, c-HDL≤40mg/dl and G≥100mg/dl. It was considered obesity when BMI/age>+2SD and overweight BMI/age>+1SD≤+2SD.

Results: 28 children were OW/O and 49 were NW. Among MS components evaluated, mean values of WC and TG were higher in OW/O vs NW group (9,6 cm higher WC and 27,7mg/dl higher TG; p<0.05). C-HDL was lower in OW/O (51.1±2.2 mg/dl) (p=0.00). The prevalence of MS components altered in OW/O was: BP 39%, WC 36%, TG 32% and c-HDL 21%. The %FM was 28.5±1.2 in OW/O and 21.8±0.9 in NW (p=0.00). Differences in PAS (4.7 in NW, 4.9 in OW/O) were not significant. The prevalence of the presence of one or more components of MS showed a positive trend with BMI/age and %FM. All children with three or more components of MS (n=6) were OW/O and had average %FM 31.2±2.5 (95%CI 26.2;36.1) compared to 22,9±0,4 (95%CI 20,9;24,9) in children without MS components (n=49) (p=0.020).

Conclusions: The prevalence of MS components in children with OW/O is high at school age. MS in these children is associated with OW/O and a fat mass ≥26%.

Key words: Childhood obesity, metabolic syndrome, body composition, physical activity Partially funded by the IAEA.

PO201

MATERNAL NUTRITION AND ADVERSE BIRTH OUTCOMES IN DEVELOPING COUNTRIES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background and objectives: Maternal nutrition plays a crucial role in influencing fetal growth and birth outcomes. It is a modifiable risk factor of public health importance in the effort to prevent adverse birth outcomes, particularly among developing populations. Deficiencies in micronutrients such as folate, iron, iodine, zinc and vitamins A, B6, B12, C, E and riboflavin are highly prevalent and occur concurrently. Low birth weight (LBW), small-for-gestational age (SGA), preterm birth, stillbirths, neonatal mortality are important adverse outcomes of pregnancy. Therefore there is a need to study the relative efficacy of multiple micronutrient supplementation on pregnancy outcomes. Aim : To systematically review the randomized controlled trials comparing the effect of supplementation with multiple micronutrients on pregnancy outcomes. Specific Objective: 1. To carry out a systematic review/meta analysis of studies that used double micronutrient supplementation vs Multiple Micronutrient (MMN).

Methods: Search Strategies: The strategy includes searching of MEDLINE, ProQuest and the database searches includes PubMed, Cochrane Systematic Reviews. PRISMA was used for conducting and reporting the Meta analysis. Data extraction and quality assessment Data will be extracted on the characteristics of the trials and their participants, which includes randomization, allocation concealment, blinding, completeness of follow-up and compliance. Statistical Analysis: Fixed and Random effects meta analysis was performed by pooling the results for outcomes. Forest plots and funnel plots were generated to view the outcome results and publication bias.

Results: A total of 17 studies was included from 881 based on the PRISMA. Multiple micronutrient supplement was more effective than single/double micronutrient supplementation of increasing the birth weight (weighted mean difference of 47g; 95% CI (3, 91g) and reducing the LBW (RR: 0.87; 95% CI(0.83, 0.92), SGA (RR: 0.88; 95% CI (0.79, 0.97). However, Pre-term birth, still births and neo-natal deaths did not show difference between the groups.

Conclusions: Micronutrient supplementation had little or no effect on adverse birth outcomes.

Key words: Meta Analysis, LBW, SGA

PO202

EXPOSURE VS. SENSORY EDUCATION: THEIR EFFECTIVENESS IN INTRODUCING NOVEL VEGETABLES TO PRESCHOOL CHILDREN'S DIETS? PRELIMINARY RESULTS OF A DANISH INTERVENTION

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Background and objectives: Developing positive eating habits begins in childhood and involves establishing good food practice. Generally, vegetables are difficult to introduce into a diet, although they are specifically addressed by all recommendations. Ways to achieve healthy eating goals include developing food experiences, conducing to accept different tastes and textures. Healthy eating interventions in kindergartens have shown promising results using different strategies including exposure to novel vegetables and sensory education. Aim The LOL (Learning over Lunch) project investigates whether preschool children's vegetable preferences are improved by sustained exposure to novel vegetables alone or by combining sensory education with exposure to novel vegetables.

Methods: A controlled intervention study was carried out in 4 Danish kindergartens, covering in total 246 children (mean age: 4,4 years; boys: 57%; girls: 43%). Three preschools received three novel vegetables that were included in the lunch service for a period of 20 weeks. One of the kindergartens received sensory education and other food-related activities during the intervention. Data on prior exposure of vegetables, knowledge, liking and willingness to try was collected using a picture-based questionnaire for children, questionnaire data from parents and food service personnel. Numeric data were analysed with SPSS v.20, visual data were analysed using Facereader ® and Observer XT®.

Results: Preliminary follow-up results show that the largest effect on children liking and eating novel vegetables is achieved by a systematic and sustained exposure through provided meals, and addition of sensory education and food-related activities seem not to affect this outcome.

Conclusions: The project suggests that preschool food service is a key player in influencing children preferences for unfamiliar vegetables and in implementing strategies to improve children's eating habits. Sustained exposure to vegetables appears to be an important tool to achieve consumption and liking of vegetables.

Key words: Vegetables, preschool children, food service in preschools

PO203

PLASMA LEVELS OF CLA ISOMERS AFTER SINGLE ORAL ADMINISTRATION OF TONALIN OIL TO RATS

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Background and objectives: The two principal CLA isomers: Rumenic acid (RA; C18:2 cis9, trans11), associated to anticarcinogenic, antiatherogenic, antioxidative and immune system stimulation, and the C18:2 trans10, cis12 isomer related with reduction of body fat activities, are present within a concentration of 80g/100g oil and a 1:1 ratio in the synthetic commercially available Tonalin TG 80 oil. Previous data from animal experimentations stated that the effective dose in humans to obtain healthy biological effects could be between 3-6 g CLA/day. However, of the Tonalin oil no data are available on their absorption, distribution and elimination characteristics. The aim of this study was to characterize the absorption grade of Tonalin administered intragastrically as a single dose in rats.

Methods: Tonalin oil was administered orally by gavage (3000 mg/kg bw. corresponding to 1200 mg C18:2 cis9, trans11/kg bw and 1200 mg C18:2 trans10, cis12/kg bw.) to male Wistar rats. Serial blood samples were collected after oral administration. Plasma concentrations of the two active conjugated linoleic acid isomers were determined by GC/MS.

Results: The active conjugated linoleic acid isomers were rapidly and partially absorbed. Maximum plasma concentration was about 7 μg/mL for each of the two isomers after 2h of oral administration. Isomer concentrations in plasma after 1 h were about 2 μg/mL, and exceeded 1 μg/mL after 12 and 24 hours respectively.

Conclusions: The present study showed that after oral administration of Tonalin oil, low concentrations of the active conjugated linoleic acid isomers (C18:2 cis9, trans11 and C18:2 trans10, cis12) reached the blood circulation intact. Tonalin plasma disposition characteristics should be considered in choosing dosage regimens that maximize efficacy of Tonalin for use in functional food and dietary supplements.

Key words: CLA isomers, Oral absorption, Plasma concentrations.

Acknowledgements: This work has been supported by CONSOLIDER FUN-C-FOOD Project.

PO204

EVALUATION OF THE LIPID AND GLYCEMIC PROFILE OF RATS WITH DIET SUPPLEMENTED WITH CHEESE WHEY PROTEINS AND THEIR HYDROLYSATES

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Background and objectives: Cheese whey, a by-product of the manufacture of cheeses, has a high nutritional value and bioactive peptides. The objective of this work was to evaluate the lipid and glycemic profile of Wistar rats with diet supplemented with integral and hydrolyzed whey proteins.

Methods: Forty young animals were used in 4 groups: control (C), integral proteins (NH), with low degree of hydrolysis (LDH) and high degree of hydrolysis (HDH), treated during 43 days with 20 g/animal/day of diet AIN 93 M. The nutritional supplement given to NH, LDH and HDH (110mg prot/animal/day) was produced using the enzymes pepsin, trypsin, chymotrypsin and carboxipeptidade-A. To obtain the hydrolyzed LDH, enzymes were added together at the same reaction time, and to obtain HDH they were added sequentially every 10min. Total reaction time was 100min to LDH and 120min to HDH. The lipid and glycemic profile were analyzed by quantification of blood HDL, triglycerides, total cholesterol, and glucose.

Results: The results showed that, after the period of supplementation, HDL cholesterol increased by around 50% in group LDH; in the same group total cholesterol was about 29% higher; in the other groups these parameters were not altered. Also there was no difference in the concentration of triglycerides. For fasting glycemia groups LHD and HDH presented lower concentration (18% and 20% respectively), in relation to control and NH groups. In the control group the glucose concentration was the highest in relation to the supplemented groups.

Conclusions: We conclude that the LHD hydrolyzate was efficient in HDL cholesterol increasing and glycemia reduction, which was also reduced by HDH hydrolyzate. There was no difference in triglycerides of the supplemented groups compared to control. The increase in total cholesterol of LDH may be due to the increase in HDL cholesterol.

Key words: whey proteins, enzymatic hydrolysis, hydrolysates, protein supplementation

PO205

DEVELOPMENT OF A HIGH THROUGHPUT ASSAY FOR THE QUANTIFICATION OF MULTIPLE PLANT POLYPHENOLS IN HUMAN PLASMA

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Background and objectives: Catechins represent a class of polyphenols found in a variety of foodstuffs including dark chocolate and green tea. Studies have linked lower instances of chronic diseases with populations whose diets are high in foods containing these compounds. The analysis of these compounds from biological samples is complicated due to the number of active components, including isomers and disparate structures, poor stability, lack of commercially available internal standards, metabolites and relative concentrations of the different catechins. The objective of this experimental work was to develop a robust assay for the quantification of green-tea derived polyphenols from plasma samples which could cope with these issues.

Methods: Extraction of catechins from human plasma has been achieved using a protein precipitation – based process. A deuterated internal standard was synthesised in the laboratory and used in combination with commercially available internal standards to correctly model and compensate for extraction losses of the eight catechins quantified. Separations of catechins and monitored metabolites were achieved using a Waters Acquity UPLC Quattro Premier LC-MS.

Results: The simple extraction process together with relatively rapid LC-MS/MS method allows for the quantification of the eight catechins in high sample number studies. Additionally, the rapid analysis circumvents the stability issues commonly associated with the analysis of this class of compounds. In addition to stability testing, assay performance has been confirmed through a comprehensive validation including sensitivity, precision and accuracy, selectivity, matrix effects and recovery testing. In all cases, acceptance criteria of inter- / intra- CVs and REs of less than 15% (20% at the LLOQ) is met.

Conclusions: An assay has been developed which is capable of simultaneous quantification of green-tea derived catechins from plasma samples. This assay circumvents common pitfalls associated with the analysis of these compounds.

Key words: Catechins, Quantification, LC-MS/MS, polyphenols, green tea.

PO206

DEVELOPMENT OF HIGH THROUGHPUT LC-MS/MS ASSAYS FOR NUTRITIONAL BIOMARKER QUANTIFICATION

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Background and objectives: Increasingly, quantification of nutritional biomarkers from biological samples is being seen as the gold standard methodology for dietary assessment. Such assessments are not without issues; the samples required for large population studies can prove logistically challenging if sample extraction and analysis run times are lengthy. Additionally, depending on the nature of the biomarker use of ELISA may not be possible, or may incur poor selectivity leading to misinterpretation of results. Liquid chromatography – mass spectrometry can address some of the issues. Here, the development of two chromatographic

Methods: One of the quantification of phytoestrogens and the other for 25-hydroxyvitamin D and steroids will be discussed. Methods LC-MS/MS: Methods have been developed using a Waters Acquity system coupled to a Sciex 5500 Qtrap. Selective MRM transitions have been found for each analyte and chromatographic separations developed using both Waters Acquity and Phenomenex Kintetex columns.

Results: A chromatographic method suitable for the simultaneous quantification of nine phytoestrogens from human urine has been developed. The analysis of a single sample is achieved within a 5 minute run time with excellent column longevity exhibited when utilised with an in-house developed extraction method. A UPLC based chromatographic method has also been designed where 4 steroids and hydroxyvitamin D2 / D3 can be separated and analysed within a 4 minute run time.

Conclusions: Chromatographic methods have been developed for the quantification of multiple phytoestrogens and hydroxyvitamin D2 and D3 together with steroids. Both methods are reliable, robust and would be suitable for use for high sample volume population studies.

Key words: 25-Hydroxyvitamin D, steroids, phytoestrogens, LC-MS/MS

PO207

URINARY ENTEROLACTONE AND ENTERODIOL CONCENTRATIONS CORRELATE WITH TOTAL FIBER INTAKE AND SHOWED A MODERATE TO HIGH REPRODUCIBILITY IN A SPANISH POPULATION

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Background and objectives: Lignans (LG) are diphenolic compounds widely distributed in the diet as part of the dietary fiber (DF) complex. Once ingested, LG may be directly absorbed, or undergo an extensive metabolism by the gut microflora leading to the formation of the so called enterolignans (enterolactone and enterodiol), that can be detected in human biological fluids. When these metabolites were discovered, it was found that their urinary levels correlated with DF intake, and could play an important role in the prevention of certain diseases like cancer. The aim of this study was to examine the validity of using urinary enterolactone and enterodiol concentrations as biomarkers of DF intake and to assess their short-term reproducibility in a ninety-nine spanish population.

Methods: To study LG exposure and its relation with reported dietary intake, dietary habits were assessed by means of a FFQ previously validated in Spain, capturing long-term intake during 3 months preceding inclusion into the study and by 3-day registry, capturing immediate intake. Participants provided a first morning sample after overnight fasting, 2 times on a 3-month interval from the study starting point. Urinary enterolactone and enterodiol were measured by HPLC-coularray detection.

Results: Urinary enterolactone and enterodiol concentrations correlated with DF intake in both first ($r=0.22$; $P<0.05$) and second ($r=0.36$; $P<0.01$) visit after adjusting for age, BMI and energy intake. The intra-class correlation coefficient was 0.79 (95% CI: 0.69-0.86) for total DF intake and 0.64 (95% CI: 0.45-0.76) for enterolactone and enterodiol showing a moderate to high reproducibility.

Conclusions: These results indicate that LG metabolites may be used as DF intake biomarkers and could be used to

assess DF intake in epidemiological studies in free living populations.

Key words: Lignans; Enterolactone; Enterodiol; Dietary fiber

PO208

INDIVIDUAL AND FAMILIAL DIETARY PREDICTORS OF OBESITY AMONG HISPANIC CHILDREN FROM AN URBAN COMMUNITY IN THE US

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Background and objectives: Although not without controversy, a growing body of evidence suggests that a high intake of added sugars, especially those in sugar-sweetened beverages (SSB), have contributed to the pediatric obesity epidemic. We examined the diet of Hispanic children in relation to body mass index (BMI) and determined the relationships between home food environment and familial dietary habits with children's intake of added sugars and SSB.

Methods: A food frequency questionnaire was administered to 187 children (aged 10 to 14 years) and height and weight were measured. Parents self-reported on home food environment, familial dietary habits, and their height and weight through questionnaires.

Results: The prevalence of childhood overweight and obesity were 24.7% and 28.1%, respectively. Reported intake of total sugars and SSB were identified as significant correlates of childhood overweight and obesity ($r = 0.24, 0.17$; $P < 0.05$). Home availability of SSB, parental intake of SSB, and children's time spent watching television (TV) were associated with higher intake of added sugars ($r = 0.35, 0.30, 0.26$; $P < 0.05$) and SSB ($r = 0.28, 0.26, 0.24$; $P < 0.05$). The presence of a TV in the children's bedroom was positively associated with children's BMI ($r = 0.17$; $P = 0.02$), and surprisingly family meals were inversely associated with children's BMI ($r = -0.17$; $P = 0.04$) and intake of added sugars ($r = -0.26$; $P = 0.05$).

Conclusions: Our results suggest that SSB intake in Hispanic children is associated with BMI status and that home food availability and familial dietary habits play a role in children's intake of added sugars and SSB. Interventions that target these modifiable risk factors and that have a parental component could have a positive effect on the risk for obesity and diabetes in this community.

Key words: Obesity, sugar-sweetened beverages, home food environment, Hispanic children

PO209

COLOUR OPTIMIZATION OF AN INULIN RICH INGREDIENT FROM ARTICHOKE (CYNARA SCOLYMUS, L.) BY-PRODUCTS

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Background and objectives: There is an increasing research trend in the use of fructooligosaccharides as prebiotic for food nutritional improvement. Artichoke flour (AF) has a high potential as a functional ingredient becoming a source of inulin and its colour is important in different food formulations. The objective of the research is the optimization of AF colour through the chlorophyll extraction minimizing the use of ethanol.

Methods: The chlorophyll of the AF obtained from industry by-products (mainly bracts and stems) was extracted with different proportions (% w/v) of flour / ethanol (20%, 10%, 7%, 5%, 4% y 3%) for the optimization of the amount of solvent used on the extraction process. After the extraction, the CIEL*a*b* colour coordinates were measured with a Minolta CR-300 colorimeter (Minolta Camera Co. Osaka, Japan). The colour parameters Chroma (C*) and Hue angle (h) were also calculated.

Results: L* was significantly higher in the samples with 4% and 3%. The value of the red – green (a*) coordinate showed lower values in the control and 20% samples, indicating a greener colour, and therefore a lower chlorophyll extraction, respect to those with higher solvent proportions. From the 10% any differences were observed with increasing solvent amount. The yellow-blue (b*) value shows yellowish samples from the 10%, without significant increases from this proportion. The

C* was lower in the control and 20% samples. The result found for hue angle in control samples was significatively higher respect to the samples after extraction.

Conclusions: The optimum colour was obtained from the 10%. Higher ethanol amounts are not needed for obtaining the extracted AF, with the adequate colour for being used as a functional ingredient.

Key words: Colour, fructooligosaccharides, artichoke, by-products.

PO210

SERUM N-6 AND N-3 POLYUNSATURATED FATTY ACIDS AS BIOMARKERS OF DIETARY INTAKE IN EARLY PREGNANCY ACCORDING TO BODY MASS INDEX

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Background and objectives: Few studies have evaluated dietary report of essential fatty acids in pregnancy against biomarkers. However, overweight subjects may underreport their intake. Thus, we investigated whether serum essential fatty acid composition in early pregnancy may be used as biomarker of corresponding dietary intake and if correlations are affected by body mass index (BMI; kg/m^2).

Methods: This study was nested within a prospective cohort in Rio de Janeiro/Brazil. The present sample was comprised of 252 women, aged 20-40 years, between 6th and the 13th weeks' gestation. Dietary intake was assessed using a validated food frequency questionnaire (FFQ). Fatty acid compositions were determined in fasting serum samples, utilizing a high-throughput robotic direct methylation coupled with fast gas-liquid chromatography. Spearman correlation (rs) was used to assess the relationship between fatty acid intake and corresponding serum composition. Women were classified according to pre-pregnancy BMI as under/normal weight (BMI<25; n=141) or overweight (BMI≥25; n=111).

Results: In the total sample, dietary report was significantly correlated with serum composition of total polyunsaturated fatty acids (PUFA; rs=0.23, p<0.001), linoleic acid (LA, 18:2n-6; rs=0.27, p<0.001), eicosapentaenoic acid (EPA, 20:5n-3; rs=0.27, p<0.001) and docosahexaenoic acid (DHA, 22:6n-3; rs=0.20, p<0.001). When analyses were stratified by BMI, significant correlations between diet and serum composition among under/normal weight women were observed for total PUFA (rs=0.35, p<0.001), LA (rs=0.35, p<0.001), EPA (rs=0.32, p<0.001), DHA (rs=0.17, p=0.038). In contrast, among overweight women significant correlations were observed only for linolenic acid (18:3n-3; rs=0.22, p=0.018) and DHA (rs=0.23, p=0.016). The reported means of fatty acids in FFQ were not significantly different between pre-pregnancy BMI groups.

Conclusions: Serum fatty acid composition in early pregnancy may be used as biomarker of dietary intake of essential fatty acids. However, caution should be taken when analyzing the dietary report of overweight pregnant women.

Key words: Biomarkers; Fatty Acids; Diet

PO211

APPLICATION OF DIET QUALITY INDEX REVIEWED BEFORE AND AFTER NUTRITIONAL GUIDANCE

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Background and objectives: Due to early diagnosis of chronic diseases and the recognition of food over its development and progression, the aim of this study was to evaluate the effect of individual nutritional counseling on changes in food practices in patients attended in ambulatory.

Methods: Two 24-hour recalls were applied before and after the orientation to calculate the Revised Diet Quality Index (RDQI). The RDQI is an instrument for evaluating the overall diet quality, and may be associated with gradients of risk for chronic diseases related to diet.

Results: Thirty patients were evaluated and submitted to individual nutritional guidance in an auxiliary unit of Medicine Faculty, UNESP, Botucatu, São Paulo, Brazil. The average score of RDQI before the intervention was 61.9 points, ranging from 34.7 to 82.6 points of a maximum 100 points total and, after nutritional guidance was for 70.2, ranging from 40.8 to 85.24 points (p=0,02). The consumption of dairy products, whole grains, fruits and vegetables were reported more frequently in the second query, as well as the lower consumption of solid fat, trans, alcohol, sugar and salt. The consumption of meats, eggs and vegetables remained the same in both interviews. Lower

scores, from 30 to 50 points, were obtained by three patients in the first interview and just one in the second. Scores considered high, from 61 to 90 points were obtained by 13 patients in the first query and by 22 in the second.

Conclusions: Thus, it was observed that 76.7% of the patients reached higher RDQI in the second query, demonstrating that the nutritional guidelines were followed by these individuals, thus improving the quality of the diet index.

Key words: diet quality index reviewed, overall diet quality, nutritional guidance, chronic diseases, nutrition.

PO212

RELATIONSHIP BETWEEN UNCOUPLING PROTEIN-2 ALA55VAL GENE POLYMORPHISM AND INDICATORS OF METABOLIC SYNDROME IN MEXICAN SCHOOL CHILDREN.

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Background and objectives: Obesity is associated with metabolic syndrome (MS) however MS is seen among eutrophic children. Identify genotypes associated with metabolic syndrome indicators in children of state of Hidalgo.

Methods: In a random sample of 750 school children of public, private and indigenous centers we measured weight and height using standardized techniques, it was considered that a child had metabolic syndrome indicators (ISM) when the children in fasting had any of the following criteria: triglycerides >150mg/dL, HDL cholesterol <40mg/dL, fasting glucose >110mg/dl, systolic and diastolic blood pressure >90th percentile for age and sex, and waist circumference ≥90th percentile for age and sex. To identify the variant rs660339 (Ala55Val) in UCP2 gen we used TaqMan® PCR GeneAmp® 9700.

Results: The proportion of children with ≥2 ISM was of 67.7% in Ob children, 20.7% in SP children and 7.9% with NP children. NP children who had ≥2 ISM showed higher frequencies of GG genotype (11.7%) and less than AA (2.9%) ($p = 0.03$), this trends were observed too in children with SP but not in the Ob children.

Conclusions: The GG genotype of rs660339 polymorphism in the UCP2 gene is more frequently in children with normal weight that had ISM. This can serve as an early indicator of risk to predict the development of metabolic syndrome in the age adult.

Key words: UCP2 polymorphism, Metabolic syndrome, School children

PO213

EFFECT OF DIFFERENT RESTRICTION LEVELS ON FOOD INTAKE AND BODY WEIGHT IN ALBINO RATS.

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Background and objectives: Experimental evidence shows that when an organism is exposed to food restriction shows changes in food and water intake and body weight. Restriction of food has been associated with eating disorders such as obesity, nervous anorexia and bulimia. However, the role of level of restriction over such changes is not yet clear. Objectives. In order to analyze this relation, an experiment was performed in which the effects of different percentages of restriction over food intake and body weight in albino rats were evaluated.

Methods: Thirty two experimentally naive Wistar albino rats of three months of age at the beginning of the experiment were used, they were separated in four different groups, three experimental and a control. The experiment consisted of nine phases of five days each. Phases 1,3,5,7 and 9 were ad libitum as long that phases 2, 4, 6 and 8 were restriction periods. The first group was exposed to a food restriction of 25 %, the second to a 50% and the third was restricted to a 75% compared to average consumption on base line period. Food intake and body weight were recorded every day.

Results: Results showed that group with a 75% restriction had a food intake higher when compared to the 50 and 25% restriction groups. Loss body weight was proportional to restriction level, as long that in phases with food ad libitum subjects showed a weight recovery over levels registered in base line.

Conclusions: Data collected demonstrated existence of a relation between food restriction level and changes on food intake and body weight.

Key words: restriction level, food intake, body weight, rats

PO214

FOOD SELECTION IN RECREATIONAL FACILITIES: DO PARENTS AND CHILDREN MAKE HEALTHY CHOICES?

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Background and objectives: Concern over childhood obesity has prompted debate regarding whether children's food choices should be constrained, particularly in settings such as recreational facilities where children are mainly, but not exclusively present. This study assessed the food purchasing behaviors of adults and children at a recreational swimming pool and examined whether food selection could be improved through three interventions.

Methods: A baseline phase was followed by three successive and additive interventions that promoted sales of healthy foods through descriptive menu labels, free samples, and 30% price reductions. Researchers observed patrons and their food purchases in an unobtrusive manner for 5h/d for 17d during the 40d study period. A chi-square analysis was performed with the rating of menu items (healthy/unhealthy) as the dependent variable.

Results: Overall, 41% of items sold (n=2650) were healthy, mirroring their availability (46%). The proportion of healthy items sold differed according to who was present during the purchase ($p<0.01$). When only adults were present, 44% of items purchased were healthy, whereas when both adults and children, or only children were present healthy items represented 39% and 37% of items purchased, respectively. The population of adults consisted primarily of parents. The first, second and third interventions increased selection of healthier items by 16%, 29% and 37%, respectively, across all groups ($p=0.03$).

Conclusions: The proportion of healthy items purchased was highest when adults/parents purchased items alone. Food selection improved during the interventions, although the majority of purchases remained unhealthy across all groups. Parents and children may not always consider the health implications of dietary choices made for themselves and for others. Policy makers should consider limiting the availability of unhealthy foods in a variety of settings where children are present.

Key words: childhood obesity, food availability, healthy foods, policy, recreational facility

PO215

PARTICIPATION IN AN INTEGRATED HOMESTEAD FOOD PRODUCTION AND NUTRITION AND HEALTH-RELATED EDUCATION PROGRAM INCREASED CHILDREN'S HEMOGLOBIN LEVELS IN BURKINA FASO

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Background and objectives: Anemia is nearly universal among young children in Burkina Faso and is likely caused by multiple factors including suboptimal infant and young child feeding (IYCF) and care practices, illness, and limited access to nutrient-rich foods and health care.

Methods: We conducted a cluster randomized control trial, of Burkinabe children aged 3-12 months. Forty-five villages were randomly assigned to a control group or one of two treatment groups. Both treatment groups participated in a two-year program that included homestead food production (HFP) to increase production of nutrient-rich foods and a behavior change communication (BCC) intervention to improve knowledge and adoption of optimal IYCF and care practices delivered by older women leaders or village health committee members (HC villages).

Results: After two years of program implementation, children in HC villages had a greater increase in mean hemoglobin concentration of 0.46 g/dL (double difference estimates; 95% CI -0.07 – 1.0, $p=0.089$), compared to those in control villages. This difference was greater and statistically significant among younger children (3-5.9 months of age at baseline)in HC villages relative to those in control villages (difference = 0.73 g/dL (95% CI 0.12 – 1.33, $p=0.02$)). Supporting this finding, we also found greater gains in women's home production of foods in the lean agricultural season and knowledge of key IYCF and care practices among women in HC compared to control villages.

Conclusions: Participation in a program that increases home production of nutrient-rich foods and provides nutrition and health related education through a well-developed BCC strategy can improve children's hemoglobin concentrations by increasing access to nutrient-rich foods and enhancing knowledge related to optimal IYCF and care practices. This is the first cluster-randomized control trial of a HFP program that has demonstrated a significant positive effect on increasing children's hemoglobin concentrations.

Key words: children, hemoglobin, Burkina Faso

PO216

EMERGING DISEASE BURDEN TRANSITION IN DEVELOPING COUNTRIES: THE CASE OF BANGLADESH

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Background and objectives: Evidence is growing that risk factors for disease burden are shifting globally from communicable diseases to non-communicable diseases (NCDs)(Lim, S. Stephen, 2012). This shift is also taking place in Bangladesh. Blood pressure (BP) and Fasting Blood Glucose (FBG) values were collected from women and men age 35+ in the 2011 Bangladesh Demographic and Health Survey (BDHS). The current study investigates the prevalence and determinants of BP/FBG in this population.

Methods: The 2011 BDHS is a nationally-representative sample of 18,000 households. BP and FBG values, hemoglobin, and height/weight measurements were obtained from 4,311 women and 4,524 men age 35 + in one third of the selected households. Bivariate tables were run to analyze the preliminary results, which were weighted to represent a national estimate. Logistic regression models will be applied to the data to identify the determinants of BP and FBG. The potential variables identified to be included in the model are age, urban-rural residence, region, education, household wealth, and BMI.

Results: The preliminary results indicate that 32% of women and 19% of men age 35+ have higher-than-normal blood pressure or are taking medication to lower the BP. Further, 45 % of women and 57% of men were not aware of the condition. Eleven percent of women and men age 35 + are diabetic or are taking medication for diabetes. More than half of these men and women were not aware of their condition. We expect to measure the likelihood of propensity towards hypertension and diabetes based on BMI.

Conclusions: NCDs in Bangladesh could be on a rise, but the awareness about it is low. Knowledge about the prevalence of hypertension and diabetes, as well as information about the their intermediate risk factors are important for the disease prevention and control.

Key words: Bangladesh, BP, Blood glucose, BMI, DHS

PO217

EXCESS DIETARY ENERGY INTAKE AND ESTROGEN-DEPRIVATION MODULATE ADIPOSITY-RELATED PROINFLAMMATORY EVENTS AND MUSCLE LOSS.

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Background and objectives: Postmenopausal weight gain is a known risk factor for breast cancer while postmenopausal women experience lower fat to lean tissue ratio. The objective of this study was to investigate the effects of excess fat accumulation and/or estrogen deprivation on adiposity related proinflammatory events and muscle tissue loss.

Methods: C57BL/6J female mice ovariectomized (OVX) or sham-operated (SHAM) at 5 wk age were fed with normal diet (ND, 15% fat as calorie) or high fat diet (HD, 45% fat as calorie) for 12 wk. Blood and tissue inflammatory molecules were measured to determine the effects of OVX and dietary fat content on inflammatory events. C2C12 skeletal myotubes were also used to examine the effects of 17¥â-estradiol, insulin, and leptin on muscle degradation.

Results: Body and adipose tissue weight were significantly higher in OVX mice compared to SHAM mice. HD significantly increased the level of circulating insulin while adiponectin level was decreased. OVX animals exhibited significantly higher blood level of leptin. There was no significant difference in the expression of PPAR-¥á and SREBP1c mRNA in the liver. However, the expression of muscle Akt, phosphorylated Akt, and FoxO1 was higher in OVX+HD mice indicating possible muscle protein degradation. Adipose tissue leptin, IL-6, and TNFα mRNA expression were increased in OVX+HD mice. Skeletal myotubes study indicated that lower level of 17¥â-estradiol increased the expression of MuRF1 and FoxO1 while mTOR expression was decreased. Leptin and insulin treatment increased the expression of MuRF1. Interaction between estrogen and insulin/leptin was observed for FoxO1.

Conclusions: These results suggest that both estrogen deficiency and excess fat intake regulate systemic inflammation by modulating the production of major adipokines in metabolic tissues including adipose tissue, liver and muscle.

Key words: ovariectomy, adipose tissue, estrogen

PO218

ABSORPTION AND GASTROINTESTINAL OXIDATIVE INJURY IN KM MALE RATS FED OXIDIZED CASIN

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Background and objectives: Protein oxidation is one of the important causes of many degenerative diseases. Protein oxidation in food process is of frequent occurence. However, the health impacts of oxidized products of food proteins in vivo have been unexplored. The aim of this study was to determine whether oxidized casein products can enter blood circulation, and to evaluate oxidative effects on the digestive organs of rats.

Methods: Westar male rats were administered orally with origin casein (control£¬C) and casein oxidized by H2O2 (0.4mmol/g prot) combined with Cu (H2O2-Cu) and HClO (0.4mmol/g prot).The chyme of intestine, blood of portal and peripheral vascular were taken for determination after 0.5, 1.0, 1.5, 2 hr.

Results: Advanced oxidation protein products (AOPPs), dityrosine (Dtyr) and carbonyls were significantly ($p<0.05$) increased in rats administered with oxidized casein, while thiol content decreased. Reactive oxygen species (ROS) levels in blood were also higher than in controls 0.5~2 h after perfusion, levels of AOPPs, Dtyr, carbonyl, and thiol in blood exhibited strong correlations with those in casein samples. Furthermore, analysis of chyme£¬plasma of portal and peripheral vascular via HPLC-MS demonstrated the absorption of oxidized-casein products including Dtyr and peptide carbonyls. ROS, malonyladehyde and protein carbonyls in blood, liver, duodenum and jejunum were significantly ($p<0.05$) elevated. Total antioxidants and activities of superoxide dismutase, catalase and glutathione peroxidase were decreased.

Conclusions: Oxidized casein products could be absorbed and possibility causing oxidative damage to digestive organs in rats.

Key words: Oxidized-casein; HPLC-MS; digestive organs; oxidative damage

PO219

THE CONTRIBUTION OF BREASTFEEDING TO ACHIEVING MILLENNIUM DEVELOPMENT GOAL FOUR IN THE ASIA PACIFIC REGION

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Background and objectives: Millennium Development Goal4 includes the target to reduce the under-five mortality by two thirds between 1990 and 2015. Despite population growth, the number of under-five deaths worldwide fell from more than 12 million in 1990 to 7.6 million in 2010. Within the Asia Pacific Region there are still 10 countries (of 48) with infant mortality rates above 50 deaths/1000 births and the region accounts for about 40% of all infant and child deaths globally. The proportion of deaths in the neonatal period is increasing and is now 54% in the Western Pacific Region. Neonatal deaths are falling at a slower rate (1.7%) than is required to achieve the target (4.4%) and it is estimated that 25% of these deaths are preventable by following recommended infant feeding procedures, including early breastfeeding and use of inappropriate prelacteal feeds. The objective is to document early breastfeeding rates and use of prelacteal feeds in the region.

Methods: Cohort studies of breastfeeding were undertaken using the same questionnaires and

Methods in the Asia Pacific Region in China (three locations), Vietnam, Japan, Nepal, Malaysia, the Maldives, Japan, Australia and Papua New Guinea. The sample sizes ranged from 281 to 1612.

Results: In many countries there was a delay in the time until the baby received its first breastfeed. In China the high rate of caesarean sections (77% in our Hangzhou study), leads to a delay in the first feed beyond the one hour recommended by WHO. In Sichuan 93% of infants received a first feed other than breastmilk, whereas in Sabah the rate was 4.4%.

Conclusions: There are many preventable neonatal deaths in the region. Early breastfeeding and not giving prelacteal feeds has the potential to reduce these deaths by as much as 20%.

Key words: Millennium Development, Asia Pacific, Infant mortality, breastfeeding

PO221

MICROSTRUCTURAL ANALYSIS OF BINGE EATING

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Background and objectives: The use of the microstructural analysis has traditionally been limited to evaluated effects of drugs on feeding behavior, this peculiarity to limited characterization of multiple food phenomena. A phenomenon that requires an appropriate characterization by its relationship to feeding pathologies development is binge eating. Experimental models based on deprivation, stress, cycles of dieting and overeating, among others have been used for their study, however, description of its microstructural behavior not yet reported. Objective of this study was to describe microstructural characteristics of binge eating using a food deprivation model in rats.

Methods: Seven male albino rats 5-month-old at the beginning of the experiment lived in the microstructural feeding analysis system enclosures continuously. Were exposed to fifteen days of free access to water and food (base line), followed by 3 days of food deprivation. On the next fifty days, water and food again were freely available. Cycle deprivation-refeeding was repeated five times.

Results: Data collected demonstrated that all subjects presented binge eating episodes after deprivation period. Meal microstructural showed differences between base line and refeeding periods. During refeeding periods, number of meals, meal size (g), meal time (s), feed rate (g/s) and returns increased, on the other hand Interval between meals (s) decreased in comparison with data collected in base line.

Conclusions: These results provide a characterization of binge eating.

Key words: Microestructural analysis, binge eating, deprivation, rats

PO222

THE MINOR ALLELE OF THE FADS1 GENE POLYMORPHISM IS ASSOCIATED WITH LOWER EICOSAPENTAENOIC ACID IN BREAST MILK OF CHINESE WOMEN

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Background and objectives: The enzyme encoded by fatty acid desaturase gene 1 (FADS1) is the rate ¨Climiting enzyme in the synthesis of long chain polyunsaturated acids (PUFAs). During the early neonatal period, rapid synthesis of brain tissue, with cellular differentiation and active synaptogenesis, has a special need for docosahexaenoic (DHA, 22:6n-3), eicosapentaenoic (EPA, 20:5n-3) and arachidonic (ARA, 20:4n-6) acids. Minor alleles of FADS1 gene polymorphisms are associated with lower ARA and EPA of breast milk in Caucasian women. We aimed to determine if SNP rs174556 (C major allele; T minor allele) in FADS1 is associated with differences in n-6 and n-3 fatty acids in breast milk of Chinese lactating women.

Methods: The subjects were 92 healthy Chinese lactating women from Changchun. Fatty acid intakes were estimated by 24 hour diet recall, and breast milk samples were collected in the postpartum 20+3 day. Fatty acid composition of breast milk was detected with gas chromatography. Rs174556 in FADS1 of lactating women was genotyped using PCR ¨CRestriction Fragment length Polymorphism method.

Results: 92 Women had mean (±SD) concentrations of ARA (0.277±0.181 mg/ml), DHA (0.184±0.129 mg/ml), and Median (±Q) concentration of EPA (0.034±0.025 mg/ml) in breast milk. The dietary intakes of PUFAs didn¡¯t differ among the women grouped by the polymorphism rs174556. The content of EPA in breast milk was the lowest in minor allele homozygotes of rs174556 TT (P=0.047). The content of other PUFAs in breast milk didn´t have significant differences among the women grouped by rs174556.

Conclusions: The minor allele TT homozygotes of the FADS1 gene polymorphism rs174556 are associated with lower EPA status of breast milk in Chinese lactating women. Supported by NSFC (81102115).

Key words: FADS1, PUFA, Breast milk, Gene polymorphism

PO223

COMPARISON OF FERMENTATION LEVELS IN LARGE INTESTINE OF RATS FED DIFFERENT CARBOHYDRATE-SOURCE DIETS BY ANALYZING FECES USING LC/MS

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Background and objectives: To acquire exact condition of fermentation in large intestine, timing of taking intestinal contents is very important. However, it´s difficult to investigate real-time degree of fermentation. The aim of this study is to establish the easy-to-use and rapid method of monitoring fer-

mentation by analyzing feces in rat using LC-MS, and compare fermentation pattern in rats fed different carbohydrate-source diets.

Methods: Wistar/ST rats (11-week-old) were divided into 3 dietary groups which were made from different source of carbohydrate (cornstarch, dextrin and sucrose). After acclimatization of three days, the training of 2 hour-feeding was started. At the fourth day of feeding restriction, feces were collected at 0, 3, 6, 9, 12 and 24 hours after 2 hour-feeding. Then, the concentrations of short chain fatty acids (SCFAs) which were composed of acetate, propionate and butyrate were measured by LC/MS.

Results: The total concentrations of three SCFAs in feces reached a peak at 6 hours after feeding in dextrin group and at 12 hours in sucrose group. However, in cornstarch group, the concentrations continued to rise until 24 hours after feeding. When SCFA concentrations were compared among contents of cecum, proximal colon, distal colon and rectum, SCFAs balance was almost same.

Conclusions: These results showed that difference of carbohydrate source changed a peak of fermentation. Although these results from analyzing feces may not reflect on real-time fermentation in large intestine, analyzing feces is easily-handled and capable of monitoring SCFAs balance. This method is thought to be useful for investigating the continuous change of fermentation in various conditions.

Key words: LC/MS, rat, fermentation, carbohydrate, short chain fatty acid

PO224

FLOW INJECTION ASSAY FOR MEASURING LYSINE-SPECIFIC DEMETHYLASE-1 (LSD1) ACTIVITY BY TIME-OF-FLIGHT MASS SPECTROMETRY

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Background and objectives: Lysine-specific demethylase 1 (LSD1), a histone-modifying enzyme, is upregulated in many cancers, especially in neuroblastoma, breast cancer and hepatoma. We set out to establish a simple method to measure LSD1 activity using a synthetic N-terminal 21-mer peptide of histone H3, which is dimethylated at Lys-4 (H3K4me2).

Methods: After the enzyme reaction, a substrate of either H3K4me2 or H3K4me1 and two demethylated products, H3K4me1 and H3K4me0, were quantitatively determined by flow injection time-of-flight mass spectrometry (FI-TOF/MS).

Results: By using recombinant human LSD1, a nonlinear fitting simulation of the data obtained by FI-TOF/MS produced typical consecutive-reaction kinetics. Apparent Km and kcat values of hLSD1 for the first demethylation reaction were found to be in the range of previously reported values. Tranylcypromine was shown to inhibit LSD1 activity with an IC50 of 2.3 μM for the first demethylation reaction in the presence of 20 μM H3K4me2. FI-TOF/MS newly provided apparent Km and Kcat values of hLSD1 for the second demethylation reaction, indicating more efficient demethylation reaction than the first reaction. Without using the recombinant enzyme, this FI-TOF/MS method was applied to detect endogenous LSD1 activity in a crude nuclei fraction of human neuroblastoma-derived SH-SY5Y cells.

Conclusions: A simple FI-TOF/MS assay is presented to efficiently and easily measure LSD1 enzyme activity. It is useful to measure the endogenous LSD1 activity in cultured cells.

Key words: H3K4me3, LSD1, TOF/MS, neuroblastoma, consecutive-reaction

PO225

TIME TRENDS IN DIET AND NUTRITIONAL STATUS OF RURAL AND TRIBAL POPULATION IN INDIA: A LONGITUDINAL NATIONAL NUTRITION NNMB SURVEYS

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Background and objectives: Undernutrition is one of the major public health problems in India, affecting mostly children, adolescents and reproductive age women. It may result by multiple overlapping and interacting factors, which are in dynamic in nature. For the purpose, National Nutrition Monitoring Bureau was established by the ICMR in 1972, to monitor diet and nutritional status of population groups in India.

Methods: The study was a community based longitudinal and adopted multistage sampling. The repeat surveys were carried out in 1979, 1990, 1997 (N 60,601) and 2012 (N 86,754) among rural population and similar surveys were carried out in 1987 (N 41,576), 1999 (N 90,885) and 2009 (N 1,15,113) among tribal population from 1200 selected villages in 8-10 major states in India to assess nutrition time trends.

Results: Despite no change in food and nutrient intakes over a period of 4 decades, the prevalence of severe underweight (<Median-3SD) was significantly ($p<0.001$) declined from 42.2% in 1979 to 15.9% in 2012. The prevalence of severe stunting (<Median-3SD) was also significantly ($p<0.0001$) declined from 57.8% to 22.2% in the same period. In case of tribal children, the prevalence of severe underweight was significantly ($p <0.001$) declined from 22.9% in 1999 to 20% in 2009 and

severe stunting was also significantly (p <0.001) declined from 30.8% to 25.7% in same period. In case of adults, the prevalence of chronic energy deficiency (BMI<18.5) was significantly declined from 50% in 1999 to 40% in 2009 and concomitantly, overweight and obesity was (p<0.01) increased.

Conclusions: The study revealed, there was significant reduction in prevalence of severe undernutrition and increase in overweight and obesity over a period of 4 decades, despite no change in the diet and it could be due to physical inactivity, which needs to be explored.

Key words: Underweight, Stunting, time trends, overweight, rural

PO226

NUTGECS: A NUTRITION GUIDE FOR EARLY CHILDHOOD ACTIVE STAKEHOLDERS – PRESENTATION OF AN EU-PROJECTS' OUTCOME

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Background and objectives: Results of the European Nutrition and Health Report 2009 [ELMADFA I, 2009] show that children aged three to six years have unfavorable nutrition behaviors. To improve these habits a guidebook for nutrition education in kindergarten was developed through collaboration between different academics (nutritionists, home economists, pediatricians, educationists, psychologists) across five countries (Austria, Germany, Latvia, Romania, Turkey) within the Lifelong-Learning-project NUTGECS.

Methods: A stakeholder analysis according to Hughes and Margetts [2011], researches concerning the nutritional status of children aged three to six years, investigation of nutrition training of kindergarten teachers, of the current situation of early childhood nutrition education, impact of community nutrition, and the legislative framework for kindergartens have been conducted in all participating countries.

Results: Based on the stakeholder analysis kindergarten teachers were chosen as the target group for the guidebook. Kindergarten teachers have a multiplier effect, are persons of trusts, important role models and have contact to other relevant stakeholders. The analysis concerning the nutritional status show that early childhood nutrition is a major health issue in all countries although problems vary. However, in all states children consume too many sweets and too less fruit, vegetables, dairy products and carbohydrate rich food, which results in a deficient intake of vitamin D, folate, iodine, and protein. Therefore, the theoretical part of the guide focused on these food items and nutrients. The practical part presents child-appropriate nutrition education examples and parental involvement strategies.

Conclusions: The established Nutrition Guide for Early Childhood Active Stakeholders (free download: www.nutgecs.eu) offers scientific information and practical approaches. Through this comprehensive approach the guidebook is a sustainable way to support kindergarten teachers in nutrition education.

Key words: nutrition education, kindergarten, guidebook

PO227

IMPACT OF SOCIO-ECONOMIC STATUS ON BODY WEIGHT OF AUSTRIAN KINDERGARTEN CHILDREN

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Background and objectives: In public opinion overweight and obesity are increasing problems in Austrian children, although data show that the number of children with too high body weight is almost constant during the last years [ELMADFA et al., 2003; 2008; 2012]. However, increasing percentages of overweight/obesity are going along with rising age and a variety of other determinants especially socio-economic status.

Methods: Within the framework of the Austrian kindergarten nutrition intervention project MOGI anthropometric measurements have been conducted in 183 3-to 6-year old children. BMI-Classification has been done according to percentile curves of Kromeyer-Hauschild [2001]. Participating families were randomized into socially disadvantaged and not disadvantaged by the Family Affluence Scale (=FAS) [BOYCE et al., 2006].

Results: 41.0 % of all participating children were socially disadvantaged. The majority of all children were normal weight (79.2%), 10.9% were overweight, 4.4% obese and 5.4% underweight. These outcomes are similar to the results of the Austrian Nutrition Report 2003 [ELMADFA et al., 2003]. Social background didn´t influence the childrens' BMI (p>0.050). Although, parents of socially disadvantaged children are less

informed about healthy nutrition than not disadvantaged (p<0.001), children of both groups consume comparable amounts of fruit and vegetables (p=0.078).

Conclusions: Data of the MOGI-project indicate that the BMI of the majority of Austrian kindergarten children is within the normal range and stable over the last ten years. Although social background determines parental nutrition knowledge their childrens' eating habits and body weight are not different in between social advantaged and disadvantaged children at that point of life. This might be due to the needless behavior of children and the compensatory influence of kindergarten teachers as important role models. These results underline the importance of nutrition education in kindergarten to sharpen personal responsibility of children.

Key words: kindergarten children, body weight, socio-economic status

PO228

A STUDY ON THE EFFECTS OF LOW PROTEIN DIET ON HEPATIC MIRNA AND ITS TARGET GENES BY MICROARRAY ANALYSIS

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Background and objectives: microRNA (miRNA) is a small non-coding RNA which regulates gene expression by repressing transcription or cleaving mRNA of target genes. In this study, we aimed to examine the effect of nutrition on the expression of miRNA, which has remained to be a target of nutritional science. In addition, we investigated the influence of nutritional condition on the regulation of miRNA on mRNA expression which might result in physiological changes.

Methods: six week male Wistar rats were divided into Control (C) group and Low Protein (LP) group. C group was fed a 20% casein diet and LP group was fed a 5% casein diet for 2 weeks. Total RNA were extracted from the livers and used for microarray analysis of miRNA (GeneChip® miRNA 2.0 Array, Affymetrix) and mRNA (GeneChip® Rat Genome 230 2.0 Array, Affymetrix). HepG2 cells were transfected with synthetic miRNA as well as its antisense inhibitor. The expression of the putative target genes were then validated by qRT-PCR.

Results: The miRNA array analysis revealed that miR-203 was down-regulated by the LP diet. mRNA expression analysis showed an up-regulation of Hadhb, which is a putative target gene of miR-203 and a gene encoding an enzyme for fatty acid beta-oxidation. In HepG2 cells, overexpression of miRNA caused a down-regulation of Hadhb, which was up-regulated by the introduction of the antisense inhibitor.

Conclusions: In this study, we have shown that low protein diet up-regulates the expression of Hadhb through the down-regulation of miR-203. This is the first research exemplifying the effective practical application of the combination of miRNA array analysis with mRNA expression analysis in nutritional science.

Key words: miRNA, microarray, protein nutrition, miR-203

PO229

STUDY ON VITAMIN D RECEPTOR GENE FOK1 POLYMORPHISM WITH PIG´S MYOFIBER PROLIFERATION

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Background and objectives: In this research the expression and polymorphism of vitamin D receptor (VDR) gene and its Fok1 locus (located in exon 2 start codon region) was studied for myofiber proliferation via protein translation in pig's Longissimus dorsi (LD).

Methods: 101 LD samples was collected from 12 breeds and used to test meat shear force, VDR gene expression and Fok1 locus polymorphism by RT-PCR, PCR-RFLP and sequencing technology.

Results: Expression of VDR gene was 0.68±0.01-0.81±0.01 in LD of all breeds, significantly (P<0.05). Fok1 locus had three genotypes such as f (wide), fF (heterozygote) or F (mutant) in pig's skeletal muscle (LD). For VDR Fok1 locus genotype frequency analysis, T and C alleled frequency of 40.10% and 59.90%, respectively. When the base T at GGATG was replaced by C on Fok1 locus, the genotype f would be mutanted to F as GGACG. It was found that there were three genotypes in LD of Shanzhu who is the special China dark pig with thin myofiber and less meat shear force, while Landrace or Yorkshire had no genotype f with bigger size and meat shear force. If Shanzhu or other China pigs were hybridized with lean-pigs as Yorkshire, genotype f and fF of Fok1 locus in LD was increased with F decrease, significantly (P<0.05). The association of VDR Fok1 genotypes with meat shear force was analyzed by GLM model. It was verified that genotypes of VDR Fok1 locus was correlated with meat shear force, significantly (P<0.05). The influence of genotypes f and F at VDR Fok1 locus on meat shear force was up to P<0.01 as F > fF > f.

Conclusions: This meant that the higher expression of genotype F at VDR Fok1 locus could induce the myofiber proliferation in skeletal muscle. It was indicated that VDR Fok1 locus polymorphism is a major factor for meat tenderness.

Key words: VDR, Fok1, locus polymorphism, myofiber proliferation, meat shear force, pigs

PO230

RELATIONSHIP OF PPARГ2 BSR1 LOCUS POLYMORPHISM AND LIPIDS METABOLISM IN LONGISSIMUS DORSI

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Background and objectives: The expression and polymorphism of PPARγ2 gene and its Bsr1 locus, located in the coding region of the first promoter, was studied the relationship of lipids metabolism in pig's Longissimus dorsi (LD).

Methods: 101 LDs as muscle samples were to analyze its intramuscular fat (IMF) and prepared cDNA to test PPARγ2 expression in LD, Bsr1 locus polymorphism and sequences.

Results: The expression of PPARγ2 gene in pig's LD was between 0.35±0.07- 0.58±0.07 in 12 breeds ($p<0.05$ or $p<0.01$, YIMF=4.04X+0.68, R=0.22). Bsr1 locus had three genotypes such as b (wide), bB (heterozygote) or B (mutant) in pig's skeletal muscle (LD). The average frequency of three genotypes was 15.49% b, 23.95% Bb and 60.56% B respectively. When the base G on Bsr1 locus (CCAGT) was replaced by A as CCAAT, wide genotype b was mutated to genotype B. Bsr1 locus genotypes in LD of China dark pig as Shanzhu contained all of three (b, bB and B), in which type b was expressing up to 50.00%. In contrast, Bsr1 locus in Landrace and Yorkshire LD was lack of type b. If China pigs were hybridized with Landrace, type bB would express highly in these breeds. So a mathematical model (GLM, $Y = \mu + G + X + S + e$, Y as apparent characters; μ as means of apparent characters; G as genotype; X as breeds; S as sex; e as residuals) was built a relationship of Bsr1 locus enotypes and lipids metabolism. It was found that the higher type b, the more content IMF, significantly ($P<0.05$). There were b > Bb > B, respectively.

Conclusions: This suggested that the high expression of type b contributed to adipose differentiation, deposition and appropriate meat tenderness. It also means PPARγ2 gene can be the meat target gene.

Key words: PPARγ2; Bsr1 locuspolymorphism; lipids metabolism; intramuscular fat; pigs

PO231

QR-CODES IN FOOD LABELING: OUTLOOK FOR FOOD SCIENCE AND NUTRITION

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Background and objectives: Although the use of QR-codes (Quick Response codes) has not been broadly adopted in the domain of food science/nutrition, it is possible to find it increasely as a complement for labelling. The aim is to explore and show proposals for using QR-codes in the domain. The final goal is to describe how the applications of QR-codes can largely benefit the food science/nutrition.

Methods: From the evaluation of QR-codes use cases in the context of the industry, it is possible to derive new applications to the nutrition domain. The goal is to design Web-based systems to enable the provision of advanced services that already are supported in the present in many contexts of the daily-life but with better performance.

Results: Some proposals about the use of QR-codes:

- Basic research:
  - -Advanced tagging of laboratory samples.
- Food security:
  - -Comprehensive information about nutritional composition.
  - -Advanced features to avoid falsifications and food fraud.
  - -Control of technological processes and determination of the HACCPs (Hazard Analysis and Critical Control Points).
  - -Application to food traceability.
- Community nutrition:
  - -Use for patient education.
  - -Reduced time and costs in investigating food poisoning.
- Clinical nutrition:
  - -Based on the patient profile, reporting food suitability in certain metabolic diseases.
  - -Providing information on food-drug interactions.

-In home care, the QR-codes will facilitate the exchange of information between caregivers and medical equipment.

Conclusions: The possibilities of QR-codes are countless, almost anything you want to imagine. Therefore, sooner or later, this technology will achieve a role of the paramount relevance in our context. This seems to be the right time to actively seek for the best ways to make the most of this promising technology tools.

Key words: Access to Information; Information Management; Health Communication; Nutritional Sciences

PO232

EFFECTS OF NON-DIGESTIBLE POLYSACCHARIDES ON FOOD TASTES

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Background and objectives: Non-digestible polysaccharides such as chitin, chitosan, ƒ¿-1,3-glucan and ƒÀ-1,4-glucan are not subjected to degradation by digestive enzymes of human beings, and commonly called dietary fiber. Non-digestible polysaccharides contribute to prevention of myocardial infarction, obesity, diabetes, and therefore such substances are of critical importance. However, it is difficult to ingest adequate non-digestible polysaccharides. Accordingly, it is desirable to ingest non-digestible polysaccharides easily. Meanwhile, at present, no studies on effect of non-digestible polysaccharides on tastes have been reported. We have focused on interaction between non-digestible polysaccharides and taste components. If non-digestible polysaccharides have favorable effects on tastes, they can be applied to new flavoring agents or food additives. Here we report effects of non-digestible polysaccharides on food tastes.

Methods: As non-digestible polysaccharides, ƒ¿-1,3 or 1,6-glucan, ƒ¿-1,3-glucan, chitin, chitosan were used. ƒ¿-1,3 or 1,6-glucan and ƒ¿-1,3-glucan were prepared in our laboratory. As taste components, sodium chloride, glucose, fructose, monosodium glutamate and sodium inosinate were used. Each non-digestible polysaccharide was mixed with each taste component and incubated. After incubation, the non-digestible polysaccharide was precipitated by centrifugal separation or standing, and then supernatant concentration of taste component was analyzed. Sodium chloride concentration was measured by salinometer. Glucose and fructose concentrations were determined by 3, 5-dinitro salicylic acid method. Monosodium glutamate used by glutamate dehydrogenase method. Sodium inosinate was determined by absorption spectrum.

Results: Significant interactions between ƒ¿-1,3 or 1,6-glucan and fructose, ƒ¿-1,3 or 1,6-glucan and monosodium glutamate, ƒ¿-1,3-glucan and monosodium glutamate were observed. Each maximum interaction rates were about 64%, 75% and 49%, respectively.

Conclusions: Significant interactions were found between ƒ¿-1,3 or 1,6-glucan and fructose, ƒ¿-1,3 or 1,6-glucan and monosodium glutamate, ƒ¿-1,3-glucan and monosodium glutamate.

Key words: non-digestible polysaccharide, taste, interaction

PO233

EFFECTIVE DOSAGE OF S-EQOL FOR MANAGEMENT OF MENOPAUSAL SYMPTOMS

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Background and objectives: We have developed a dietary supplement with S-equol, a fermented soygerm by lactic acid bacterium Lactococcus 20-92. This research investigated the dosage of S-equol needed to alleviate menopausal symptoms. Two double blind placebo controlled studies were conducted with Japanese postmenopausal equol non-producing women.

Methods: One hundred five subjects (40-60yrs) were randomly assigned to either 2mg/d (EQ-2), 6mg/d (EQ-6) or 10mg/d (EQ-10) equol supplement groups or placebo (P) for 12 wks. Subjects completed the simplified menopausal index (SMI), which is a rating scale for menopausal symptoms at 0, 6 and 12 wks. Since treatment of menopausal symptoms have many placebo effects, over 50% placebo responders in SMI during the 4 wks of screening period were excluded from the treatment period in the confirmation study. One hundred sixty subjects (45-60yrs), who were more than 25 in SMI and 1/day in hot flushes (HF), were assigned either P or EQ-10 group for 12 wks. Menopausal symptoms were assessed by multiple instruments including HF frequency record.

Results: The changes in SMI score at 12 wks were -49.3% in P, -54.1% in EQ-2, -52.8% in EQ-6 and -68% in EQ-10. Reduction of shoulder stiffness showed EQ dose dependency, with a difference between P vs. EQ-10 for 6 wks (0.0+/-0. 4 vs -0.5+/-0.7, $p<0.05$) and for 12 wks (-0.3+/-0.4 vs -1.0+/-0.9, $p=0.06$). Thus, EQ-10 was decided to be used as the dosage for the confirmation study. In the confirmation study, both severity of HF and neck and muscle stiffness were significantly improved in EQ-10 vs in P at 12 wks. HF frequency was reduced in EQ-10 than P (-58.7% vs -34.5%, $p<0.01$).

Conclusions: These results suggest that 10mg/day EQ supplement alleviates menopausal symptoms, especially in HF and neck/shoulder and muscle stiffness, in EQ non-producing post menopausal Japanese women.

Key words: equol, soy, menopausal symptoms

PO234

CIRCADIAN RHYTHMYCITY AS A PREDICTOR OF WEIGHT LOSS

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Background and objectives: One of the objectives in the treatment of obesity is to identify which are the best predictors of weight loss success. Circadian rhythmicity, previously associated with obesity, could be a good marker of the effectiveness of the treatments. The aim of this work was to study the potential relationship between circadian rhythms and total weight loss in women undergoing a behavioral therapy treatment based on Mediterranean Diet.

Methods: We selected 85 overweight women (BMI: 28.59±4.30), subjected to a weight-reduction program. Efficacy of the treatment was defined as the total weight loss, percentage of initial weight and weekly weight loss rate of the studied population. To study circadian rhythmicity, distal wrist temperature (WT), motor activity and position were analyzed.

Results: Pearson´s correlation analyses showed significant association between the efficacy of the treatment and different circadian rhythmicity variables. Lower weight loss was related with worse WT circadian rhythmicity determined by means of Circadian Function Index (r=0.228, p=0.038) and a more flattened pattern measured as amplitude from cosinor (r=0.235, p=0.032). This correlation was inverse for the intradaily variability (r=-0.339, p=0.002), which suggests a higher fragmentation of rhythms. Moreover, the group of women (n=10) who lost less weight displayed lower relative amplitude (0.71±0.36 vs 1.24±0.62, p=0.036) and higher intradaily variability (0.24±0.11 vs 0.15±0.07, p=0.043) than those who achieved the highest weight loss (n=10).With respect to position, other marker of circadian rhythmicity, women who lost more weight were in general presents position less lying during the day (higher positions) than those with lower weight loss (39.12±3.79 vs 35.31±2.53, p=0.011).

Conclusions: The study of the circadian pattern at the beginning of the treatment may be a good predictor of future weight loss. Further treatment should consider chronobiological aspects to diagnose obesity and effectiveness of treatments.

Key words: Circadian Rhythm, Weight Loss, Treatment Efficacy.

PO235

DIVERSE SIGNALING PATHWAYS OF AMINO ACIDS FOR AUTOPHAGY CONTROL

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Background and objectives: Amino acid (AA) is a well-known autophagy regulator. mTOR is considered as the main signaling pathway of physiological regulation for autophagy. Additionally, reactive oxygen species (ROS) modulates autophagy in response to various cellular stresses, such as starvation, and is also considered as a signaling molecule in autophagy. To explore the relevance of ROS production to AAs effect on autophagy, we analyzed the effects of individual AA on the intracellular ROS level and autophagy in H4IIE cells.

Methods: DCFDA was used as fluorescent probe during ROS measurement. The cytosolic LC3 ratio (LC3-IIs/LC3-I) was employed as a suitable autophagic index. LC3 signals were detected by Western blotting.

Results: Separate treatments of complete (CAA), regulatory (RegAA), and nonregulatory (nonRegAA) amino acids in H4IIE cells resulted to suppression of autophagy by 42%, 22%, and 18%, respectively. Significant suppression in intracellular ROS production was observed with CAA and RegAA. Interestingly, individual AA showed various stimulating or suppressive effects on ROS level. The profile did not correspond with that of autophagic suppression by individual AAs. The response of autophagy to tryptophan, alanine, glutamine, and tyrosine fit with the suppression of ROS production. Cysteine showed remarkable suppression on ROS production, in contrast with cystine, but both showed minimal effects on autophagy. Furthermore, arginine resulted in 35% autophagic suppression, but its ROS production was stimulated. During inhibitor study of NO pathway, aminoguanidine, L-NMMA, and rapamycin treatments suggested that NO signaling pathway, but not mTOR pathway, was involved in arginine regulation on autophagy.

Conclusions: These results strongly indicate diverse and unique signaling pathways for individual AA, as manifested by lack of correlation between ROS production and autophagy regulation. The involvement of NO signaling for arginine is an evidence that mTOR is not the only signaling pathway possible for autophagy regulation by AA.

Key words: Autophagy, ROS, Amino acid

PO236

A NEW FERMENTED MILK SAUCE G LACTOSHOH USING A MONASCUS KOJI

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Background and objectives: Cow's milk is used for drink and food all over the world because of its high nutritive value. However, the difficulty of production adjustment and decrease of consumption have caused the problem of mass disposal of cow's milk. Lactosho was developed for the method of effective utilization of cow´s milk. Lactosho is the new fermented seasoning which is produced from milk protein by referring soy sauce fermentation process. In this study the fungus Monascus is used as major koji mold instead of Aspergillus oryzae. Since monakolin K which is the secondary metabolite of Monascus has hypocholesterolemic activity, it is expected to add functionality to Lactosho by using Monascus. Here are report Lactosho fermentation using Monascus as major koji mold and evaluation of the product.

Methods: Monascus pilosus, Monascus purpureus and Aspergillus sojae were used for koji mold. Skim milk powder and flour were used for raw materials of koji. Several combinations of koji mold were applied to Lactosho fermentation in this study. Lactosho fermentation was conducted for 90 days. Enzyme activities (protease, ƒ¿-amylase, glucoamylase, ƒÀ-galactosidase) were monitored during fermentation. Amino acid analysis of fermentation samples were performed by HPLC. Sensory test of fermentation products was conducted by lab members.

Results: The Lactosho made Monascus and A.sojae koji mixed showed relatively high enzyme activities (protease, ƒ¿-amylase, and glucoamylase) and quantity of amino acids compared with other samples. On the other hand, ƒÀ-galactosidase activity was low in all samples. The taste of Lctosho made by Monascus purpureus koji was more high evaluation than Monascus pilosus.

Conclusions: Combination of Monascus koji and A.sojae koji gave a good properties to Lactosho, high enzyme activities (protease, ƒ¿-amylase, glucoamylase) and high quantity of amino acid.

Key words: Cow's milk, Lactosho, Monascus pilosus, Monascus purpureus, Aspergillus sojae

PO237

OLIGOSACCHARIDE DERIVED FROM LEUCONOSTOC MESENTEROIDES SUPPRESS GLUCOSYLTRANSFERASE I FROM STREPTOCOCCUS MUTANS

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Background and objectives: Streptococcus mutans causes dental caries, since it adheres to the tooth and secretes lactic acid which can dissolve tooth enamel. The adhesion of S. mutans is supported by its extracellular polysaccharide (a-1,3-glucan, also called mutan), synthesized by glucosyltransferase I (GTF-I). Mukasa et al. reported that activity of GTF-I from S. sobrinus was decreased by addition of nigerooligosaccharide, considering that a-1,3-or-1,6-glucan oligomer can serve as GTF-I inhibitor. Leuconostoc mesenteroides synthesizes water-insoluble glucan which has a-1,3- and a-1,6-linkage, also called alternan. Because lactic acid bacteria have been extensively applied in the food industry, their glucans are interesting for the additives used in the production of foods. This study investigated the suppressive effect of a-1,3-or-1,6-glucan oligomers from L. mesenteroides on activity of GTF-I from S. mutans.

Methods: Alternan was synthesized by L. mesenteroides NBRC 100496 using sucrose as a substrate. Oligosaccharides were prepared by partial hydrolysis of alternan, using mutanase or/and dextranase, for 15, 30, 60, and 90 min at 30 ºC. The preparations were subjected to evaluation of their inhibitory effect on GTF-I from S. mutans. Inhibitory activity was evaluated by measuring the turbidity of synthesized mutan in glass tube. The preparation that showed high inhibitory activity was analyzed by gel filtration chromatography (Bio-Gel P6), thin layer chromatography, and ultrafiltration (10,000-M.W. cutoff).

Results: The preparation with highest inhibitory activity was obtained by hydrolysis of alternan for 30 min with dextranase. It showed 65 % suppression of GTF-I from S. mutans when it was added to the reaction solution at a concentration of 0.092 mM (glucose equivalent). Molecular size of oligosaccharides was estimated under 10,000 and their backbone was a-1,6-linkage.

Conclusions: a-1,3-or-1,6-glucan oligomers derived from L.mesenteroides can used as new anticariogenic oligosaccharides because of their suppression of GTF-I from S. mutans.

Key words: oligosaccharide, glucosyltransferase, Streptococcus mutans, Leuconostoc mesenteroide

PO238

THE USE OF FOOD FREQUENCY QUESTIONNAIRE AS A TOOL FOR BEHAVIOR MODIFICATION

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Background and objectives: Obesity is a difficult-to-treat disease. In most instances, it is also a behavior problem as well as the eating awareness. A self-check questionnaire of high-risk food items can be a good behavior-modifying tool for the obese. It is easy and takes only little time to fill out.

Methods: Twenty-nine items of high risk food affecting weight were chosen to create a short semi-quantitative questionnaire. Its content consisted of the frequency and also the amount of food ingested during the past week. Participants who wanted to lose weight were taught to modify their behavior based on self awareness, energy calculation, food exchange and exercise. The short semi-quantitative food frequency questionnaire was used as one of the several evaluating forms which subjects must answer following through the program. The behavior was checked at the first visit before starting the protocol, and during staying in the study.

Results: Forty-nine cases completed the questionnaire. Compare with the first visit the frequency and amount of high risk food items eaten by the participants, during subsequent visits were fruit cooked in concentrated syrup, Fast foods, sweeten milk, curry in coconut milk, Thai dessert, Potato chip, dried crunchy meat were being consumed less and the reduction were 26.5, 20.4, 20.4, 18.4, 16.3, 16.3, 16.3%, respectively. Two weight-influence food items being consumed by most participants during the last follow up at 8 weeks were iced coffee and tea and fruit juice.

Conclusions: The short and appropriate itemized food-questionnaire is an interesting monitoring-tool for making awareness and gradually modifying the unhealthy food behavior of the subjects. Adding more items of the high risk food to the questionnaires as well as keeping regular recording of the questionnaires should provide more benefit for individualized weight reduction.

Key words: Food frequency questionnaire, Behavior modification, Self awareness

PO239

REGULATION OF AUTOPHAGY BY ANTIOXIDANTS IN RAT ISOLATED HEPATOCYTES

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Background and objectives: In eukaryotes, autophagy is an indispensable intracellular mechanism of bulk protein degradation that is induced by starvation, and also regulated by nutrients and hormones. In recent years, we have focused on the effect of antioxidants on autophagy. Physiological levels of vitamin C and vitamin E enhanced autophagy. Enhancer of autophagy is considered to be beneficial for anti-aging. Then, we further attempt to clarify the effect of typical antioxidants, N-acetylcysteine (NAC), alpha-lipoic acid (LA), and epigallocatechin gallate (EGCG) on autophagy in rat isolated hepatocytes. EGCG is a main component of green tea catechins.

Methods: Fresh hepatocytes were isolated from male Wistar/ST rats by collagenase method. Autophagy was assessed by cytosolic LC3 ratio method*. All nutritional signals of autophagy are believed to get to LC3, a specific autophagy marker protein.

Results: Autophagy was suppressed by 5mM NAC, and 1 and 5mM LA. However, the effect of EGCG was biphasic, stimulated autophagy at 50*f*ÊM (physiological dose) and suppressed it at 200*f*ÊM.

Conclusions: These results suggest that, in rat isolated hepatocytes, the effects of these antioxidants on autophagy are not uniform. The reason may be dependent on the specificity of the antioxidants and on their concentrations, i.e., physiological or pharmacological.

Key words: Autophagy, Antioxidants, EGCG, Rat isolated hepatocytes, Cytosolic LC3 ratio method

* Karim et al, Autophagy, 3(6): 553-560 (2007)

PO240

THE ETHNO-BOTANY OF WILD EDIBLE FRUIT TREES IN GULU, UGANDA AND ASSOCIATED CONSERVATION THREATS

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Background and objectives: Edible wild fruits are recognised in diets and livelihood strategies of rural communities resettled after civil wars in Northern Uganda. However, the contribution is unknown. The study objectives were to document: 1) the products and services obtained from most preferred wild edible fruit trees in Gulu District, and their modes of harvest, 2) to determine threats against these species, and 3) to establish existing constraints and conservation strategies.

Methods: A survey was conducted in 2010-2011 and included 350 respondents from six sub-counties. Quantitative data were collected using questionnaires with households. The respondents were selected in a cluster sampling procedures. Qualitative data were collected using field and home observational studies.

Results: The five top ranked fruit tree species preferred for their fruits were identified in the survey, and selected for detailed investigations. These included: Vitellaria paradoxa Gaertn, Vitex doniana Sweet, Borassus aethiopum Mart, Tamarindus indica L. and Annona senegalensis Oliv. Both direct and indirect uses and services of the fruit trees were mapped. These included: fuel-wood, charcoal, medicinal, timber, construction materials, crafts and ecological services. Modes of harvests varied for the different products, consequently impacting differently on the tree populations and diversity. The main constraints for sustainable future utilisation included perception that these trees were still in plenty and cannot be transplanted from their original environment (62%), and lack of knowledge on nutritional contribution (15%). Majority of the respondents (66%) preferred to retain the trees in their gardens, rather than to replant them.

Conclusions: Edible fruit trees provide extensive benefits to the rural livelihoods, but they are highly threatened due to unsustainable exploitation. Collaborative actions among different stakeholders that enhance conservation and provisions of such trees are recommended.

Key words: Wild Fruit uses, Gulu, Uganda

PO241

OREXIGENIC HYPOTHALAMYC ACTIVATION DETERMINED WITH FUNCTIONAL DIFFUSION WEIGHTED IMAGING (FDWI) DIFFERS AMONG OBESE AND LEAN ANIMALS DURING FASTING

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Background and objectives: the outcome of adaptive responses mediated by hypothalamus during fasting is the reduction of energy expenditure and the promotion of food intake. Therefore, understanding its regulation is key in appetite management. Our aim was to compare hypothalamic activation in spontaneous lean, normal and obese animal under fed and fasting conditions using fDWI.

Methods: 16 male wistar rats were fed ad libitum during 6 months with high-fat diet. After 18 weeks animals were distributed according its body weight (bw) into obese (n=3; bw > 600g), normal (n=10 bw between 450 and 550g) and lean (n=3; bw < 430g). Functional Diffusion weighted imaging (fDWI) was applied to fed and overnight fasted rats in a 7T magnet. Data was analyzed in the Dorsomedial, Ventromedial and Arcuate Nucleus (DMN, VMN and ARC, respectively) and fitted to a biexponential model with slow (SDP) and fast (FDP) diffusion phases and slow (Dslow) and fast (Dfast) diffusion coefficients. Plasmatic biochemical parameters were assessed enzimaticatly, while hormone and plasma adipose cytokines were determined by ELISA.

Results: Obese animals presented larger adipose depots and worse lipid profile than the normal and lean group. Not significant differences were observed in the plasmatic glucose, hormones and cytokines concentrations among groups. Obese and normal rats showed similar fDWI responses to fasting, with significant increments of SDP and Dslow in the orexigenic ARC and VMN nuclei, reflecting activation-induced astrocytic swelling. In contrast, SDP and Dslow decreased in the DMN of non-obese rats upon fasting.

Conclusions: Animals that spontaneously did not develop obesity following a high fat diet showed a different hypothalamic response to fasting than animals that developed obesity. Under energy restriction hypothalamic nuclei activation follows similar patterns in obese and normal animals, which activate orexigenic signals in contrast with those observed in lean group.

Key words: hypothalamus, appetite, obesity

PO242

BODY MASS INDEX AND BLOOD PRESSURE OF UNDERGRADUATES STUDENTS IN SOUTH WEST NIGERIA

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Background and objectives: The study was carried out to determine the prevalence of overweight and the blood pressure of undergraduates in South west Nigeria. A total number of five hundred (500) students were randomly-selected.

Methods: A representative sample of five hundred (500) students was surveyed from south west Nigeria pretested interview guide was used to collect information on personal data, and socio demographic characteristics of the subjects. Information on dietary diversity was obtained using Food and Nutrition Technical Assistance Project questionnaire (FANTA). Body mass indexes (BMI), waist-hip ratio (WHR) were used in classifying obesity. Information on food intake was obtained from 24- hour dietary recall techniques. Fasting Blood samples were collected from the students to determine their lipid profile. Automatic sphgmanometer was used to measure the blood pressure, dietary diversity score (DDS) was computed and the nutritional status was assessed. Data were analyzed using descriptive statistics; SPSS software package version 16.0.

Results: The result of the blood pressure revealed that 36% of the female had normal blood pressure, 22% had pre-hypertension, 6% had stage 1 hypertension while 2% had stage 11 hypertension. Also, 14% of male had normal blood pressure, 15% had pre-hypertension, 4% had stage 1 hypertension, 2% had stage 11 hypertension. The result of BMI shows that 7% of the female were overweight, 2% had obesity grade 1 while 0.3% had obesity grade 11. Only 2% of male were overweight. The result reveals that 10% of female had chronic energy deficiency while 1.3% of male had chronic energy deficiency. The dietary diversity score of the students were low (3.22+- 20 and 3.31+- 22 for male and female respectively).

Conclusions: The protein intake of the subjects was low. The nutritional status of the student must be improved.

Key words: BMI, protein intake, blood pressure

PO243

REDUCTION OF INFLAMMATION-RELATED CVD RISK FACTORS IN PERIPHERAL TISSUES BY SUPPRESSION OF POSTPRANDIAL HYPERGLYCEMIA IN TYPE 2 DIABETIC OLETF RATS

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Background and objectives: Postprandial hyperglycemia is reportedly related to risks for cardiovascular diseases (CVD), but the underlying mechanisms are unclear. In this study, we examined whether suppression of postprandial hyperglycemia by supplementation with alpha-glucosidase inhibitor miglitol leads to alterations in the expressions of inflammatory cytokines and adhesion molecules in peripheral tissues including leukocytes, aorta and skeletal muscle.

Methods: Thirteen-week-old male Otsuka Long–Evans Tokushima Fatty (OLETF) rats, an animal model of type 2 diabetes, were fed a control diet or a diet containing 600 mg/kg miglitol for 47 weeks. Blood, skeletal muscle and the aorta were collected, and total RNA was subjected to real-time RT-PCR analysis of the mRNA levels of inflammatory cytokines and adhesion molecules. Concentrations of adhesion molecules in arterial blood were determined using antibody-immobilized beads by MILLIPLEX system.

Results: Oral glucose tolerance tests showed that OLETF rats fed a diet containing miglitol showed a decrease in postprandial glucose levels, along with preserved postprandial insulin response. Real-time RT-PCR analysis of the genes in peripheral leukocytes showed that rats fed a diet containing miglitol had reduced expressions of the genes coding inflammatory cytokines (IL-1beta, TNF-alpha, S100 a11) and E-selectin, an adhesion molecule which enhances attachment of leukocytes with vascular endothelium. In OLETF rats fed a diet containing miglitol, mRNA levels of IL-1beta and CD11c integrin were reduced in the skeletal muscle, and those of E-selectin were reduced in the aorta, which was accompanied by a reduction in the serum sE-selectin and sICAM-1 levels.

Conclusions: These results suggest that suppression of postprandial hyperglycemia leads to a reduction in the expressions of inflammation-related CVD risk factors in various tissues including peripheral leukocytes, aorta and skeletal muscle.

Key words: postprandial hyperglycemia, inflammation, leukocyte, adhesion molecule, diabetes

PO244

DIETARY DIVERSITY SCORE, LIPID PROFILE AND NUTRITIONAL STATUS OF UNDERGRADUATES IN SOUTHWEST NIGERIA

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Background and objectives: This study was carried out to determine the Dietary Diversity score, lipid profile and nutritional status of undergraduates in South west Nigeria.

Methods: A representative sample of five hundred (500) students was surveyed from Moshood Abiola Polytechnic and Lagos state Polytechnic using simple random technique. A pretested interview guide was used to collect information on personal data, and socio demographic characteristics of the subjects. Information on dietary diversity was obtained using Food and Nutrition Technical Assistance Project questionnaire (FANTA). Body mass index (BMI), waist-hip ratio (WHR) and skin fold thickness were used in classifying obesity. Information on food intake was obtained from 24- hour dietary recall techniques. Fasting Blood samples were collected from the students to determine their lipid profile. Dietary diversity score (DDS) was computed and the nutritional status was assessed. Data were analyzed using descriptive statistics; SPSS software package version 16.0.

Results: The results revealed that majority (97.7%)of the students were within the age range of 18-15 years, more than half (59%) were female. The results of the dietary diversity score showed that starch received the highest score 0.70±2.91 while cereal/ grain received the lowest score (0.30±3.37). The result of the lipid profile showed that 7% male were below optimal level of low level lipoprotein (LDL), 7% were near optimal, 10% had normal triglycerides. The result of body mass index showed that 6% had chronic energy deficiency, 3% were obese while others had normal body weight.

Conclusions: The dietary diversity score of the students were low and it had influence on their nutritional status.

Key words: Diversity, nutritional, dietary

PO245

NUTRITIONAL EXTREMES AMONG RURAL CHILDREN AGED 7-15 INHABITING POMERANIA REGION IN THE LIGHT OF THE ECONOMIC TRANSITION IN POLAND.

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Background and objectives: The aim of this study is to examine the prevalence of underweight, overweight and obesity, using International Obesity Task Force (IOTF) criteria, in four rural children living in Pomerania Region cohorts in different economic eras: communist economy (1976/1983), crisis of the 1980s (1988/1991), political transformation (1996/2001) and free market economy (2006/2010), when the living conditions of majority of the Polish population changed.

Methods: The study included 11,780 records (5,818 boys and 5,962 girls) for children aged 7-15. The Chi-Square test was used for statistical analysis of the prevalence of over- and underweight in boys and girls during the subsequent decades and in the groups with different SES. Logistic regression models was applied for underweight/overweight risk assessment (odds ratio-OR) vs. the analysed variables

Results: Children were characterised by a statistically significant ($p<0.0001$) differentiation of the prevalence of body mass deficit and excess in particular periods of the study. Almost each period –excluding 2006-2010 demonstrated both a high prevalence of overweight and thinness among girls ($p<0.0001$). The highest prevalence of thinness in girls and boys was noted in the third period of the study (16.38% and 12.24% respectively). In the years 2006-2010 both girls and boys presented the highest prevalence of overweight and obesity (15.9% and 16.03%). Social factors such as mother`s or father`s education were moderately associated with under- or overweight ([odds ratio] OR fluctuated from 1.55 to 3.23). High association in density of households per room (equivalent of low income) with both under- and overweight noted over all four past decades ($p<0.00001$).

Conclusions: While overweight and obesity was significantly spreading, malnutrition still remained a serious problem. The coexistence of children representing opposite sides of the energy balance equation presents a unique challenge for policy and interventions.

Key words: rural children, body mass index, SES

PO246

THE REGULAR INTAKE OF LACTOBACILLUS PLANTARUM 3547 IMPROVEMENT THE INFLAMATORY PROFILE MEASURED IN PLASMA OF PEOPLE WITH OVERWEIGHT AND OBESITY.

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Background and objectives: Overweight and obesity are characterized by a mild but chronic state of inflammation. Probiotics have showed to strengthen the beneficial microbiota modulating inflammatory process. Main objective has been to evaluate the effect of regular intake of probiotic Lactobacillus plantarum 3547 (Lp3547) on markers of inflammation measured in plasma of people with overweight and obesity.

Methods: A randomized, double-blind, placebo-controlled clinical trial was carried out during 10 weeks in 22 healthy volunteers of both genders with overweight/obesity (IBM ≥27-<35kg/m2); 40-50 years old, without chronic diseases and without pharmacologic treatment. Before 2 weeks of diet stabilization and fermented foods suppression participants were randomized into 2 groups: Probiotic Group (LpG, n=11) that consumed a daily capsule of Lp3547 (10x109cfu) and Placebo group (PG, n=11) with a capsule containing maltodextrin. Both groups maintained the habitual pattern of physical activity and diet. At the beginning and end of the intervention, blood samples were collected to determine the inflammatory profile by ELISA. Anthropometric and diet were evaluated.

Results: At the beginning of the intervention both groups had similar values of cytokines in plasma. After the intervention the participants who belonged to LpG showed a significantly decreased of INF-γ; compared with those belonging to GP (-2.9±1.1 vs. -0.01±0.06pg/ml)($p<0.05$). Other cytokines such as TNFα; levels showed a tendency to decrease in LpG participants between the beginning and end of the intervention (8.6±9.3 vs 7.4±4.2pg/ml) ($p<0.1$) while those participants belonging to PG remained stable (4.4±2.9 vs 5.23±3.5pg/ml). The other cytokines had no significant changes.

Conclusions: regular consumption of the probiotic Lp3547 for 8 weeks improves the inflammatory profile from plasma to decreasing the INF-γ levels and improving slightly the TNF-α levels in people with overweight and obesity.

Key words: Probiotics, Overweigh/Obesity, Cytokines.

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PO247

UTILIZATION OF MATERNAL HEALTH SERVICES AND APPROPRIATE FEEDING PRACTICES TO IMPROVE NUTRITIOANAL STATUS OF INFANTS AND YOUNG CHILDREN IN NEPAL

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Background and objectives: In some developing countries, including Nepal, mothers receive nutrition education covering infant and young child feeding (IYCF) practices while attending maternal antenatal care (ANC) and postnatal care (PNC) visits. However, the relationship between maternal health service utilization and child undernutrition remains unknown. Moreover, few studies indicated the relationship between a summary of comprehensive IYCF practices and undernutrition. This study aimed to examine the relationship between maternal health service utilization and undernutrition, and that between IYCF and undernutrition.

Methods: A cross-sectional study was performed with 400 mothers who had children aged 6-23 months in Makawanpur district, Nepal. Information on sociodemographic backgrounds, household food insecurity, utilization of maternal health services, feeding practices and children anthropometrics were collected. To measure summary of comprehensive IYCF covering breastfeeding, meal frequency, dietary diversity, and food variety, an infant and child feeding index (ICFI) was used. Multivariate logistic regression analysis was applied to examine the association of exposure variables with underweight and stunting.

Results: Approximately 50% of children were stunted and 22% of them were underweight. Maternal ANC visit was negatively associated with underweight (AOR: 3.5; 95% CI: 2.86-13.82; p=0.040) and stunting (AOR: 3.1; 95% CI: 1.58-13.40; p=0.009). Also, maternal PNC visit was negatively associated with underweight (AOR: 3.9; 95% CI: 1.63-9.15; p=0.002). Low ICFI score was positively associated with underweight (AOR: 2.8; 95% CI: 1.00-7.87; p=0.042) and stunting (AOR: 4.0; 95% CI: 1.40-11.38; p=0.009) among the children.

Conclusions: Maternal ANC and PNC visits were was negatively associated with underweight and stunting. Additionally, inappropriate feeding practice had positive association with underweight and stunting. Increase in coverage of ANC and PNC visits is recommended along with nutrition education, that target mothers to improve feeding practices and thus to improve nutrition status of children.

Key words: Breastfeeding; infant and child feeding; undernutrition; antenatal care; postnatal care; Nepal

PO248

FABP4 AND TNF-ALPHA METHYLATION LEVELS ARE ASSOCIATED WITH WEIGHT LOSS IN SPANISH ADOLESCENTS: THE EVASYON STUDY

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Background and objectives: FABP4 and TNF-a are predominantly expressed in adipose tissue and its circulating levels have been linked to obesity. However, there is very scarce information of whether epigenetic patterns of these genes could influence individual weight loss response. Therefore, the aim of our study was to analyze whether methylation levels of two CpGs sites in FABP4 and TNF-a genes could predict weight loss response to a lifestyle intervention programme in overweight/obese (OW/OB) Spanish adolescents.

Methods: Twenty four OB/OW adolescents (12-16 years old; 42% males) undergoing 10 weeks of a multidisciplinary intervention for weight loss (EVASYON study) were assigned as high (n=12; BMI-SDS loss >1.0) or low (n=12; BMI-SDS loss < 0.4) responders to the treatment. Baseline methylation levels of CpGs located in FABP4 and TNF-a genes were measured using the genome-wide Illumina Infinium HumanMethylation27 BeadChip array.

Results: We found a sex-response interaction (p=5.8 x 10-4) for FABP4 (cg10062803) methylation levels. Male low responders to the weight loss intervention programme had significantly higher basal methylation levels (p=6 x 10-4) for the studied CpG, while in females this site was hypomethylated in low responders compared to high responders (p=0.008). Concerning TNF-a (cg04425624), basal hypermethylation predicted a greater weight loss after the intervention both in males (p=0.002) and females (p=0.04).

Conclusions: Methylation levels of two CpGs in the FABP4 and TNF-α genes are associated with the weight loss response and could therefore be used as putative epigenetic biomarkers to predict the susceptibility to lose weight after a multidisciplinary lifestyle intervention in OW/OB adolescents.

Key words: weight loss intervention, epigenetics, genes, biomarker.

PO249

EFFECT OF A FOS-LACTOBACILLUS FERMENTUM SYMBIOTIC ON HEPATIC AND ADIPOSE TISSUE TRANSCRIPTOME IN OBESE ZUCKER RATS

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Background and objectives: Modulation of the intestinal microbiota may play a role in the management of metabolic syndrome. Here we examine the impact of a beneficial symbiotic on adipose and hepatic tissue at the genomic level.

Methods: obese Zucker rats were treated with FOS (5% diet) and 1.25·E11 UFC/L of Lactobacillus fermentum for 10 weeks. RNA was isolated from the liver and visceral adipose tissue and analyzed with SurePrint G3 Rat Gene Expression Microarray (Agilent Technologies). Experimental groups: lean Zucker (control) rats, untreated obese Zucker, treated rats. ·

Results: obesity had a major impact on the transcriptome of both hepatic and especially adipose tissue, with 3584 and 7036 sequences differentially expressed compared with the lean controls. The adipose tissue of symbiotic treated rats showed only 52 sequences upregulated and 88 downregulated compared with that of obese controls. The general effect of the symbiotic was that of normalization, i.e. treatment tends to augment obesity-repressed genes and viceversa. The exceptions were Arntl, which is lowered by obesity and further downregulated by the symbiotic, and Mt1a, Tef, Bhlhe41, Pik3ip1 and Hspb7, which show the opposite behaviour. The transcriptome of hepatic tissue showed 2612 sequences differentially modulated by the symbiotic compared with obese controls. Only 1335 of these correspond to genes modulated by obesity, i.e. half of the changes in the transcriptome affect genes whose expression is not changed by obesity. Furthermore, the profile was very different from that observed with adipose tissue, in that there are many genes showing changes of expression in the same direction i.e. upregulated by both obesity and symbiotic, and viceversa.

Conclusions: symbiotic treatment of obese Zucker rats has a major effect on hepatic gene expression, which may be related to its beneficial impact in metabolic syndrome.

Key words: genomics, symbiotic, metabolic syndrome, transcriptome

PO250

HIGHER TELOMERE LENGTH IS ASSOCIATED WITH A DECREASE IN OBESITY RISK IN AN INTERVENTION WITH MEDITERRANEAN DIET: THE PREDIMED-NAVARRA TRIAL

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Background and objectives: Shorter telomere length (TL) is associated with some age-related human disorders, but its relationship with obesity or adiposity parameters remains unclear. The aim of this study was to assess the relationship between TL and changes in adiposity indexes after a 5-year nutritional intervention. Subjects and

Methods: TL was measured by quantitative real-time PCR in 521 subjects (55-80 years, 55% women). Participants were randomly selected from the PREDIMED-NAVARRA center after they completed a 5-year intervention program. Anthropometric parameters and TL were measured and assessed at baseline and after 5-year intervention.

Results: Higher baseline TL significantly predicted a greater decrease in body weight (B= -1.09 kg, 95%CI: -2.01;-0.16 kg), BMI (B= -0.47 kg/m2, 95%CI: -0.83;-0.11 kg/m2), waist circumference (B= -1.15 cm, 95%CI: -2.28;-0.01 cm) and waist to height ratio (B= -0.008, 95%CI: -0.010; -0.001) in multiple-adjusted models. In addition, the reduction in adiposity indexes during the intervention was associated with increasing TL and was even higher among subjects with the longest telomeres at baseline. Logistic regression analysis showed that the risk of remaining obese after 5 years was lower in those participants who initially had the longest telomeres and increased their TL after the intervention.

Conclusions: Our research suggests that TL is inversely associated with changes in obesity markers. The assessment of TL can provide further insights for biological pathways leading to adiposity. We show for the first time that a decrease in obesity risk is linked to higher TL after a 5-year Mediterranean diet intervention.

Key words: Telomere length, adiposity, aging, nutritional intervention.

PO251

DNA METHYLATION PATTERN AND GENE EXPRESSION OF KCNQ1 AND C5AR1 IN RELATION TO ISCHEMIC STROKE AND OBESITY

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Background and objectives: DNA methylation that may be modified by obesity and stroke is one of the epigenetic mechanisms that regulates gene expression. The objective of the present study was the search of epigenetic changes related to cerebral infarction, and whether these modifications depend on the obese state.

Methods: DNA isolated from white blood cells of 6 non-obese patients without stroke (BMI 22.5±2.0 kg/m2; Waist circumference (WC) 83.3±12.5), 6 non-obese with ischemic stroke (BMI 22.5±1.6 kg/m2; WC 84.5±4.1), 6 obese without stroke (BMI 36.6±3.4 kg/m2; WC 111.3±9.3), and 6 obese with ischemic stroke (BMI 33.7±1.1 kg/m2; WC 117.6±12.5) was bisulfite treated and hybridized on a Human Methylation27BeadChip array (Illumina). Selected genomic regions of the KCNQ1 and C5AR1 genes were subsequently analyzed by Sequenom EpiTYPER, and RT-PCR was applied to determine changes in their expression.

Results: Array analysis showed more than 97 CpGs differentially methylated ($p<0.05$ and Δmethylation>5%) between obese and non-obese subjects (i.e., KCNQ1). 80 CpGs were

modified in stroke patients and 27 CpGs showed interactions between groups (i.e., C5AR1). EpiTYPER approach showed that two CpG sites of KCNQ1 were hypermethylated ($p<0.05$) in obese in comparison with lean patients. Concerning C5AR1, the whole promoter region was hypomethylated ($p<0.05$) in stroke patients and hypermethylated ($p<0.05$) in obese subjects. Obese patients showed significantly lower ($p<0.05$) expression of both genes, whereas stroke patients showed lower ($p<0.05$) KCNQ1 mRNA levels.

Conclusions: The DNA Methylation pattern of white blood cells was modified by ischemic stroke and obesity status. Moreover, DNA hypermethylation in obese status was reflected in a decrease of gene expression of KCNQ1 and C5AR1. These results suggest the potential use of gene expression and/or epigenetic biomarkers in clinical diagnosis and prognosis of obesity comorbidities.

Key words: cerebral infarction, epigenetic, mRNA

PO252

EFFECTS OF CARDIOTROPHIN-1 ON HSL AND ATGL PROTEIN LEVELS IN ADIPOSE TISSUE OF OB/OB MICE

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Background and objectives: Cardiotrophin-1 (CT-1) is a member of the IL-6 family of cytokines. A recent study of our group has revealed that CT-1 is a key regulator of glucose and lipid metabolism. The aim of this study was to analyze the effects of recombinant CT-1 (rCT-1) on protein levels of adipose triglyceride lipase (ATGL), hormone-sensitive lipase (HSL) and perilipin, the key enzymes of lipolysis, in mouse epididymal white adipose tissue.

Methods: Effects of rCT-1 treatment were evaluated in eight weeks-old male ob/ob mice. Animals were treated intravenously with rCT-1 (0.2 mg/kg of body weight) and sacrificed 30 minutes after administration. Control mice were administered vehicle (saline). Total protein content of perilipin and the main lipases ATGL and HSL, as well as the phosphorylation levels of perilipin and HSL at Ser563, Ser565 and Ser660 were analyzed by Western Blot in epididymal fat lysates.

Results: rCT-1 treatment induced a marked increase in PKA mediated phosphorylation of perilipin and HSL at Ser660 and Ser563. However, AMPK mediated phosphorylation of HSL on Ser 565 was significantly decreased. Moreover, a significant increase on ATGL protein levels was observed in mice adipose tissue after 30 min of rCT-1 treatment compared with that from control ob/ob mice.

Conclusions: The present data suggest a lipolytic action of rCT-1 in adipose tissue of ob/ob mice mainly mediated by activation of the main lipases, HSL and ATGL, involved in the lipolytic process.

Key words: Cardiotrophin-1, lipolysis, ATGL, HSL, perilipin

PO253

DIETARY ALPHA-LIPOIC ACID SUPPLEMENTATION DECREASES CHEMERIN IN HIGH FAT-FED RATS

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Background and objectives: Chemerin is a novel adipokine highly expressed in white adipose tissue. Serum chemerin levels are elevated in obese compared with lean both in animals and humans. Serum chemerin levels are strongly associated with markers of inflammation and components of the metabolic syndrome. α-Lipoic acid (α-LA) has been shown to exert beneficial properties on diabetes and obesity. So, the aim of this study was to investigate the effects of supplementation of high fat diet with α-LA on chemerin circulating levels in rats.

Methods: Control and high fat-fed male Wistar rats were assigned into two subgroups; in one of them the diet was supplemented with α-LA (0.25 wt/100 wt of diet) during 8 weeks. Two Pair-Fed (PF) groups were also included in order to evaluate if α-LA actions are secondary to its inhibitory effects on food intake. Serum chemerin levels were determined by ELISA.

Results: Chemerin circulating levels were significantly higher in the obese high fat-fed group in comparison with the control group. Supplementation of the diet with α-LA was able to reduce the overproduction of chemerin induced by the high fat feeding. α-LA also reduced chemerin levels in control-chow fed animals. A decrease in circulating chemerin was also observed in the PF group fed on a high fat diet, suggesting that the effects of α-LA on chemerin are in part secondary to its anorexigenic and body weight lowering properties.

Conclusions: These results suggest that the reduction of chemerin could also contribute to the beneficial effects of dietary supplementation with α-LA on obesity-related metabolic disorders.

Key words: Lipoic Acid, Obesity, Chemerin

PO254

FEATURES OF A POPULATION INTERESTED IN PERSONALIZED NUTRITION BASED ON GENOTYPE: APPLICATION OF A SNP GENOTYPING KIT

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Background and objectives: Personalized nutrition is starting to be based on genetic variance, which is enabling to prescribing a customized dietary pattern to prevent or treat nutritionally-related diseases through specific genetic risk scores (GRS) and SNP screening tools. The aim of the present study was to describe the features of a population which have required a nutrigenetic service.

Methods: The interactions between food intake or dietary pattern with genetics was assessed by screening of 24 specific SNPs previously reported in GWAS studies and meta-analyses for obesity, type 2 diabetes, lipid profile, cardiovascular risk and metabolism of specific nutrients by Luminex based SNP genotyping using DNA Zip Coded beads. Furthermore, medical/family history, habitual dietary habits, lifestyle behaviors, anthropometric and biochemical data were collected between September 2012 and January 2013 from the first three hundred users seeking for a nutrigenetic advice. Genetic samples (isolated from oral epithelial cells) allowed calculating a GRS related to the risk to develop 14 metabolic associated disorders and micronutrient alterations.

Results: About 23% of the users were male (n=70) and 77% were female (n=230), while 152 users were <50 y.o. and 148 were ≥50 y.o. The more prevalent diseases among of subjects seeking for a nutrigenetic advice were obesity (41%) and related disorders such as hypercholesterolemia (24%) and hypertension (21%). According to the GRS, 59% of the subjects with BMI>30kg/m2 presented genetic predisposition for obesity. Similarly, 25% of the diabetic, 22% of the hypercholesterolemic and 38% of the hypertriglyceridemia subjects showed genetic predisposition according to the GRS for each disease.

Conclusions: The user profile of this nutrigenetic service are a 50 y.o. obese woman. This nutrigenetic approach will allow personalizing the management of obesity and related disorders trough genotype assessment.

Key words: Personalized nutrition, Nutrigenetic service, Metabolic diseases

PO255

EFFECT OF METHYLATING AGENTS ON ADIPOCYTE DIFFERENTIATION: CHANGES IN CAVEOLIN-1 METHYLATION AND EXPRESSION

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Background and objectives: Obesity is a metabolic disease in which regulation of gene expression by epigenetic mechanisms may play a critical role. Caveolin-1 (Cav-1) is a gene highly expressed in adipocytes that plays a key role in the regulation of insulin signalling. The aim of this study was to determine whether high concentrations of methylating agents might cause alterations in the adipogenic process and if these modifications might be associated with changes in the methylation pattern of the Cav-1 gene and its expression.

Methods: 3T3-L1 cells were differentiated during 21 days in the presence or absence of a methylating cocktail composed of choline 70 μM, betaine 1400 μM, vitamin B12 0.074 μM and folic acid 0.09 μM. Adipocyte differentiation stage was monitored by Oil Red O staining. The region of Cav-1 studied (from 619 bp 5´ to 1333 bp 3´ of the ATG codon) includes two CpG islands located in the proximal promoter and the first intron of the gene. Methylation percentage of CpG dinucleotides was determined by MassArray Epityper. Cav-1 expression was measured by RT-PCR and protein level by western blotting.

Results: The treatment of 3T3-L1 cells with the methylating agents for 21 days produced a slight but significant delay in the differentiation process. The pro-methylating environment induced a significant increase in the methylation of most of the CpG sites of the analyzed Cav-1 region. The expression of the Cav-1 gene was also affected by the methylating agents.

Conclusions: The current study demonstrates that a milieu rich in methylating agents could affect the adipogenic process and induce changes in the expression of key genes involved in the regulation of insulin signalling through epigenetic mechanisms.

Key words: Caveolin-1, adipocyte differentiation, epigenetics, insulin signalling.

PO256

TRANSCRIPTOME ANALYSIS IDENTIFIED A POTENTIAL NOVEL FUNCTION OF CORIANDER IN SUPPRESSION OF COLITIS

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Background and objectives: Coriander (Coriandrum sativum L.), a widely consumed spice, has been reported to have antioxidant, antimicrobial and carminative properties. In this study, transcriptome analysis was first performed in normal rats fed coriander to explore its new functions. Thereafter the predicted impacts and underlying mechanisms of coriander on colitis were investigated in DSS-induced mice colitis.

Methods: Six-week-old male Wistar rats were fed either AIN-93G diet or AIN-93G-based diet with 0.5% of coriander powder for 4 weeks. Hepatic gene expression profile was obtained using DNA microarray analysis (Rat Genome 230 v2.0, Affymetrix). Functional categorizing was assigned using Ingenuity Pathway Analysis. Experimental colitis was induced in seven-week-old male C57BL/6J mice by adding 1% DSS in drinking water for 9 days. Mice were fed either AIN-93G diet or 2% coriander diet. Severity of colitis was estimated as disease activity index (DAI). Plasma TNF-α levels and colonic gene expression of pro-inflammatory cytokines were also measured.

Results: Top "bio" Function involved in Diseases and Disorders in rats fed coriander was Inflammatory disease. The highest ranked functions involved in this were Inflammatory bowel disease (IBD), Crohn's disease, Asthma and rheumatic arthritis, of which the latter two are main extraintestinal manifestations of IBD. These results indicate that coriander may have a potential beneficial role for the management of IBD. In mice, COR significantly suppressed the elevation of DAI and plasma TNF-α levels. Gene expression of pro-inflammatory markers such as IL-6, MIP2, IL-1β, COX-2 and CCL2 were down-regulated, whereas IL-10, which reduces the production of inflammatory cytokines, was up-regulated in COR group.

Conclusions: The transcriptomics analysis uncovered new beneficial functions of coriander. Coriander improved colitis symptoms and suppressed pro-inflammatory cytokine responses in experimental colitis, which might be involved in the mechanisms underlying the cytoprotective function of coriander in colon.

Key words: coriander, DNA microarray, rat liver, mice colon

PO257

ESTIMATING THE ADEQUACY OF NUTRIENT AVAILABILITY OF UGANDAN FARMING HOUSEHOLDS' FOOD PRODUCTION

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Background and objectives: There has been increasing discourse about the optimal mix of nutrition programs. However, few empirical studies examine this important issue. The objective was to examineZambia's micronutrient program portfolio and discussthe optimal mix based oncosts, coverage, impact and cost-effectiveness.

Methods: We used household consumption and acquisition data from the 2006 Living Conditions Monitoring Surveywith a Zambian food composition table to estimate usual intakes of calories and key micronutrientsand estimated the prevalence of inadequate intake. Using purchases of fortified sugar and three other potentially fortifiable staples, we modeled the additional intake of nutrients due to each vehicle.We also modeledbiofortification of a high pro-vitamin A maizeand empirically identified the key characteristics of the maize market.Finally we analyzed vitamin A supplementation throughChild Health Week. For each intervention independently and all combinations, we analyzed the cost, coverage and impact including the change in the prevalence of inadequate intake and the total number of disability-adjust life years (DALYs) saved. We used IFPRI's IMPACT Model to predict changes in food production and consumption patterns through 2042and used alternative objective criteria to optimize the micronutrient program portfolio mix over 30 years.

Results: Oil and sugar offer the greatest coverage (67%-69%) while biofortification can reach greater than 50%. Supplementation and sugar and oil fortification produce the greatest impacts. The most cost-effective 1, 2, and 3-package interventions were oil fortification alone; oil plus biofortification; and oil plus biofortification and supplementation. The sequencing of combinations affected these results.

Conclusions: Each intervention plays a significant role in combating micronutrient deficiency in Zambia. However, the choice of vehicles and the order of implementation sequencing of the interventions is crucial to optimizing overall impact and cost-effectiveness.

Key Words: Biofortification, fortification, supplementation, impact, cost-effectiveness

PO258

EFFECT OF FATTY ACIDS ON THE INFLAMMATORY CASCADE IN THP-1 DERIVED MACROPHAGES

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Background and objectives: A long-lasting inflammatory response has been related to the development of chronic-degenerative diseases. Fatty acids from the diet are incorporated into inflammatory cell membranes and give rise to bioactive compounds determining the duration and intensity of an inflammatory process. Macrophages are key players in the regulation of inflammation. Nevertheless, the signalling pathways coordinating the production of newly characterized lipid mediators and the role of fatty acids in this network are not fully understood. We aimed to study the synergy between the elements involved in the inflammatory signalling cascade in macrophages and to evaluate the effect of different fatty acids on these.

Methods: THP-1 monocytes were differentiated to macrophages using PMA. Macrophage phenotype was confirmed by evaluating cell morphology and cell surface expression of CD11c, CD14 and CD68 by flow cytometry and immunohistochemistry. THP-1 derived macrophages were incubated with LPS or fatty acids. Cell pellets were collected for analysis of gene and protein expression. Lipid mediators and cytokines were evaluated by mass spectrometry and flow cytometry, respectively.

Results: PMA induced changes in cell morphology and macrophage features in THP-1 monocytes. CD11c and CD14 expression were increased and THP-1 derived macrophages were positively stained for CD68. LPS incubation resulted in a dose- and time- dependent increment of inflammatory cytokines and lipid mediators. The NFκB pathway was activated following LPS treatment as evidenced by the decrease of IκB in the cytosol and the increment of nuclear p65 at early time points. Fatty acid treatment altered COX protein and gene expression.

Conclusions: The upregulated production of some cytokines and lipid mediators is linked to the activation of the NFκB pathway. Fatty acids may modulate the course of the inflammatory response by inducing changes in this signaling pathway. We are grateful with Dr Mojgan Masoodi for assistance with mass spectrometry.

Key words: Macrophage, inflammation, fatty-acids.

PO259

INTRODUCING MIRONUTRIENT POWDER AS A POTENTIAL COMPLEMENTARY STRATEGY FOR ALLEVIATING PERSISTING MICRONUTRIENT DEFICIENCIES AMONG CHILDREN IN TANZANIA

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Background and objectives: Micronutrients deficiencies are public health problems in Tanzania affecting mostly children and women of reproductive age. Ongoing interventions include twice-yearly vitamin A supplementation among children, salt iodation and nutrition education to promote appropriate complementary feeding and dietary diversification. Food fortification of maize flour and edible oil and home fortification with micronutrient powder (MNP) for foods consumed by children aged 6 – 59 months is being introduced in the country as a complementary intervention.

Methods: Micronutrient deficiencies among children aged 6-59 months was assessed in a cross-sectional study of Tanzania Demographic and Health Survey of 2010 in which dried blood spot samples obtained from children aged 6-59 months were tested for vitamin A (retinol binding protein) and Iron (soluble transferrin receptor). A sample of household salt was collected and tested using a quantitative method. Coverage of vitamin A supplementation was assessed by asking women if their children had received vitamin A supplements. Current infection and or inflammation were assessed by testing C-reactive protein. Market-based micronutrient powder to fortify foods intended for children aged 6-59 months is being introduced in 8 districts of Tanzania.

Results: After adjusting for current infection and/or inflammation, 33% of children aged 6-59 months had vitamin A deficiency, 59% had anaemia and 35% were iron deficient. About 47% of households were using salt that is adequately iodized. Vitamin A supplementation coverage was 61% among children; yet there was no significant reduction of vitamin A deficiency. Recent introduction of MNP with social marketing and behavioral change communication strategy in place is a key component of the intervention and expected to result in increased consumption of MNP by children.

Conclusions: MNP intervention has a great potential for complementing supplementation and other interventions to alleviate micronutrient deficiencies among children in Tanzania.

Key words: Micronutrients deficiencies, Micronutrient powder, Tanzania

PO260

MATERNAL STRESS AND DISTRESS AND CHILD NUTRITIONAL STATUS

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Background and objectives: Malnutrition and overweight/obesity seem to be more likely to occur in children of mothers with stress and distress. This study assessed the relationship between maternal stress and distress in pregnancy and 5-8 years postpartum and child nutritional status.

Methods: Longitudinal cohort study carried out in Jundiai city, Southeast Brazil involving 409 women followed throughout pregnancy to 5-8 years postpartum, and respective children. Measures of stress and distress were obtained three times in pregnancy (at gestational ages lower than 16 weeks, from 20 to 26 weeks and from 30 to 36 weeks) and 5-8 years postpartum by the Perceived Stress Scale-PSS, General Health Questionnaire-GHQ, and the State Trait Anxiety Inventories-STAI. The nutritional status of the children was assessed by the WHO body mass index-BMI z-score for age. The relationship between child BMI z-score for age and scores of the PSS, GHQ and STAI, was evaluated by multivariate linear regression, controlling for confounding variables.

Results: BMI z-score for age of the children was negatively associated with maternal scores of the PSS 5-8 years post-partum and scores of the GHQ in the second trimester of pregnancy. BMI of the children was positively associated with maternal BMI and birthweight (R2=0.13). There were 0.04 (CI=0.07-0.9x10-2) decrease in child BMI per score unit of the PSS increase, and 0.09 (CI=0.18-0.6x10-3) decrease in child BMI per score unit of the GHQ increase.

Conclusions: This study detected a relationship between maternal mental and nutritional status and child nutritional status, implying that if the mother is not physically or mentally well, her capacity for caring for her child may be impaired.

Key words: maternal stress, maternal distress, child nutritional status, birthweight.

PO261

PNPLA3 RS738409 POLYMORPHISM IN ASSOCIATION WITH THE SUSCEPTIBILITY OF ALCOHOLIC LIVER DISEASE: A META-ANALYSIS

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Background and objectives: Emerging evidence suggests an association between rs738409 polymorphism in the patatin-like phospholipase domain containing 3 (PNPLA3) gene and the susceptibility to alcoholic liver disease (ALD). This study was to integrate previous findings and quantitatively summarize the association through a meta-analysis.

Methods: Electronic literature search was performed in the PubMed/MEDLINE and EMBASE databases through December 2012. Case-control and cohort studies that reported data about the association between the PNPLA3 rs738409 with ALD risk were eligible for inclusion. A meta-analysis was conducted in a random-effects model.

Results: Of the 85 potentially relevant articles, six articles comprising 6808 subjects (3220 ALD cases and 3588 controls) were included in the meta-analysis. A significantly increased risk for ALD, in particular cirrhotic ALD, was observed in individuals with the rs738409 G allele as compared with those with the C allele; the pooled odds ratios (ORs) and 95% confidence intervals (CIs) were 1.80 (1.49-2.16) for overall ALD and 2.07 (1.81-2.37) for cirrhotic ALD (both $P < 0.001$). Furthermore, the pooled ORs and 95% CIs for overall ALD and cirrhotic ALD among individuals with the GG genotype versus those with the CC genotype were 3.59 (2.37-5.43) and 4.37 (3.06-6.26), respectively (both $P < 0.001$).

Conclusions: Alcohol consumers carrying the rs738409 G allele in the PNPLA3 gene may have a higher risk of ALD, in particular cirrhotic ALD, than those carrying the C allele. Further studies are warranted to demonstrate the detailed molecular mechanism and the clinical utility of these findings.

Key words: PNPLA3; ALD; cirrhosis; meta-analysis; susceptibility

PO262

NUTRITIONAL STATUS AND COGNITIVE DEVELOPMENT OF CHILDREN (6-24 MONTHS OLD) IN ISOKAN LOCAL GOVERNMENT AREA, OSUN STATE, NIGERIA.

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Background and objectives: Studies have shown that a child's learning capacity seems to be partially determined by parental investments in nutrition during infancy. The main objective of this study was to assess the nutritional status and cognitive development of 6-24 months old children.

Methods: A cross-sectional survey was conducted among 403 children (6-24 months) randomly selected from most patronized four comprehensive Primary Health Centers (PHC). Semi-structured questionnaire was used to collect information on mother's socio-demographic characteristics and child feeding practises. Child's length and weight were measured, HAZ, WAZ and WHZ z-scores were also determined. Malawi Developmental Assessment Tools consisting of 42 questions (of 90% pass assurance) in Gross motor, fine motor, social and language domains were used to test for cognitive development of the children.

Results: The results shows that 86.8% of the mothers were employed; out of which 42.4% were petty traders. Most of the mothers (66.0%), earned less than N10,000 per month. Of the mothers, 72.9% initiated breastfeeding within 1hour but only 15.1% practiced exclusive breastfeeding. Only 42.7% of the children were introduced to complementary foods at 6 months and 45.2% of all ate three times daily. Result also showed that 21.8%, 36.5%, 15.4% of the children were wasted, stunted and underweight, respectively. Sixty three percent (61.3%) of children had adequate cognitive development while 38.7% were inadequate. There was significant association between mother's occupation and income, feeding baby with colostrum, complementary feeding practices and cognitive development of children. The duration of breast feeding was not associated with cognitive development. Wasting status (WHZ) was strongly associated with cognitive development of children but there was no association with underweight and stunting.

Conclusions: This study showed that childhood malnutrition and inadequate cognitive development starts early in life and often coincides with mothers' economic status and child feeding practices.

Key words: Nutritional status, Cognitive Development, child feeding practices.

PO263

DIVERSITY AND NUTRITION QUALITY OF SOME SORGHUM GRAIN AND GERMINATED SORGHUM (SORGHUM BICOLOR) GRAIN VARIETIES GROWN IN KENYA

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Background and objectives: Sorghum grain is an important traditional food staple in many African countries. There are different varieties of sorghum grown in Kenya that differ in their nutritional value. The nutritional value can be improved by germination, which reduces the tannin content. The objective of this study was to determine the nitrogen and tannin content of different varieties of sorghum grain grown in Kenya, and the characteristics of the germinated and dried grain.

Methods: Physical characteristics of 10 varieties of sorghum grain were assessed by determining colour, kernel weight testa presence, and endosperm texture. Nitrogen and tannin content were also determined. The characteristics of the germinated grain was assessed by determining diastatic power (DP),and free amino nitrogen (FAN).

Results: The crude protein levels ranged from 9.7% to 14.6%, respectively. Six of the sorghum grain samples had high tannin content of more than 1.0% Catechin Equivalents (CE), while four were low tannin samples, with CE less than 0.2%. The diastatic power of the grain after 48, 72, 96 and 120 hours of germination ranged between 5.4 to 15.8, 8.1 to 24.8, 10.9 to 27.7 and 13.5 to 28.5 Sorghum Diastatic Units (SDU), respectively. The corresponding alpha amylase activity ranged between 2.5 to 16.6, 3.3 to 23.9, 5.4 to 25.5, and 7.4 to 29.1 SDU, respectively. Beta amylase activity for the same periods ranged between 0.1 to 6.5, 2.2 to 7.5, 1.9 to 7.5, and 2.1 to 10.6, SDU, respectively.

Conclusions: There was wide variations among the sorghum varieties in the physical characteristics, nitrogen and tannin content. There was also wide variation in the characteristics of germinated grain.There is good potential for using these differences to improve the utilization of sorghum grain for various foods.

Key words: Sorghum, Varieties, Characteristics, Utilization, Germination.

PO264

CORIANDRUM SATIVUM L. ETHANOL EXTRACT UP-REGULATE THE EXPRESSION OF THE ƒà CLASS OF GLUTATHIONE S-TRANSFERASE AND NAD(P)H: QUINONE OXIDOREDUCTASE 1 AS WELL AS NRF2 ACTIVATION

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Background and objectives: Coriandrum sativum L. is used not only as spice, but also as folklore medicine in many countries. To explore the chemopreventive action of Coriandrum sativum the effect of Coriandrum sativum ethanol extract on glutathione level and expression of ƒà class of glutathione S-transferase (GSTP) and NAD(P)H: quinone oxidoreductase 1 (NQO1) was investigated.

Methods: PCR, Western blot, molecular biology analysis.

Results: Real-time PCR analysis and immunoblotting analysis revealed that ethanol extract of Coriandrum sativum significantly increased protein and mRNA expression of GSTP and NQO1 in rat Clone 9 liver cells. Moreover, Coriandrum sativum extract up-regulated GSTP promoter activity and nuclear accumulation of nuclear factor erythroid 2-related factor 2 (Nrf2) as well as Nrf2 with GSTP enhancer I binding affinity and Nrf2 transcriptional activity.

Conclusions: The efficacy of Coriandrum sativum ethanol extract in induction of GSTP and NQO-1 expression as well as Nrf2 activation implies that Coriandrum sativum could be considered as a potential chemopreventive agent.

Key words: Coriandrum sativum, GSTP, NQO-1, Nrf2

PO265

MATERNAL AND CHILD NUTRITIONAL STATUS IN RURAL AND URBAN COMMUNITIES OF LAGOS STATE, NIGERIA

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Background and objectives: The quality of food intake is an important factor in the determination of the nutritional status of people in any community. This study was carried out to determine the nutritional status of mothers and children and to compare the nutritional status of mothers and children in rural and urban communities of Lagos, Nigeria.

Methods: The study was cross-sectional and structured questionnaire was used to collect data using a multistage random sampling technique. A total of 300 mother-child pair were selected to participate in the study. Data collected include demographics and socio-economic characteristics. Nutritional status was assessed using 24-hour dietary recall and anthropometry.

Results: The calorie intake of mothers in rural communities was 11.3 + 2.9 MJ and this was significantly higher than 8.7 + 1.8 MJ obtained for urban mothers ($p < 0.001$). However, the intake of proteins (31.1 + 8.1g), calcium (685.0 + 206.7mg), iron (21.8 + 6.9mg), (zinc 4.7 + 2.1mg), vitamin A (259.2 + 57.7microgRE), and vitamin C (25.5 + 9.3mg) among mothers from rural communities were lower than corresponding values of 43.3 + 10.8g, 694.7 + 157.3mg, 24.4 + 6.4mg, 5.3 + 2.1mg, 306.7 + 92.6 microgRE, 31.3 +10.9mg obtained for urban mothers. The prevalence of maternal under-nutrition was significantly higher among mothers from rural compared with those from urban communities (10.7% vs. 2.7%, $p = 0.022$). The complementary foods given to children from rural and urban communities were mainly cereals. The prevalence of underweight and stunting among the children were significantly higher in rural than urban communities (19.4% vs. 9.3%, $p = 0.025$) and (43.3% and 12.6%, $p = 0.001$), respectively.

Conclusions: This study had established a high prevalence of under-nutrition among mothers and children living in rural and urban areas in Lagos, Nigeria

Key words: Mothers; children; nutritional status, rural; urban

PO266

THREE-DIMENSIONAL ANALYSIS OF THE ONSET OF REGIONAL HETEROGENEITY OF HEPATOCYTES AND MICROVASCULAR ARCHITECTURE IN SHREW HEPATIC LOBULES

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Background and objectives: Morphological and functional heterogeneity of hepatocytes are closely related to nutritional status. We previously reported that, in diabetic house musk shrews (Suncus murinus), typical lipid deposition begins in pericentral hepatocytes and extends the whole of the hepatic

lobes. Herein, we decided three-dimensionally (3D-ly) and morphometrically to elucidate the onset of the hepatocellular heterogeneity and the development of liver cell cords and microvasculature using normal prenatal, early postnatal and adult shrews.

Methods: The livers were fixed and embedded in epoxy resin. The semi-thin serial sections were served for light microscopy. The contours of hepatocytes, portal and central veins, and sinusoids were traced by an imaging software, and their three-dimensional reconstructions were performed with geometric and volume rendering methods. Besides, confocal microscopic observations were also performed with fluorescent substance-casted hepatic vessels.

Results: Hepatocytes surrounded wholly a straight course of a sinusoid from a portal venous side to a central vein was 3D-ly reconstructed. The regional heterogeneity of hepatocytes in size appeared from 4th day after birth and became conspicuous by 16th day. The sinusoids in adult lobules branched out from a portal venous side, ran radially to the central vein with a few ramifications, and then anastomosed each other to make a unique mesh sheet around the central vein. This characteristic microvascular architecture seemed to intimately relate to the obvious intralobular heterogeneity of hepatocytes.

Conclusions: These spatial visualization and analysis have yielded many interesting findings which are available for explanation of several region-specific events in livers induced by NAFLD, NASH and other nutritional status.

Key words: hepatocytes, lipid deposition, heterogeneity, microvascular architecture

PO267

ABNORMALITIES OF HEMOGLOBIN, IRON, VITAMIN B12 AND 25(OH)D STATUS IN A CONVENIENCE-SAMPLE OF PRESCHOOLERS ATTENDING A DAY-CARE CENTER IN GUATEMALA

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Background and objectives: Vitamin D, known as the "sunshine" vitamin, can be synthesized in the skin by exposure to solar ultraviolet energy. Little concern has been expressed for the nutritional status of this vitamin in the tropics. Vitamin B12 has been identified as a problem nutrient in Guatemala. Our objective was to assess the prevalence of abnormal status of these two vitamins along with hemoglobin and iron in preschoolers from a peri-urban area of Guatemala-City.

Methods: 165 day-care children (aged 3-6 years) at Fe y Alegría in Peronia, 18 km from Guatemala-City, participated. Anemia was assessed by altitude-adjusted hemoglobin criteria. For iron status, ferritin of <20 g/dL signified deficiency. Circulating levels of vitamin B12 were measured in Boston, MA by an Immulite 1000 method (Siemens, IL), using cutoff-criteria for deficient and marginal of <200 pg/mL and 200-299 ng/m, respectively. Serum 25(OH)D was measured in Omaha, NE on a Liaison instrument (DiaSorin, Inc., Stillwater, MN), using cutoff-criteria for deficient and insufficient of <20 and 20-29 ng/mL, respectively.

Results: The average hemoglobin (g/dL) was 12.6±0.7 (median:12.6). Median ferritin (ng/mL) was 30.2, with 19% of values <20 g/dL. Overall mean vitamin B12 concentration (pg/mL) was 539±298 (median: 454; range:118-2012); globally, 4% had deficient and 15% marginal values, for a 19% abnormal prevalence. The mean 25(OH)D concentration (ng/mL) was 29±7 (median: 28; range:17-76); globally, 5% had deficient values and 54% insufficient, for a 59% abnormality rate.

Conclusions: ~1/5 of the preschoolers presented abnormal status regarding iron and vitamin B12. 3 in 5 children were deficient/insufficient in their vitamin D status. With these findings, we add another segment of the Guatemalan population to the groups vulnerable for under-explored vitamins.

Key words: Hemoglobin, iron, vitamin B12, 25(OH)D, Guatemala

PO268

DIETARY LACTOFERRIN SUPPLEMENTATION PROTECTS THE NEWBORN PIGLETS FROM EARLY WEANING DIARRHEA

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Background and objectives: Lactoferrin is a natural rich compound in the milk of mammals that has shown to play many biological functions in infants including regulation of immune response and protection against microbial infection. Objective: To investigate the effects of dietary supplementation of lactoferrin on intestinal micro-flora and early weaning diarrhea in newborn piglets.

Methods: 3 days old male piglets (Sus scorfa Landrace¡ÁLarge White F1, n=54) were randomized to 3 feeding groups fed milk supplemented with lactoferrin for 5 weeks at dose level of 0.05g/L (group 1, control), 0.5g/L (group 2) and 1g/L (group 3). At 38 days old, the jejunum tissue and the descending colonic contents were collected for colonic bacterial community using qPCR. The faecal consistency score of piglet was monitored daily throughout 5 weeks.

Results: Our results showed that the piglet administrated with lactoferrin significantly delayed the onset of food transition diarrhea; reduced the frequency of diarrhea; reduced the duration of diarrhea with a dose response relationship ($p<0.05$). The incidence of diarrhea in lactoferrin groups decreased marginally significant than that of the control group ($p=0.058$). There was no difference in 16S rDNA copies of total bacteria, Bifidobacteria and Lactobacillus per gram of colonic contents among the groups, however, the E.coli levels tended to be lower in lactoferrin groups.

Conclusions: Dietary lactoferrin supplementation improved gut comfort and alleviated early weaning diarrheal symptoms. This benefit may result from the well-known immune-boosting activity of lactoferrin.

Key words: lactoferrin, diarrhea, piglet, colonic-flora This study was supported by a research grant from the School of Medicine of Xiamen University and Nestle Research Center.

PO269

ASSESSMENT OF HEALTH PROFESSIONAL CURRICULAR FOCUS ON NUTRITION IN INDIA

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Background and objectives: Despite the fact that nutrition constitutes an integral part in prevention and treatment of all major chronic and communicable diseases, commensurate directives for it's appropriate education to future health care providers is much left to be desired. In western countries, efforts are already underway to collaboratively accommodate nutrition education into health professional training. However, the same is yet to be initiated in India where both under and over nutrition are the prime causes of morbidity and mortality and pose considerable public health challenge. Present work attempted to identify the nutritional content of different health profession curricula in India and assess its quality and quantity. This mapping of curricular components would lead to designing a nutritional curriculum that can be effectively and efficiently integrated in traditional health professional education without additional elongation.

Methods: Curricula of medicine, dentistry, nursing, physiotherapy, occupational therapy and pharmacy were analyzed in detail to identify elements relating to nutrition teaching imparted throughout the pre and clinical years. The time allotted and the mode of teaching was also assessed in depth.

Results: In under graduate curriculum, nutrition related content is taught under biochemistry, physiology, pathology, pharmacology, medicine, and community medicine. There is no teaching of nutrition in the context of disease prevention and health promotion. Learning of nutritional counseling skills is starkly missing.

Conclusions: Future physicians, nurses and health care givers should possess adequate knowledge base and inculcate specific patient-centered nutrition counseling skills during the formative years. Appropriate integration of nutrition into various health profession courses appears to be deficient and necessitates urgent academic intervention. Curriculum designers first need to be sensitized in this regard. The respective apex councils and national associations should consider prioritizing nutrition in their education and promoting a culture that builds competency in nutrition education.

Key words: nutrition, curriculum, education, India

PO270

FEEDING PRACTICES AND NUTRITIONAL STATUS OF UNDER FIVE TWINS AND SINGLETONS IN IGBOORA COMMUNITY, NIGERIA

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Background and objectives: Several studies have been done on the IYCF and nutritional status of under-five children in Nigeria but few have focussed on twins. The objective of this study was to comparatively assess feeding practices and nutritional status of twins and singletons below five years of age in Igboora.

Methods: A cross sectional study was purposively carried out in Igboora, a community reported to record the highest prevalence of twining in the world. Eighty two mothers of Twins and 83 mothers of singletons were selected through snow ball and systematic sampling techniques respectively. Anthropometric measurements were conducted to assess for the nutritional status while structured questionnaire was used to assess child feeding practices.

Results: Early initiation of breastfeeding was practiced by 45% of mothers with singleton while 42% of mothers with twins reported the practice. The rate of exclusive breastfeeding among mothers of singleton was 15.7% while it was 7.3% among mothers of twins. Majority of the mothers of singletons

and twins continued breastfeeding beyond one year. Introduction of complementary foods before six months was observed among 34.9% and 58.5% of mothers with singleton and twins respectively. While 23% of singletons were fed with minimum acceptable diet, 30.4% of twins had minimum acceptable diet. The prevalence of wasting, stunting and underweight among singletons were found to be 14.5%, 36.1% and 19.3% respectively while twins were found to have higher prevalence: 25.6%, 45.1% and 39.6% respectively. The twins were two times more likely to be wasted (OR=2.04), stunted (OR= 1.45) and underweight (OR=2.75) than singleton.

Conclusions: From this study, adequate Infant and Young Child Feeding were more likely to be practised by mothers of singletons than mothers of Twins and twins were found to be two times more likely to be malnourished than the singletons.

Key words: IYCF practices, nutritional status, twins

PO271

FOOD SECTOR APPROACH IN REDUCING SALT INTAKE IN THE NETHERLANDS: BREAD AND MEAT PRODUCTS SECTORS AS EXAMPLES

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Background and objectives: Elevated salt intake is associated with a number of noncommunicable diseases (NCDs) including hypertension, cardiovascular disease and stroke. Decreasing salt intake may reduce blood pressure and the risk of associated NCDs. Since in the Netherlands about 80% of daily salt intake comes from processed foods, food sectors should play a major role in salt reduction.

Methods: A unique cooperation on food reformulation between ministries, research institutions and a university resulted in an overview on to what level sodium reduction in foods would be technologically possible, maintaining safety and integrity of the product and acceptability to the consumer. Since bread and meat products (as sandwich filling) are main contributors to daily salt intake in the Netherlands (26% and 10%, respectively), the findings on these two food groups were discussed in detail with the concerning food sector through workshops. Food producers, retailers and caterers were all involved.

Results: For Dutch men aged 19-69 yr salt intake from processed foods is 7.8 g/d and for Dutch women 6.0 g/d. Salt intake from bread is 2.0 and 1.4 g/d respectively. Technologically reductions are possible to 1.0 and 0.7 g/d, respectively. Salt intake from meat products (as sandwich filling) is 0.78 and 0.60 g/d, respectively. Technologically reductions are possible to 0.32 and 0.25 g/d, respectively. Both workshops revealed that sectors consider the discussed options in general as feasible. The bread sector is already quite far in implementing salt reduction, the meat product sector considers the targets as feasible providing sufficient time is given to realize technological modifications.

Conclusions: Food sectors may contribute substantially to lowering daily salt intake. Food sectors are willing to contribute, providing that all sectors contribute simultaneously. Sector-organized workshops with all involved stakeholders seem to be a valuable instrument.

Key words: Salt reduction, food sectors, bread, meat products

PO272

HDL SIZE IN OBESE ADOLESCENTS

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Background and objectives: Obesity exerts negative impact in many classical cardiovascular risk factors, and adolescents are a vulnerable group to development obesity. In this fashion, it is probably that obesity in adolescents show significant and early changes in lipid metabolism. The goal of this study was to analyze the possible association between HDL size and other lipid parameters in obese adolescents.

Methods: Adolescents (n=237), both sexes and aged 10 to 19 years were included in this protocol. Socio-demographic, clinical, physical activity and dietetic habits were evaluated. After fasting (12h) blood samples were collected and from plasma/serum were analyzed: lipid profile, Apo AI, Apo B, CETP, HDL size and PON-1.

Results: Linear trend analysis showed that higher tercis of HDL size was associated to higher tercis of TC, LDL-C and non-HDL, while the inverse relationship was observed to apo AI, HDL, waist circumference, body mass index and percentage of fat mass had a size inversely proportional variation.

Conclusions: Obesity promotes multiple and negative effects on HDL particle in adolescents.

Key words: Size HDL, Obsesity, Adolescents

PO273

BREAST CANCER SURVIVORS AND THE ROLE OF NUTRITION

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Background and objectives: Evidence-based nutritional guidelines are published for cancer survivors. Limited information is available however regarding patients' nutritional status, eating patterns, and quality of life (QOL).

The studies objective was to sample a pool of breast cancer survivors to garner information concerning nutritional status, QOL, and their interest in nutritional intervention.

Methods: Breast cancer survivors within Germany, at self-help groups and gynecological practices, were asked to anonymously complete a standardized questionnaire.

Results:

1. Study included 236 women; all voluntary participants. of those surveyed:

30.9% were aged 50-59 years

44.5% were aged 60-69 years

14.4% were aged ≥70 years.

Of these, 75% received their cancer diagnosis over 4 years ago, while 78% of all participants reported no relapse.

2. BMI was calculated in Kilograms (weight) / meters (height) squared.

Average BMI among participants was 27 ± 5.5 kg/m².

45.3% were overweight

17.8% were obese

0.4% were underweight

49.6% reported a weight gain of 8.6 ± 6.1 kg

14.8% reported a weight loss of 8.5 ± 4.8 kg

44.1% of participants reported two or more hours of exercise per week.

3. Post treatment, 56.4% of participants modified their eating habits.

Higher consumption of vegetables (30.8%), fruits (27.2%) and fish (8.7%) were reported in addition to a 39.2% decrease in meat and meat products.

4. Participants QOL was estimated as "generally good."

5. Of 27.1% of patients offered nutrition or dietetic counseling, 87.5% participated.

Conclusions: The study demonstrated the need for more attention to be placed on nutrition concerning survivors of breast cancer. It emphasizes the need for nutrition to become an integral part of follow-up care, with a focus on maintaining healthy weight, and information concerning portioning and nutritional quality of dietary choices.

Key Words: Cancer survivors, breast cancer, nutrition, BMI, food choice

PO274

DIETARY GLYCEMIC INDEX AND GLYCEMIC LOAD ACCORDING TO MEDITERRANEAN DIET ADHERENCE: THE PREDIMED STUDY

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Background and objectives: Low dietary glycemic index (GI) and glycemic load (GL) have been related with a decreased risk of chronic degenerative diseases. However, the relationship between GI/GL and Mediterranean diet adherence is unclear. Objective: To assess the GI and GL according to the Mediterranean diet adherence in the PREDIMED study, a nutrition intervention trial for primary cardiovascular prevention in a high- risk cohort.

Methods: We measured GI and GL among 2880 non diabetic subjects. Diet was assessed with the use of a validated 137-semiquantitative FFQ. Mediterranean diet adherence was determined using a 14-point score validated tool. Gl and GL of each item of the FFQ were assigned by a 5 step methodology using the International Tables of Glycemic Index and Glycemic Load Values. Participants were classified according to quartiles of Mediterranean diet adherence. Dietary variables were energy adjusted by the residual method. Generalized linear models were fitted to assess the regression coefficients (95% CI) for the association between the Mediterranean diet adherence and GI and GL using the lower category as the reference.

Results: On the studied population, mean (SD) for dietary GI was 56.97 (4.72) and for dietary GL was 112.85 (22.99). The multivariate-adjusted models revealed a significant inverse association between GI or GL and the level of Mediterranean diet adherence. For GI: the regression coefficient for the upper category of adherence versus the lowest was ?= -1.83 (-2.27 to -1.39) in the adjusted model. We also found statistical inverse relationship for GL, ?= -13.10 (-15.27 to -10.93) upper category vs. lowest category.

Conclusions: An Inverse association between GI or GL and the level of Mediterranean diet adherence was found.

Key words: Glycemic Index, Glycemic Load, Mediterranean Diet.

PO275

ZINC STATUS AND METALLOTHIONEIN 1F AND 2A GENE EXPRESSION IN ATHEROSCLEROSIS PATIENTS TREATED WITH ROSUVASTATIN AND ZINC SUPPLEMENTATION

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Background and objectives: Given that reduced zinc concentrations have been attributed to the use of statins, it is important to determine zinc flow in patients with atherosclerosis and assess the need for supplementation. The study aimed at evaluating the effects of zinc supplementation on zinc status and metallothionein (MT) 1F and 2A gene expression in patients with atherosclerosis treated with rosuvastatin.

Methods: Fifty-four patients that took part in the original study (Clinicaltrials.gov I.D NCT01547377) were enrolled in Natal, Northeast Brazil. We conducted a double-blind randomized clinical trial in which patients were treated with 10 mg of rosuvastatin for 4 months and a zinc (30 mg/d) supplement (n=27), or placebo (n = 27). The following parameters were analyzed both before and after the intervention: diet, lipid profiles, hs-CRP (high-sensitivity reactive protein), plasma and erythrocyte zinc concentration, erythrocyte SOD activity and metallothionein (MT)1F and 2A gene expression.

Results: Rosuvastatin therapy was efficient in reducing LDL and non-HDL total cholesterol, triglycerides and hs-CRP irrespective of zinc supplementation. No differences were observed in plasma ($p>0.671$) or erythrocyte ($p>0.123$) zinc concentrations. The SOD antioxidant enzyme was unchanged by zinc treatment ($p=0.201$); however, comparison between pre- and post-treatment values shows that its activity increased significantly in the placebo group ($p=0.021$). The pattern of MT1F and MT2A gene expression was not significantly altered by zinc treatment ($p=0.088$; $p=0.229$), even though intra-group comparison demonstrated that the placebo group displayed a significant decline in the pattern of MT1F expression ($p=0.043$), suggesting a likely effect related to the need to supply the organic demands of oxidative stress with lower zinc intake.

Conclusions: Treatment with rosuvastatin did not have a significant impact on zinc status. Further, the zinc doses used here did not influence zinc biomarkers or the pattern of MT 1F and 2A gene expression.

Key words: zinc, rosuvastatin, metallotioneins.

PO276

NUTRITION GOVERNANCE: FIVE CRUCIAL BUILDING BLOCKS AND AN APPLICATION OF THESE BUILDING BLOCKS INTO SPECIFIC COUNTRY CONTEXTS

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Background and objectives: Enjoying unprecedented momentum in the international agenda, nutrition policies and programs have become a leading priority for actors at the international, national and local levels. The change in global sentiment toward nutrition is largely due to successful high-level nutrition-based policy campaigns such as Scaling Up Nutrition (SUN) and the 1,000 Days Initiative. The institutional architecture for addressing nutrition, however, has been largely lacking and in need of renovation.

Methods: This work examines the concept of nutrition governance and its relatively new appearance on the global stage. A review of the existing literature reveals five key concepts as being fundamental to good nutrition governance: political commitment, consensus building and coordination, financing, service delivery capacity, and transparency and accountability. The paper explores these concepts and demonstrates how they are necessary to implement meaningful nutrition policies and programs at the national level. These five building blocks are examined through the lens of six country case studies that illustrate good nutrition governance. The country stories of Peru, Brazil, Bangladesh, Tanzania, Vietnam and Thailand are highlighted because each country illustrates a different path in its nutritional programming and each demonstrates declines in nutrition-related deficiencies.

Results: This literature review and country context research gave rise to two main observations. The first is the interdependent nature of the five building blocks as a basis for effective nutrition governance; effective program implementation relies

on all of the building blocks to be engaged at some level. The second is that while the building blocks are broadly applicable across different countries, how the specific processes and activities within each block manifest themselves depends on the country context.

Conclusions: The purpose of this analysis is to further develop the current thinking on nutrition governance in the interests of strengthening the SUN movement and related efforts to combat malnutrition globally.

Key words: Governance, policy, financing, capacity, transparency

PO277

THE IN VITRO FUNCTIONAL EFFICACY OF PROBIOTIC COMBINATIONS IN FERMENTED GOAT'S MILK

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Background and objectives: Resistance to gastrointestinal condition, adhesion to intestinal epithelium and immunomodulation are critical factors in maintaining probiotic efficacy. Most of the studies evaluating these characteristics in vitro have been conducted without considering the protective and synergistic effects of carrier food matrices towards these characteristics. This study evaluates the in vitro functional properties of various probiotic combinations in fermented goat's milk including tolerance to simulated gastrointestinal juices, cellular adhesion and immune-stimulation of intestinal cell cultures.

Methods: Seven different types of fermented drinking milk were made from goat's milk using various culture compositions of three probiotics: Lactobacillus acidophilus LA-5, Bifidobacterium animalis subsp. lactis BB-12 and Propionibacterium jensenii 702 and stored at 4oC for 3 weeks. In vitro gastrointestinal tolerance (using simulated gastric juice, pH 2 and intestinal juice, pH 8 with or without 0.3% bile salts), adhesion ability (using a Caco-2 cell model) and immunomodulation aspects (by measuring stimulation of IL-6 and TNF-α production from Caco-2 cells) of these probiotics were evaluated.

Results: All three probiotics and combinations in fermented goat's milk have demonstrated significantly lower viability after exposure to simulated gastric and intestinal (with 0.3% bile) fluids in vitro ($p<0.05$). The ability of these probiotics to adhere to Caco-2 cells appeared to be influenced by the specific probiotic strains with which that they were combined in the manufacturing of fermented goat's milk. P. jensenii 702 was unable to induce IL-6 and TNF-α; production from Caco-2 cells either in monoculture or co-cultures with other probiotics, while the monocultures of L. acidophilus LA-5 and B. animalis subsp. lactis BB-12 and the co-culture of those two probiotics were able to induce low levels of IL-6 and TNF-α; production (< 4.17±1.25 pg/ml) respectively.

Conclusions: Probiotic combinations as well as food matrix may affect the functional properties of probiotics.

Key words: Probiotics, gastrointestinal-tolerance, adhesion

PO278

THE FATTY ACID COMPOSITION AND MAIN FOOD SOURCES OF FATTY ACIDS IN THE DUTCH DIET

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Background and objectives: The fatty-acid composition of the diet is an important determinant of cardiovascular disease risk. Decreasing the intake of saturated and trans unsaturated fatty acids, and increasing the intake of fish fatty acids (EPA&DHA) lowers cardiovascular risk. The development of atherosclerosis starts in childhood. Therefore, insight in the fatty acid composition of the diet is needed across all ages. Objectives: To provide estimates of intakes and main food sources of saturated and trans unsaturated fatty acids, and EPA&DHA in Dutch children and adults and to analyse compliance with dietary recommendations.

Methods: In 2007-2010, a Dutch national food consumption survey among 3819 participants aged 7-69 years was conducted. Two non-consecutive 24-hour dietary recalls with the software EPIC-Soft® were collected. Habitual nutrient intake was calculated using the Dutch Food Composition Database2011 and SPADE. Intake distributions were compared with dietary reference values set by the Dutch Health Council.

Results: About one third of consumed energy was derived from fat. In this population, 85% and <5% exceeded the advised maximum intakes of 10en% saturated fat en 1en% trans unsaturated fatty acids, respectively. The main sources of saturated fatty acids were dairy products, meat products, added fats, and cakes. Median intake of EPA&DHA increased with age, but was below the adequate intake for all age groups. Meat, fish, and eggs were the main sources of EPA&DHA; dietary supplements contributed 6%.

Conclusions: For the prevention of cardiovascular diseases, the Dutch diet could be improved through consumption of less or less-fatty choices of dairy, meat, added fats, and cakes, and increased consumption of fatty fish. In contrast to the past, intake of trans fatty acids is at an acceptable level. Food consumption surveys facilitate to identify where dietary targets are not being achieved and how they can be improved.

Key words: fatty acids, dietary monitoring

PO279

A STUDY ON BODY WEIGHT PERCEPTION, FUTURE INTENTION AND WEIGHT MANAGEMENT BEHAVIOUR AMONG NORMAL WEIGHT, OVERWEIGHT AND OBESE WOMEN IN INDIA

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Background and objectives: Inaccurate body weight perception is threat to healthy weight management behaviour. Although body weight perception studies are abundant in developed countries to form basis for weight management programmes, in developing country such as India, where obesity is rising, body weight perception and weight management behaviour have been hardly studied. We studied the socio-economic differential in the self perception of body weight, future intention for weight management and actual weight management behaviour among overweight and obese women in India.

Methods: A follow-up survey was conducted from sampled women of 2nd National Family Health Survey after four years in 2003 and 325 adult women years were interviewed in national capital territory of Delhi. Information on their own weight perception, intention of weight management and actual weight management behaviour were collected through personal interview along with anthropometric measurements for BMI. Descriptive statistics and multivariate logistic regression are used for data analysis.

Results: Discrepancy between self perceived body weight and women's actual body weight was reported. One quarter overweight women and one in ten obese women perceived themselves as normal. A significant proportion of overweight (one in four) and 4% obese women also wanted to maintain their weight as it is. Only one in three overweight and one in four obese women were performing any physical activity to reduce their weight. Women daily exposed with media were significantly more likely to perceive their weight accurately (aOR: 8.78;95%CI:2.15-37.97) and also had intention to reduce weight (aOR:16.38;95%CI:2.04-25.26) than who were not exposed.

Conclusions: These findings are important for public health interventions in obesity care. Implementation of health promotion and health education in the community should use effective mass media to raise awareness of accurate body weight to combat the growing level of obesity among Indian women.

Key words: obesity; self-perception; weight-management; women; India

PO280

PROGRAMMING THE METABOLIC GENE EXPRESSION IN ZEBRAFISH JUVENILES (DANIO RERIO) BY SUPRA-PHYSIOLOGICAL GLUCOSE LEVEL DURING EMBRYOGENESIS

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Background and objectives: Fish show a low ability to use dietary carbohydrates. Knowledge on the role of early nutritional stimuli as triggers of metabolic pathways (metabolic programming) in fish is extremely scarce. A series of studies were undertaken with zebrafish, as model organism, to assess the effect of supra-physiological levels of glucose during early embryonic stages as a lifelong modulator of metabolic pathways.

Methods: Molecular ontogeny of metabolic pathways during zebrafish embryogenesis was analysed by real-time PCR. Embryos at 0.2 days post fertilization (dpf) were enriched with glucose solution by means of microinjection. Acute effects of glucose injection on gene expression were assessed in larvae up to 10 dpf, while the programming concept was evaluated in juveniles (41 dpf) challenged with a hyperglucidic diet.

Results: Data on molecular ontogeny showed that genes related to carbohydrate metabolism, transport and digestion have low expression levels at 0.2 dpf, yet are activated at endogenous feeding period (4 dpf). By microinjecting zebrafish eggs, a 43-fold increase of basal levels of glucose was achieved, without compromising survival. Larvae from glucose-enriched eggs (4 dpf) showed a down-regulation of several genes related to glycolysis, glycogenolysis, lipogenesis and carbohydrate digestion in comparison with control (saline injected). This inhibitory regulation was suppressed after 10 dpf. At juvenile stage and upon switching from a low to a high carbohydrate diet, early glucose enrichment did not lead to marked benefits on the metabolic abilities of zebrafish. However, fish exposed to early glucose stimulus showed an improved capacity for glucose storage in muscle and lower glucose production and transport in viscera.

Conclusions: Early yolk supplementation with glucose caused both acute and chronic changes on the expression pattern of several genes that may permanently influence carbohydrate metabolism. This study suggests that early nutritional stimuli have the potential to modulate the metabolism of zebrafish at later stages.

Key words: Glucose; Programming; Gene expression, Zebrafish.

PO281

THE LEVEL OF KNOWLEDGE OF MOTHER IS A COMMON DETERMINANT RELATIONSHIP WITH MOTOR AND MENTAL DEVELOPMENT OF STUNTING INFANTS IN WEST SUMATRA PROVINCE INDONESIA

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Background and objectives: Stunting can have long-term effects on cognitive development, school achievement, economic productivity in adulthood and maternal reproductive outcomes. This study aims to determine the relationship of nutrition knowledge of mothers, health status, parenting and psychosocial stimulation of children with levels of motor and mental development of stunting infants 6 to 12 months of age in West Sumatra Province Indonesia.

Methods: It was a cross sectional study conducted at Tanah Datar regency in West Sumatra Province Indonesia from April to August 2012. Among 265 infants from 11 villages in Tanah Datar regency ware assessed for nutritional status and stunting according to standard (WHO, 2006). The qualitative approaches also used for enrich analyses from informants consisting midwives, cadres and mothers of stunting infants. Sampling was carried out with Multistage Random Sampling technique. The collected data was analyzed by Statistical Program SPSS version 15. Frequencies and percentages were computed to present all categorical variables Quantitative variables such as age, nutritional status was presented by mean ± SD. Data analysis was performed with a statistical test as Multiple Logistic Regression.

Results: The quantitatively data was found an association with maternal nutrition knowledge of motor and mental development of stunting infants with p value 0.02. While the incidence of diarrhea, respiratory events, parenting and psychosocial stimulation did not significantly associated with motor and mental development of stunting infants. Maternal nutrition knowledge was the most common related to motor development of stunting infants is with respective OR 2.837 (95% CI 1.134 to 7.095).

Conclusions: It was found relationship low knowledge nutrition of mother with delay motor and mental development of stunting infants 6 to 12 month of ages in West Sumatra Province.

Key words: stunting, motor, and mental development, infants.

PO282

EFFECT OF ANIMAL SOURCE FOOD (ASF) PROVISION ON THE GROWTH OF MALNOURISHED CHILDREN IN KELANTAN, MALAYSIA: A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: It is well established that animal source foods (ASF) is a major contribution to the diet, yet parents who never serve eggs and red meat are keeping children away from the most concentrated sources of proteins, vitamins and minerals that promote the growth and enhance child's immunity. The objective of this study was to evaluate the effect of Animal Source Food (ASF) on the growth of malnourished children in Kelantan, Malaysia.

Methods: A six months of ASF intervention trial was carried out in 90 malnourished children of food insecure households in a rural area of Malaysia. Children were randomized into three groups: 30 children was assigned to Milk group (M) who consumed two carton of 250 ml milk daily over the study period; in Egg group (E), 30 children consumed two eggs daily and Control group (C) (n=30).Anthropometric data were collected at baseline, at 3 and 6 months of the trial.

Results: Over the study period there was a significant increase in height, weight and Mid Upper Arm Circumference (MUAC) when One- way repeated measures ANOVA was performed. However, there was no significant differences of increments in height, weight and MUAC were observed between the groups.

Conclusions: The provision of ASF trial improved weight, height and MUAC among malnourished children.

Key words: Milk, egg, malnutrition, weight, height

PO283

ASSOCIATION OF THE ANXIETY WITH THE NUTRITIOUS CONDITION IN ADOLESCENTS, AGES 11 TO 13 YEARS IN MEXICO CITY

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Background and objectives: Nowadays is more frequent than the adolescents present problems of anxiety, due to multiple stressful events to which find them exposed day after day, since they can be an adverse economic situation, school exigency, parents divorce,school bullying, which together with their own development changes, it does that they experience dread, worry or be concerned, and that feelings interferes in his food habits and ways of life. The aim of present study was to know the prevalence of anxiety disorders in adolescent students of middle schools in Mexico City and, in its case evaluate if some relation exists with they nutritious condition.

Methods: The study sample was constituted by 142 students (72 women/70 men), with age from 11 to 13 years, of 8 secondary schools public of Mexico City. Through the application of the 'scale HAD insole anxiety', which contains 7 items and the use of Who Anthro Plus program, the conditions of anxiety and nutritiously status were obtained, respectively.

Results: We establish that the percentage of adolescents without anxiety was 60 % (women 29% and men 31%), the percentage of adolescents with probable anxiety was 13.3% (women 7% and men 6.3%) and finally with significant anxiety 26.7% (women 14.7% and men 12%). With regard to the nutritious condition we establish that 1.4% presented thinness (women 1.4%), 57.7% normal weight (women 34.5% and men 23.2%), 27.5% overweight (women 10.5% and men 17%) and 13.4% obesity (women 4.2% and men 9.2%). The statistical analysis (test chi2 de Pearson) did not find significant association (p>/0.05) between the anxiety and the nutritious condition.

Conclusions: We recommend to extend the study to identify the factors that predispose the anxiety and its relation with the increase of weight in the adolescents of middle school in Mexico City.

Key words: anxiety, adolescent, middle school, nutritious condition, Mexico

PO284

HIBISCUS SABDARIFFA POLYPHENOLS PREVENT INFLAMMATORY-RELATED PATHOLOGIES THROUGH EPIGENETIC REGULATION

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Background and objectives: The low-grade chronic inflammation pathology matches as seemingly disparate as cancer or obesity, which share energy metabolism as pathogenic scene. The potential of Hibiscus sabdariffa L. to protect against inflammatory metabolic disturbances has been previously reported.

Methods: In this study, we have evaluated the effect of the phenolic extract from HS (PEHS) on triglyceride accumulation, oxidative stress and adipokine secretion in hypertrophic adipocytes. A bioavailability study was performed in rats, determining the PEHS major metabolites. Finally, we assessed the ability of HS polyphenols to modulate hepatic metabolism and microRNA expression in diet-induced fatty liver disease in hyperlipidemic mice model.

Results: PEHS showed a decreased triglyceride accumulation, adipocyte size, ROS generation and adipokines, especially MCP-1 and leptin in hypertrophic/insulin-resistant adipocytes grown in high glucose conditions. Increased expression of MCP-1 in adipocytes transfected with an MCP-1 enhancer and stimulated with TNF-alpha was regulated by PEHS. Seventeen polyphenols and metabolites were detected in plasma samples rats, after oral acute administration of PEHS. Flavonol-conjugated forms were the most representative as measured by HPLC-ESI-TOF-MS. Experiments performed in hyperlipidemic mice model shown that quercetin 3-O-beta-D-glucuronide accumulated in small intestine, liver immune cells and hepatic lipid droplets through immunohistochemistry. The allocation of these metabolites in cells associated with the immune and inflammatory functions suggests that macrophages may be a specific goal of polyphenols and also a link with its antioxidant and anti-inflammatory actions. In this model, HS polyphenols decreased postprandial glucose level and hepatic lipids together with a significant increase in PPAR-alpha mRNA expression. The high-fat diet induced overexpression of miR-103 and miR-107 was totally reversed by the continuous administration of polyphenols.

Conclusions: Plant-derived polyphenols may prevent and/or attenuate the metabolic effects of high fat diet. The use of plant-derived polyphenols might open preventive measures against management of inflammatory diseases, using simple dietary recommendations.

Key words: flavonoids, epigenetics, MCP-1

PO285

EFFECTS OF VITAMIN C SUPPLEMENTATION ON SICKLE CELL DISEASE: A DOUBLE BLIND PLACEBO-CONTROLLED STUDY

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Background and objectives: In West African countries, sickle cell disease contributes the equivalent of 5% of under–five mortality. This rate can be reduced if more efforts are made to improve the general nutritional status of sickle cell patients. Fortunately, Vitamin C has been found to be very vital in improving and sustaining health. However, the vitamin C status of sickle cell patients has been found to be low. Objectives: To determine the effects of vitamin C supplementation on the blood pressure, body mass index and some blood count parameters in sickle cell patients.

Methods: A randomized double blind, placebo –controlled study. The treatment group was supplemented with 300mg of vitamin C per day and the control group was supplemented with placebo. Supplementation was for 3 months. The data of 30 subjects in the vitamin C group (18 SS and 12 SC genotypes) and 30 subjects in control group (18 SS and 12 SC genotypes) were analysed and discussed.

Results: There was a statistically significant increase in the mean MCHC of the subjects with SC genotype on vitamin C (from 29.61 to 31.32 g/dl) compared to those on placebo (from 30.44 to 28.5 g/dl) (P= 0.01). There was also a statistically significant reduction of the lymphocyte count of the subjects with SS genotype on vitamin C supplementation (from 4.2 to 3.0 ×109/L) by the end of the 3 months of supplementation (p=0.024).

Conclusions: Vitamin C supplementation therefore has some beneficial effects on some full blood count parameters of sickle cell patients. It is recommended that sickle cell patients are supplemented with at least 300mg of vitamin C in addition to other nutrient supplements.

Key words: Sickle cell disease, Vitamin C, Double blind, Placebo-controlled

PO286

IMPACT OF INTERVENTIONS BY CONSORTIUM FOR IMPROVING AGRICULTURE-BASED LIVELIHOODS IN CENTRAL AFRICA (CIALCA) ON FOOD AND NUTRIENT SECURITY OF FARMER-HOUSEHOLDS

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Background and objectives: In the past decades Democratic Republic of Congo (DRC), Rwanda and Burundi, were characterized by political instability, civil conflict and widespread poverty. This has interfered with the countries' food production and economic activities resulting in high levels of food and nutrient insecurity.

Methods: This was a cross-sectional survey to establish the impact of adopting products promoted by the Consortium for Improving Agriculture-based livelihoods in Central Africa (CIALCA) project on food and nutrient security. Multi-stage sampling was used to select 7 project mandate areas, 5 villages per mandate area (stratified into action, satellite and control sites) and 913 households. Structured questionnaires were administered and analysis of impact was based on comparison between stratums. Differences in means were tested by analysis of variance and significance of difference obtained by Tukey's HSD multiple rank tests.

Results: A majority of the households indicated consuming a sufficient quantity of food, although not of the desired type. Overall, the perception of adequate household food sufficiency received a higher rating in the action and satellite sites compared to the control sites. The dominant factor reported for improved food security was use of improved agricultural technologies. For the households that indicated worsened food security, majority (>60%) stated that this was due to climatic conditions. Although the proportion of households meeting their calorie RDIs in DRC and Burundi was higher in the action and satellite sites as compared to the control sites the difference was statistically insignificant. In Rwanda action and satellite sites had a lower proportion of households meeting their daily calorie RDIs but again this difference insignificant.

Conclusions: Overall, majority (53%) of respondents in the control sites indicated a decrease in intake of protein rich foods over the past three years, which was significantly higher than the proportion of households in the action (46%) and satellite (41%) sites.

Key words: food intake, food security

PO288

SOLAR-POWERED DRIP IRRIGATION CONTRIBUTES TO IMPROVED HOUSEHOLD FOOD PRODUCTION AND CONSUMPTION, AND FEMALE EMPOWERMENT

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Background and objectives: Food insecurity is in about 29% of rural households in Benin and malnutrition particularly micronutrient deficiencies contributes significantly to high rates of maternal and child mortality. This study measured the impact of solar-powered drip irrigation (PVDI) systems on household food production and consumption, and women empowerment in the Kalalé district.

Methods: In 2007 PVDI systems were installed with local women's agricultural groups engaged in horticulture as a strategy to increase and ensure year-round availability and for enhancing food security. Results were compared with other women groups in other villages and random samples of households in the same villages. Household surveys were conducted before and 1-year after implementation to evaluate the impact of the PVDI systems in 244 and 286 households respectively.

Results: The percentage of households who grew vegetables and fruit increased, 14% and 200%, respectively, when they had access to PVDI compared with other households in the same villages (-20% for vegetables and 55% for fruit). Daily consumption of vegetables and fruits during the hunger season (dry season) also increased by 42% in women groups who used PVDI systems compared with a decrease in daily consumption in other women's groups and households. Women empowerment in household spending and purchasing improved: 77% of PVDI women's groups used most of their income on food and household expenses at baseline. Afterwards, 62% of women in PVDI households had access to the income and 80% used this income on health care, education, livestock, and microenterprises.

Conclusions: The study indicated that PVDI has the potential to improve household food production and consumption and consequently to enhance household food security of all household members. These changes occurred with minimal nutrition education which could further enhance consumption and decrease food insecurity.

Key words: solar-power drip irrigation, food production, consumption, food insecurity, women empowerment.

PO289

PROGRAMMING OF LIVER GENE EXPRESSION BY GESTATIONAL EXPOSURE TO FOLIC ACID /VITAMIN B12 IMBALANCE

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Background and objectives: Developmental programming suggests that changes in environment during development can program metabolic response later in life and increase risk for chronic disease. Food fortification with folic acid has increased folate intakes of Canadians, however there is concern regarding vitamin B12 status. Around 5% of Canadian women are vitamin B12 deficient. This is concerning because an association between gestational exposure to high maternal folate and low vitamin B12 status with greater adiposity and insulin resistance in children has been reported. We examined the effect of gestational exposure to maternal folic acid/vitamin B12 imbalance on programming of liver gene expression.

Methods: Female C57BL/6 mice were fed a high folic acid/adequate vitamin B12 (HFA+B12), high folic acid/no vitamin B12 (HFA-B12), or control (adequate folic acid/vitamin B12) diet 6 weeks prior to mating and through pregnancy and lactation (n=6-8 mice/group). At weaning, the offspring mice were randomly assigned to receive the control diet or a Western diet (45% fat, 35% carbohydrate) for 20 weeks (n=5-6 mice/group). We quantified mRNA expression by real-time PCR of key enzymes in methyl nutrient metabolism in liver from adult male offspring: Mtr (encodes methionine synthase), Mat1a (encodes methionine adenosyltransferase) and Cbs (encodes cystathionine â-synthase). Data were analyzed by two-way ANOVA.

Results: Offspring mice with gestational exposure to maternal HFA-B12 had lower Cbs mRNA expression ($P<0.05$) and this was unaffected by postweaning diet. Offspring mice fed the Western diet had higher Mtr mRNA expression ($P<0.05$) compared to control-fed mice, regardless of gestational maternal diet. No effect of gestational and postweaning diet on Mat1a expression was observed.

Conclusions: Our findings suggest that gestational exposure to maternal folic acid/vitamin B12 imbalance programs Cbs mRNA expression in liver of adult male offspring.

Key words: Folic acid; Vitamin B12; Developmental programming; Cystathionine â-synthase; Methionine synthase.

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PO290

INFLUENCE OF FEEDING, PARENTAL ANTHROPOMETRY, SOCIO-CULTURAL AND PERINATAL ASPECTS ON INFANT BODY SIZE IN SPAIN

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Background and objectives: Infant growth during the first months of life is a sensitive indicator of early health status, as a result of the continuous interaction between heredity and environment, and it may be also a predictor of long-term outcome. We aimed to study the influence of nutritional, socio-cultural and perinatal aspects on infant body size at 12 months of age in Spain.

Methods: The sample included a cohort of 1.602 infants (48.3% females) born in Northern Spain during 2009. Multivariate regression analyses were used to determine the variables associated with child anthropometry at 12 months of age. Five levels were selected for the analyses: Level 1 (smoking during pregnancy), level 2 (parity, maternal age, maternal educational level and maternal origin), level 3 (paternal BMI, maternal BMI and maternal weight gain during pregnancy), level 4 (gestational age, sex, length and birth weight) and level 5 (breastfeeding during first 4 months).

Results: Adjusted for gestational age and sex, the factors significantly associated with higher weight and length at one year of age were: to be born to immigrant mother (315.20 g and 0.73 cm; p=0.002), higher maternal weight gain during pregnancy (p<0.01), formula feeding (compared with exclusively breastfeeding during the first 4 months) (142.19 g and 0.46 cm; p<0.05) and higher newborn length (p<0.001). Variables like newborn weight, maternal BMI and maternal educational level were also associated with infant weight at 12 months of age.

Conclusions: Maternal education level, maternal origin, maternal BMI, maternal weight gain during pregnancy, newborn anthropometry and infant feeding are all factors that independently influence infant body size in Northern Spain at the end of the first year of life.

Key words: Growth, infant, breastfeeding.

PO291

VALUE CHAIN ANALYSIS FOR NUTRITION: A METHODOLOGICAL CASE STUDY OF THE FRUIT AND VEGETABLE SECTOR IN FIJI

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Background and objectives: Low quality diets among the poor are a major challenge to both health and development and are driven by lack of access to a diverse, nutrient-rich, and acceptable food supply. Value chain analysis (VCA) has been proposed to support the identification of solutions to food supply problems, however little evidence of its utility for this purpose exists. The objectives of this case study were to determine how fruit and vegetable value chains in Fiji – where poor diets and high rates of diet-related disease have been identified – contribute to product accessibility and acceptability in urban areas and to assess the benefit of VCA in identifying opportunities for intervention.

Methods: Eight focus groups with urban consumers established what attributes are valued in fruit and vegetables and four workshops with chain actors and stakeholders were facilitated to map three exemplar value chains. The performance of these chains in respect to their ability to deliver consumer-defined value was then explored through observations and interviews with chain actors. Data were collected in English, Fijian, and Hindi and analysed in Nvivo using thematic analysis.

Results: Urban consumers are highly motivated to consume fresh, local fruits and vegetables, but find the supply to be poor quality and often unaffordable. A number of value chain characteristics contribute to these supply challenges, particularly poor infrastructure (e.g. roads and water supplies), strained relationships between chain actors, sub-optimal post-harvest handling and storage, and limited access to agricultural inputs. The extent of these challenges was found to vary by chain type: short-length, medium-length, and export-oriented.

Conclusions: This case study identified multiple points in the exemplar chains where targeted intervention could lead to increased accessibility and acceptability. In doing so, the findings suggest VCA as a beneficial tool for identifying solutions to poor quality diets.

Key words: Value chain analysis

PO292

ASSOCIATION BETWEEN MEDITERRANEAN DIET QUALITY INDEX (MDQI) AND SERUM LIPID PROFILE IN CROATIAN WOMEN

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Background and objectives: Potential positive effect on plasma lipid profile could be one of the benefits of following Mediterranean diet (MD). Therefore, the objective was to evaluate diet by Mediterranean Diet Quality Index (MDQI) and correlate it with the serum lipid profile (triglycerides, total cholesterol, LDL and HDL cholesterol) in women from the continental part of the Croatia.

Methods: MDQI, a qualitative method to evaluate MD, was computed using dietary data collected from 237 women aged 30-70. The dietary method used was 24-hour recall carried out in three different seasons during one year. Anthropometric parameters and serum lipid profile were assessed by a standard laboratory method.

Results: There was no observed significant difference in total MDQI score between groups, but was observed in some of the MDQI categories: cereal (p=0,041) and cholesterol (p=0,003) intake. More than 50% of the women in both group (67,7% fertile and 66% menopausal) are categorised in medium-poor group (MDQI score 8-10). Positive correlation was obtained between triglycerides and fish intake (p=0,026); cholesterol and meat intake (p=0,001), and BMI and fish intake (p=0,030) within fertile women group. Within group of menopausal women significant positive correlation was observed between HDL and cereal intake (p=0,037), and negative between HDL and intake of fruit and vegetables (p=0,022).

Conclusions: Correlation between MDQI total score and lipid profile parameters were not established in observed population. The difference between participants age and menopausal status may be one of the reasons for this result. The influence of estrogen status of the women in this sample could have significant impact on the serum lipid profile, although exclusion criteria for participants were diseases that could affect lipid profile. For the future study more uniform sample according the age and menopausal status should be included.

Key words: women, Mediterranean Diet Quality Index (MDQI), serum lipid profile

PO293

PREDICTORS OF TOLERANCE TO ENTERAL FEEDING IN CRITICALLY ILL PATIENTS

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Background and objectives: Patients in the critical care units are under acute stress having metabolic changes and increasing their energy demands, that is why specialized nutritional support is required in order to cover the different energy demands in this stage, and it´s known that enteral nutrition support is the first option as long as there is no contraindication for its prescription. The use of indicators that will help identify patients who will not tolerate enteral feeding before it´s started might be a strategy which will reduce the time needed to reach energy goals and maintain the nutritional status.

Methods: Tolerance to enteral feeding was measured in 38 patients in this study, 20 patients were intolerant and 18 tolerated diet well, demographic, biochemical, hemodynamic and metabolic variables were used in order to predict the intolerance. Positive likelihood ratios were used, 4 variables were statistically significant for the prediction of intolerance to enteral feeding, these were: the diagnosis of sepsis, risk of refeeding syndrome, PEEP (Positive End Expiratory Pressure) >10 cm and serum glucose >200 mg/dl;

Results: the probability posttest increase from a 40% in the pretest to 65% for sepsis diagnosis, 50% for risk of refeeding syndrome, 78% for PEEP >10 cm and 72% for serum glucose >200 mg/dl in the posttest. Being PEEP >10 cm and Serum Glucose >200 mg/dl the variables with the highest statistical power.

Conclusions: Sensitivity was 70% and specificity was 94% for PEEP > 10 cm while a sensitivity of 80% and specificity of 94% to serum glucose > 200 mg/dl, making these two variables great predictors to enteral feeding tolerance in UCI patients.

Key words: critical illness, enteral nutrition, nutrition tolerance

PO294

MAPPING BIODIVERSITY FOR FOOD SECURITY IN RUDEWA MBUYUNI VILLAGE KILOSA DISTRICT, TANZANIA

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Background and objectives: The number and variability of living organisms in an ecosystem contribute to many constituents of human well being including food, water, medicine and oxygen. The biodiversity of natural systems provide safety net and benefits to poor rural communities in terms of food and nutrition security and access to medicinal products. Do we know how many food plants species are available in a given area? Objective: to identify and map out various species of plants, trees, animal, birds and insects that are of food value in Rudewa Mbuyuni village in Kilosa district, Tanzania.

Methods: mapping plots were laid systematically in an interval of 250m between plots. Geo-referenced top map of the village and geographic coordinates in LTM system were selected randomly at an interval of 250m apart forming a square matrix of 250m inter plot distance and 250m intra-transect distance, hence a sampling intensity and a transect of 20m x 20m was established. All plants and animal species were identified and both scientific and local names listed by researchers and local facilitators, including information about local uses and economic importance of species was recorded.

Results: a total of 257 plant species belonging to 61 families were identified an indication that the area is rich and diverse in plants and animals. Out of the 257 species, 98 species are edible. A total of 46 insect species from 19 different families were observed. Also 102 species of birds from 45 different families were identified, indicating a high diversity of birds.

Conclusions: There is a diverse of plants and animals in the study area and most of them are edible but underutilized. Hence there is potential for improving food security in the area through the utilization of the available of species of plants and animals.

Key words: mapping biodiversity species food security

PO295

INTERACTIONS BETWEEN ZN, FE AND MG IN CRITICAL CARE PATIENT

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Background and objectives: Minerals like Zn, Fe and Mg are essential nutrients for the cellular integrity. The lack of one or more of them may determine the big disorder on cell metabolism all this inducing dysfunction of multiples organs which is common in hypercatabolic critically ill patient. Objective: To assess the status of Zn, Fe and Mg in a group of ICU patients.

Methods: Multicentre observational study of 40 critically ill subjects, with mean age 58 from Granada area, Spain. Zn, Fe and Mg were analyzed by AAS in blood cells samples which were previously wet mineralized.

Results: Zinc intake is 7.8 ± 4.9, Mg 172.5 ± 110.2, Fe 7.74 ± 6.3 (mg/d). Mean of Zn in whole blood was 0.43 ± 0.17 mg/dL in final of ICU period. In case of cellular Mg and Fe after 7 days of ICU period the mean values is 2.5 ± 2.1 mg/dL, 59.7 ± 30.3 mg/dL respectively. The results show statistical significance according whit Mg levels in blood cells at the end of the period monitored in critically ill patients ($p = 0.033$), showing that patients with Mg deficiency, have 5.5 times more risk to suffer zinc deficiency.

Conclusions: According to the results, the patients have no sufficient intake of Mg being necessary a nutritional assessment during ICU stay to know the status of minerals such as Zn, Fe and Mg which are key for critical ill patients avoiding gaps that may worsen their evolution.

Key words: Magnesium, Zinc, Iron. Mineral status, Critical Care Patient.

PO296

ANEMIA REDUCTION IN CHILDREN LIVING IN A MALARIA-ENDEMIC REGION OF TANZANIA

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Background and objectives: If iron containing supplements are distributed in malaria endemic areas, the WHO recommends that malaria monitoring and treatment accompany supplement distribution. Hypothesis: Education regarding prompt treatment for malaria and malaria screening will allow safe supplementation with iron. The objectives of two studies were to determine if an iron-containing supplement could reduce anemia without increasing malaria in rural areas with basic medical care.

Methods: The first study determined whether 2.5 mg of iron as ferric EDTA and 2.5 mg of iron as ferrous lactate was as effective in correcting anemia as 10 mg of iron as ferrous lactate. Moderately anemic children 6 - 36 mo (N = 69 and 70) had baseline hemoglobins (Hb) of 7.0 – 9.1 g Hb/dl and received one of two micronutrient supplements differing only in iron content and source.

Results: Both supplements improved Hb status ($p < 0.05$) equally ($p > 0.95$) and the average Hb concentration improved from 8.30 ± 0.60 g/dl to 11.08 ± 1.25 g/dl upon consumption of the supplements for 60 days. Malaria incidence (10.0 to 10.4%) did not change with iron supplementation. The second study provided the low-dose iron supplement to > 4,000 children. Only 10% of the children (453) were monitored for changes in Hb and malaria. The baseline Hb was 9.72 ± 0.93 g/dl and after consuming the supplement for 60 days, the average Hb concentration increased to 10.96 ± 0.88 g/dl ($p < 0.05$). Malaria incidence (10.4 to 10.6%) did not change.

Conclusions: iron containing supplements can be safely utilized in malaria endemic areas to alleviate anemia and other "hidden, sub-clinical nutrient deficiencies" if village health attendants and parent's are educated regarding the importance of malaria monitoring and treatment. The Heinz Company Foundation provided the micronutrient supplements and funds for the studies.

Key words: anemia, malaria, ferric-EDTA

PO297

VITAMINS SERUM CONCENTRATIONS' ARE ASSOCIATED WITH BLOOD PRESSURE LEVELS IN EUROPEAN ADOLESCENTS. THE HELENA STUDY

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Background and objectives: Previous research showed that vitamins status may be involved in the early stages of many chronic diseases development, like hypertension. The objective is to analyze the potential association between vitamins (antioxidant vitamins, hidrosoluble vitamins and vitamin D) serum concentrations and blood pressure (BP) in European adolescents. Patients and

Methods: Participants from the Healthy Lifestyle in Europe by Nutrition in Adolescence cross-sectional study (HELENA-CSS) (n = 1,089; 12.5–17.5 yr; 580 girls) were selected by complex sampling. The associations between vitamins serum concentrations (vitamin A, vitamin B6, vitamin B9, vitamin B12, vitamin C, vitamin D) and BP were examined by multilevel linear regression models (school as context variable), the analysis were stratified by sex and adjusted by contextual and individual potential confounders.

Results: In girls, we found a positive association between red blood cell folate concentration and systolic BP (β= 3.19; CI 95%= 0.61 – 5.77), although no association between the vitamins serum concentration biomarkers and diastolic BP was found. In boys, retinol was positively associated with diastolic BP (β= 3.84; CI 95%= 0.51 - 7.17) and vitamin B6 was positively associated with systolic BP (β= 3.82; CI 95%= 1.46 - 6.18). In contrast, holo-transcobalamin was inversely associated with systolic BP (β= -3.74; CI 95%= -7.28 - -0.21).

Conclusions: RBC-folate and vitamin B6 serum concentrations may impact BP in adolescents. Programs aiming to prevent high blood pressure levels should promote consumption

of vegetable proteins and foods rich in vitamin B12 i.e. white meat and eggs, which may help to blood pressure control in adolescents.

Key words: iron; vitamins; blood pressure; adolescents; multilevel analysis.

PO298

HEALTH ECONOMIC MODEL FOR ASSESSING THE IMPACT OF HIGH BIRTH WEIGHT ON PUBLIC HEALTH

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Background and objectives: Inspite of the general interest in the impact of overweight and obesity on public health, little is known about the impact of being large for gestational age (LGA, >90th centile), or being macrosomic (birth weight >4,000g); both conditions are related to maternal obesity and/or gestational diabetes and associated with increased morbidity for mother and child. Macrosomic infants have a higher risk of developing obesity and type 2 diabetes mellitus (T2DM) in later life. The objective of our study is to assess the health-economic impact of macrosomia.

Methods: A decision analytical model was designed to estimate the health-economic impact of macrosomia, including both short- and long-term consequences. Options for performing different base-case analyses and various scenario analyses are incorporated.

Results: Maternal obesity, excessive maternal weight gain and poorly controlled diabetes during pregnancy are associated with intermittent periods of fetal exposure to hyperglycemia and subsequent hyperinsulinemia. This acts as a fetal growth hormone, particularly leading to increased body adiposity and glycogen storage in the liver. This first analysis shows the health-economic consequences of macrosomia. Details of cost per case and outcomes of a budget impact analysis will be presented.

Conclusions: Overweight and obesity are of concern in the general population, affecting increasing numbers of women of child-bearing age. Subsequent macrosomia and associated complications for mother and child are included in our model, considering both short- and long-term consequences. It allows for the mapping of the related health-economic burden and indicates that the annual budgetary impact of macrosomia could be substantial. The current core-model offers a template for further health technology assessments to determine the cost-effectiveness of preventive educational interventions on life style, diet and physical activity to reduce the short- and long-term public health consequences of macrosomia.

Key words: macrosomia, overweight, health economic modeling, healthcare costs

PO299

BODY MASS INDEX AND WAIST CIRCUMFERENCES: HOW EFFECTS THE DISEASE RISK OF NORTHERN CYPRUS ADULTS?

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Background and objectives: All overweight and obese adults considered at risk for diseases such as hypertension, type 2 diabetes, cardiovascular disease. This study was planned to observe the risk of these diseases according to body mass index (BMI) and waist circumferences of people living in Turkish Republic of Northern Cyprus (TRNC)

Methods: The study involved 1740 subjects (738 male, 1002 female) from 19 to 65 years old, who were selected to constitute a representative TRNC population as a whole between June-July 2012. Anthropometric measurements (BMI and waist circumference) were obtained using standardized techniques and equipment. Abdominal obesity (AO) was considered a waist circumference of >102 cm in men and >88 cm in women. Disease risk was evaluated according to classification of BMI and waist circumferences which has been defined by World Health Organization.

Results: Mean waist circumferences were 96.7±14.1 cm in men and 87.6±15.1 cm in women. In addition, the percentages of AO were assessed 36.6% for total, 31.0% for males and 45.1% for females. When disease risk was determined according to BMI and waist circumferences, percentages of the population who had increase, high, very high and extremely high disease risk were 20.6%, 15.9%, 20.8% and 2.5%, respectively. While 30.9% of males had increase, 34.4% had the sum of high, very high and extremely high disease risk. Also, 13.1% of females had increase and 43.0% had high disease risk. It was determined that males (65.3%) were under higher disease risk than females (56.1%).

Conclusions: Consequently, approximately 1/3 of TRNC. population are under the disease risk due to overweight, obesity, abdominal obesity and this risk increases rapidly for men day by day. Therefore, to prevent obesity and its comorbidities national nutritional programs should be improved and males attendance these programs could be more beneficial.

Key words: body mass index, abdominal obesity

PO300

THE FAMILY AS AN AGENT FOR CHANGE IN EATING HABITS AND OBESITY IN GRADE 2-3 SCHOOLCHILDREN

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Background and objectives: The prevalence of obesity is increasing worldwide and in Israel. Our study tests a new educational approach through a controlled school-based trial to achieve an improvement in eating habits and reduced obesity in Grades 2-3.

Methods: A cluster randomized controlled trial allocated 4 elementary schools to intervention or control groups. This allocation was switched with the next cohort of children. Recruitment was in first grade, randomization at the beginning of second grade, evaluation of

Methods: end of second grade and the beginning of third grade Intervention: 5 joint parent-children classroom activities on nutritional topics and 5 educational workshops for parents only. Alfred Adler's concepts were the guiding principles. Subjects: of 743 children in 23 second grade classes, parents provided informed consent for 508 (68%), and for the third grade follow-up 432 (58%).

Results: At the end of 2nd grade, the intervention group compared with the control group reported significantly increased intake of fruits, vegetables and high protein foods, and reduced sweets and munched snacks. By the 3rd grade the variety of protein-rich foods had increased in the intervention classes, and sweets and munched snacks declined. No differences in meal patterns were noted except for eating breakfast. From individual observations of food brought for the ten o'clock snack at the end of the 2nd grade, the intervention group showed a significantly higher intake of water, whole-wheat bread sandwiches, protein-rich spreads, vegetables, and a decline in candy snacks and sweetened sandwich spreads. The intervention group showed better height and BMI measures at the end of second grade and waist circumference in the 3rd grade.

Conclusions: There were encouraging changes in eating habits and in anthropometric measurements. To maintain changes over longer periods, refreshing these nutrition themes annually in school using the model is required

Key words: childhood obesity, nutrition intervention.

PO301

PHYSICAL FITNESS REFERENCE STANDARD IN EUROPEAN CHILDREN: THE IDEFICS STUDY

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Background and objectives: Reference standards of physical fitness in European adolescents have been published (HELENA study; 12.5-17.5 yrs). However, there are no data on children from large and representative samples. The IDEFICS study provides a golden opportunity to establish normative values of a large set of fitness components from eight European countries using common and well-standardized methods of measurement. We aim to report sex- and- age specific fitness levels in European children aged 6-9 yrs.

Methods: A cohort of 16,224 children aged 2-9 yrs. met the IDEFICS inclusion criteria: complete data on weight, height and age. Fitness was measured in children 6-9 yrs (N= 7,385; 50.5 % girls). Cardiorespiratory fitness [20m shuttle run (stage)], coordination/equilibrium [flamingo balance (attempts/min)], flexibility [back-saver sit and reach (cm)], speed [40m

sprint (sec)] and strength [handgrip (kg), standing long jump (cm)] were measured. Sex -and age- specific normative values for physical fitness in European children were derived by using the LMS statistical method as tabulated percentiles from 10 to 100 and as smoothed centile curves (P5, P25, P50, P75 and P95).

Results: The results (showed as mean values, boys \\ girls) showed that boys performed better in cardiorespiratory fitness (2.8 \\ 2.4), strength (handgrip: 11.7 \\ 10.5; standing long jump: 111.0 \\ 102.3) and speed (9.2 \\ 9.5), while females performed better in coordination/equilibrium (9 \\ 7) and flexibility (19.0 \\ 21.4). A trend towards increased physical fitness with age in both sexes was observed, except for the flexibility test (in boys remained stable and in girls it decreased with age). Sex-and-age specific tabulated percentile values and centile curves were provided to be used as reference values for this population.

Conclusions: The present data will enable evaluation and correct interpretation of European children's fitness status from 6 to 9 yrs.

Key words: fitness, childhood, percentiles

PO302

COMMUNITY BASED INTERVENTION IMPROVES INFANT FEEDING PRACTICES IN BETHLEHEM VILLAGES

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Background and objectives: Infant feeding practices are critically important for children's growth and development. Sub-optimal feeding practices are known to be prevalent in Bethlehem villages. The objectives of this study were to assess mothers' knowledge and practices regarding infant feeding and to evaluate the effectiveness of Timed , Targeted Counseling (TTC) in improving these practices.

Methods: An intervention study was carried out in four villages surrounding Bethlehem. All mothers (n=118) of infants born during March , April 2011 were identified by Community Health Workers (CHWs) and randomly assigned to intervention (n=66) and comparison (n=52) groups. The CHWs targeted the intervention group with key messages and support for positive infant feeding practices during home-visits (TTC) throughout 16 month. The comparison group were not exposed to any messages but were visited only for data collection such as disease incidence. Baseline and end-line data were collected from both groups through household interviews .

Results: Infant feeding practices were significantly improved in the intervention group after the intervention; exclusive breastfeeding until 6 months increased from 27.3% to 69.7% (P <0.001), duration of breastfeeding above 1 year increased from 56.1 to 83.3% (P <0.001),timely introduction of the complementary meals increased from 38.5% 66.7% (P <0.001) and offering the minimum meal diversity increased from 16.7% to 22.7%. No significant changes were seen among the comparison group. During the study period there were fewer reported disease episodes in the intervention versus comparison group for diarrhea (10 vs. 25 cases), respiratory illness (15 vs. 33), common cold (39 vs. 50), fever (20 vs. 31) and ear infections (7 vs. 32).

Conclusions: The TTC approach has positively influenced infant feeding practices in Bethlehem villages. Scale up plans for TTC, integrated with early childhood stimulation component, is envisioned.

Key words: Timed and targeted counseling, Community health workers, Infant feeding practices.

PO303

PACIFIC KIDS DASH FOR HEALTH (PACDASH) TAILORED MULTILEVEL INTERVENTION FOR PREVENTION OF OBESITY AND ELEVATED BLOOD PRESSURE AMONG MULTIETHNIC CHILDREN.

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Background and objectives: The PacDASH intervention program provided tailored information to children according to stage of readiness to change and self-efficacy in order to improve fruit and vegetable intake and physical activity level, and to prevent obesity and elevated blood pressure.

Methods: The randomized two-arm program (intervention, n=41; and usual care, n=44) was given to children (BMI from the 50-99th percentile according to CDC reference data) from a health care maintenance organization (intervention, n=41; usual care, n=44). Targeted recommendations were provided to child, parent and health care provider (latter at baseline only) at baseline, 3, 6 and 9 months, along with monthly supportive mailings and tested for effect on BMI, DXA body composition, and blood pressure.

Results: Child (n=85; 62.3% female; mean age=7.1, SD=0.95; 43.5% Asian, 28.2% Native Hawaiian or Other Pacific Islander, 21.2% White, and 7.1% Other ethnicity) outcomes were modeled across 9 months (62 children at endpoint, 33 intervention, 29 usual care) using mixed linear regression, adjusted for age, sex and ethnicity. All children in the program experienced a constant BMI z-score of 1.30 (SD=0.72) from baseline to 9 months (p=0.97). Diastolic blood pressure percentile increa-

sed in both study groups, to a greater degree in the usual care group, with a 12 percentile point difference in change between groups by 9 months (p=0.01). There was no change in systolic blood pressure percentile (mean=31, SD=23).

Conclusions: The intervention had a protective effect on diastolic blood pressure, and held expected weight gain constant across the 9 month study time period.

Key words: child obesity blood pressure ethnicity intervention

PO304

NEW ZEALAND GREEN-LIPPED MUSSELS (PERNA CANALICULUS) ENHANCE NON-HAEM IRON ABSORPTION WHEN PROVIDED AS A SINGLE DOSE IN MICE

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Background and objectives: Non-haem iron bioavailability is affected by the nutritional composition of a meal. Like red meat, New Zealand green-lipped mussels (NZGLM) have been reported to improve non-haem iron absorption from a second dietary iron source in vitro. Objectives: To investigate whether NZGLM enhance non-haem iron absorption compared to egg albumin, (a negative control) or ascorbic acid (a positive control) in iron-deficient mice, and to investigate the effects of repeated exposure to NZGLM extract on iron uptake from a single iron dose.

Methods: 6 week-old male Swiss mice were maintained on a low-iron diet (5ppm) supplemented with or without NZGLM extract (3.3% w/w) ad libitum for 2 weeks. Fasted mice were provided with a single dose of ascorbic acid, NZGLM or egg albumin combined with 59FeCl2 radionuclide and 56FeCl2 by gavage after a 12 hour fast. Control and NZGLM-supplemented diets were re-introduced ad libitum for 4 days. Iron loading was determined by measuring the incorporation of radiolabelled iron into whole blood and the small intestine.

Results: Ascorbic acid enhanced blood and small intestinal iron loading by 140% (P=0.01) and 144% (P=0.0005) respectively compared to egg albumin. NZGLM enhanced blood and small intestinal iron loading by 148% (P=0.002) and 128% (P=0.035) respectively compared to egg albumin in mice raised on the NZGLM-free diet. Blood iron loading and small intestinal iron loading were reduced by 22% (P=0.009) and 25% (P=0.015) respectively in mice repeatedly exposed to the NZGLM extract compared to mice maintained on the control diet.

Conclusions: NZGLM enhance blood and small intestinal iron loading with a similar magnitude to ascorbic acid when provided as a single dose to iron deficient mice. This result is similar to that reported in vitro. Repeated exposure to NZGLM extract for 18 days significantly reduces iron uptake from a single iron dose.

Key words: Iron, meat, mussel

PO305

NUTRITION OUTREACH THROUGH COMMUNITY EVENTS IN THE BLOGOSPHERE: THE NUTRITION CARNIVAL EXPERIENCE

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Background and objectives: During 2012 there was an outreach initiative based on collaboration between Health and Nutrition blogs. This kind of community event is known in the blogosphere as 'Carnival', has been common in other scientific disciplines such as Physics (38th edition), Chemistry (22th edition) and Biology (20th edition). Two Nutrition Carnival editions were held (May and October 2012). In this events different bloggers analyze and propose their visions of a predefined theme. This study analyzes the content and impact of the event in order to find out if it is a good outreach tool in Health and Nutrition sciences.

Methods: Descriptive study of the texts generated, a review was conducted of participants post and a statistical analysis of the impact of the event.

Results: 72 post were analyzed. The topics covered were 'Children's food education' and 'Nutrition Myths'. According to the writers are essential in food education factors as: family (88.2%), school (26.5%) school meals (14.7%) and play an essential role: family (41.2%), dietitians (20.6%) and medical personnel (17.6%). The most common nutritional myths were the properties of specific foods (50%) and weight loss information (36.8%). The two host blogs registered 71,301 visits during the month of celebration, and the official pages of both editions have 3,556 registered outbound links. The participants articles have been shared on social networks 3714 times until January 2013. There were a total of 589 comments, visitors shared personal experiences and asked questions reflecting the importance and usefulness of the event.

Conclusions: Outreach events in the blogosphere conducted by professionals can be a great alternative to broadcast

scientific evidence and to bring information to the population, promoting healthy practices, preventing unhealthy habits, generating discussion areas and resolving the gap between theory and practice.

Key words: Nutrition, Dietetics, Public health, food education, Internet.

PO306

UNVEILING THE PROPORTIONAL MORTALITY OF FOOD-RELATED AND NUTRITION-RELATED DISEASES. VENEZUELA: 1938-1998

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Background and objectives: Abundant epidemiological evidence has been accumulated on the direct association between food, nutrition and development of communicable and non-communicable diseases. However, this would be the first study to analyze the proportional mortality related with food and nutrition (PMFN) in a long-term trend for a developing country.

Methods: Data from national registry is collected and analyzed in order to show PMFN of the top 5, 25 and 27 causes of death in Venezuela since 1938 to 1998 and the principal causes by sex since 1950 to 1998.

Results: PMFN was increasing rapidly: 10.63% in 1938 (top 5), 28.38% in 1950 (top 27) and 62.43% in 1998 (top 25). The top three causes were changing from diarrhoea and gastroenteritis of presumed infectious origin (ICD-10: A09), tuberculosis (A15-A19) and pneumonia (J12-J18) in 1938 to A09, A15-A19 and certain conditions originating in perinatal period (PO0-P96) in 1950 and finally, heart diseases (I05-I09, I11, I13, I21-I51), neoplasms (C00-D48) and accidents (V01–X59) in 1998. Between men and women order and speed of movement of causes were different. Male: 22.52% to 52.81% for 1950 and 1998 (top 10), went on to die of A09, PO0-P96 and tuberculosis to heart diseases, neoplasms and accidents. Female: 24.54% to 65.62% for 1950 and 1998 (top 10) went on to die of A09, tuberculosis and neoplasms to heart diseases, neoplasms and cerebrovascular diseases (I60–I69). A considerable proportion of deaths could be related to PMFN, however, percentage that those deaths represent is still to be determined and also their real weight.

Conclusions: Study of mortality related to food and nutrition should not be limited only to what is contemplated in subgroup nutritional deficiencies (E40-E64) or diabetes (E10-E14) for example, since it would incur in underestimation of impact of food-nutrition on disease development.

Key words: Nutrition; mortality; Venezuela.

PO307

BIOACTIVE COMPOUND AND FIBER AND CAROTENOIDS IN FLOUR LEAVES OF MORINGA OLEIFERA LAM

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Background and objectives: The Moringa oleifera Lam belongs to the family of Moringaceae, is native to northern India and grows in many countries of the tropics. With representative amounts of nutrients and countless popular uses due to its nutritional and pharmacological applications. The study of their physical and chemical characteristics allows its application in various food products and verification of its behavior toward various treatments used in processing is certainly an important aspect, however do not have well-known anti-nutritional characteristics, since these substances could alter the composition or its nutrients become unavailable, and cause adverse physiological effects. Objective - To determine the anti-nutritional substances flour leaves of Moringa, with emphasis on tannins, cyanogenic compounds, trypsin inhibitors, nitrate and oxalic acid, its crude fiber and determine the carotenóides.

Methods: For determination of tannins was the spectrophotometric (JOSLYN, 1990). The presence of compounds was assessed by testing cianogêncios Guignard (Montgomery 1969). Nitrates were determined by the colorimetric method of Cataldo et al. (1975) and oxalic acid titration method was used as described by AOAC (1990). The activity of trypsin inhibitors was determined by the method of Kakade et al. (1969), using BAPA (benzoyl-DL-arginine-p-nitroanilide) as a substrate. The determination of dietary fiber as AOAC (1990). Carotenoids as described by Rodriguez-Amaya (1999).

Results: In the analysis of antinutritional compounds were observed: tannins (20.69 mg / g), cyanogen (no), trypsin inhibitor (UTI 1.45 / mg), nitrate (17mg / g) and oxalic acid (10 5 mg / g), crude fiber content (10.99%), carotenoids were identified β-carotene and lutein, with concentrations of 161.0 and 47.0 respectively ?g.g-1 leaf.

Conclusions: These results suggest it becomes possible applicability of flour jug sheet feeding by low toxicity and significant amount of fiber and carotenoids.

Key words: Moringa oleifera, antinutrients, feeding, fibers and carotenoids.

PO308

EFFECTS OF CALCIUM AND VITAMIN D ON THE SERUM PTH AND ADIPONECTIN LEVELS IN GROWING RATS

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Background and objectives: Calcium and vitamin D deficiency are reported to associate with obesity and to induce inflammatory reactions as parathyroid hormone (PTH) increase. This study was conducted to investigate the effects of different levels of calcium and vitamin D intake on the serum PTH and adiponectin levels in growing rats.

Methods: Fifty six 5-week-old Sprague-Dawley male rats were divided into 7 groups and fed for 6 weeks: control (0.5% Ca, 1000IU VD), LCLD (0.05% Ca, 10IU VD), LCND (0.05% Ca, 1000IU VD), LCHD (0.05% Ca, 5000IU VD), HCLD (1.00% Ca, 10IU VD), HCND (1.00% Ca, 1000IU VD), HCHD (1.00% Ca, 5000IU VD). Serum intact parathyroid hormone (iPTH) and adiponectin were analyzed, and then the effects of Ca and vitamin D on each group were evaluated by two-way ANOVA.

Results: The concentrations of serum Ca were not significantly different among seven-groups, but the levels of serum 25(OH)D3 were higher in high vitamin D groups than the other groups ($p<0.001$). The serum adiponectin levels in high Ca or vitamin D groups were not significantly different compared with control and low groups. However, the serum iPTH in LCLD was the highest level among the other groups ($p<0.05$). The amount of internal fat and abdominal fat in the low calcium groups were higher than control and high calcium groups ($p=0.001$, $p<0.001$), moreover those fat amount was the highest in LCLD group. The amount of body fat was affected by calcium intake rather than vitamin D intake when analyzed by two-way ANOVA.

Conclusions: Low calcium intake may contribute to increase the serum iPTH level and body fat amount. However, vitamin D intake was showed low effect on the serum adiponectin level for 6 weeks.

Key words: calcium, 25(OH)D3, iPTH, adiponectin, body fat

PO309

CONSUMER BEHAVIOR REGARDING FOOD LABELLING INFORMATION IN THE CITY OF PETRÓPOLIS (RJ)

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Background and objectives: The nutrition labelling on foods for the promotion of healthy food is fundamental. The consumers get more information about what they are consuming through the product labels. Objective: To verify if the consumers have the habit to read and to know the information contained on the products labels.

Methods: transversal, observational, quantitative and descriptive study type. The consumers (154) were interviewed during shopping in supermarkets located in the Petrópolis through a questionnaire where the answers were related to the habit of reading labels and also according to sociodemographic variables.

Results: the majority of consumers were female and only 46% interwiwed had the habit of reading labels. It should that the older and more educated the consumers were, the interest for information increased. The most consulted items were the expiration date (39%) and price (27.8%). The nutritional information more consulted were the caloric value (28.1%) and sodium contents (26.7%). It was observed that the price also influences on the choice of products (35%), followed by the brand (28%). The most common reasons for not consulting the labels were lack of interest (44.3%) followed by the letter size on the label. (40.8%). The results showed that most consumers interviewed (84.4%) did not know the correct meaning of the terms light and diet.

Conclusions: This study showed the necessity to find a most clear form to present nutrition information to consumers enabling them to understand and make healthier decisions when choosing their products. It reinforced the need of nutrition education programs including food labelling, in order to enlighten and educate consumers about the importance of nutritional information contained on labels to avoid any misinterpretations about the products.

Key words: nutritional Information, food labeling, Light and Diet.

PO310

THE ROLE OF BILIRUBIN IN HUMAN HEALTH: IMPLICATIONS FOR OXIDATIVE STRESS-MEDIATED DISEASES

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Background and objectives: Bilirubin is the primary bile pigment which is formed during haem catabolism within the reticulo-endothelial system. Mostly unconjugated bilirubin (UCB) circulates in the plasma, the majority of which tightly bound to albumin, and is excreted by the liver to eventually enter the intestine. Epidemiological studies report a negative association between circulating UCB concentrations and the risk for cancer, cardiovascular and metabolic diseases. To further explore physiological effects of UCB, a human and an animal trial, along with a series of in vitro experiments were performed. The overall aim of this project was to investigate whether lower levels of oxidatively damaged DNA and chromosomal aberrations in hyperbilirubinemic humans and animals can be observed.

Methods: 76 age- and gender-matched individuals were allocated into Gilbert's syndrome (GS; UCB≥17μM; n=38) or controls groups (n=38). A hyperbilirubinemic rat model (Gunn rats) was selected to support the human trial, and included 40 rodents in total. Applied methods included the comet and micronucleus assay. In vitro experiments were performed to investigate anti-mutagenic and antioxidant properties of bile pigments and derivatives in the Salmonella reverse mutation assay, and DNA-damaging effects in human cancer cell lines in the comet assay. To obtain assistive mechanistic data, flow cytometry parameters were analyzed.

Results: The findings suggest DNA protection in epithelial tissue of older hyperbilirubinemic individuals. The significantly lower BMI found in the GS group might contribute to the prevention of cardiovascular diseases and could improve the health status in metabolic diseases. In vitro data suggest anti-mutagenic effects of bilirubin derivatives in the applied bacterial model, and DNA strand-breaks in human cancer cells.

Conclusions: This study suggests an indirect effect of elevated plasma UCB levels in protecting against metabolic diseases, and implies manifold beneficial in vitro properties of bile pigments.

Key words: Bilirubin, DNA damage, micronuclei, CVD

PO311

CLINICAL TRIAL FOR THE EVALUATION OF ANTI-HYPERTENSIVE EFFECTS OF SOLAR SALT PRODUCED IN KOREA

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Background and objectives: The study was performed for evaluating blood pressure(BP) and its biomarkers when Korean solar(sun-dried) salt (86% NaCl, SS) were administered as a daily condiment compared with refined salt(99% NaCl, RS) for 12 weeks.

Methods: Twenty-three female (20~65 yrs) volunteers were given SS (n=12) or RS (n=11) group. The subjects must consume at least 15 meals a week cooking with either salt. BP was checked morning and evening everyday for 12 weeks. Biomarkers measured at day 1, 4th and 12th week were electrolytes (Na+, K+, Cl-, Mg2+, Ca2+), aldosterone, renin and catecholamines in blood and urine.

Results: The morning systolic BP(SBP) in SS group tended to be lower than RS group without statistical significance. The evening SBP was slightly increased in both groups. The serum electrolytes did not change except for Ca+ level , which was increased in both groups at 12th week($p<0.05$). The urinary electrolytes showed similar tendency to blood, except that urinary Ca+ and K+ levels of SS group tended to be lower. Plasma aldosterone of both groups at 4th week were increased ($p<0.05$), but plasma rennin level did not change. Plasma norepinephrine level of RS group at 4th week was increased than that of day 1($p<0.001$) and epinephrine level of both groups were also increased at 4th week ($p<0.05$). However, SS group of norepinephrine and epinephrine levels tended to be lower than RS group. Urinary norepinephrine, epinephrine and dopamine levels were decreased in both groups after 12 weeks ($p<0.05$), but there were no significant differences between the groups.

Conclusions: Two types of salts exerted differently on blood pressure and its biomarkers. From the findings, it would be worthy to conduct more controlled clinical study since several biomarkers as well as blood pressure were compromised.

Key words: solar salt, refined salt, blood pressure, human clinical trial

PO312

PEN - THE GLOBAL RESOURCE FOR NUTRITION KNOWLEDGE TRANSLATION

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Background and objectives: Dietitians translate research into practice when applying the science of nutrition to the feeding and education of individuals or groups in health and disease. Maintaining currency is challenging when knowledge is constantly expanding. In 2005 Dietitians of Canada launched a dynamic knowledge translation subscription service called Practice-based Evidence in Nutrition (PEN) as a resource for dietitians, including those working in two Canadian provincial government call centres. Establishing international partnerships required modifying PEN processes of knowledge translation.

Methods: Collaborating authors from each global partner use protocols to identify, analyse and synthesise the evidence to create new or update existing practice questions, guidance summaries and client resources, the key components of PEN. While the evidence to develop these components comes from the international literature, global partners have customised PEN to take into account national reference documents e.g. nutrient reference values and dietary guidelines. Additional partners have meant enrichment in knowledge pathway content and usage data is helping to prioritise pathways for revision or development. Partners have used online tutorials, webinars and conference workshops to build capacity and maximise use by practitioners, and to encourage contribution to the PEN knowledge pool.

Results: As of February 2013 there were 169 knowledge pathways, 1044 practice questions and 3341 resources. Usage data indicates that client handouts are often accessed more than practice questions. Social media confirms the popularity of PEN with distribution to 10,000 first year PEN eNews subscribers and greater than 1000 followers on each of Facebook and Twitter. Universities report PEN as a tool to support student studies and for students to gain recognition by contributing to the global knowledge pool.

Conclusions: Problem solving and cooperation within the global partnership has enabled the development of PEN as a valuable international resource for practitioners.

Key words: research, social media, knowledge translation, partnerships

PO313

THE EFFECT OF AGE ON ATTITUDES OF POLISH GIRLS TO NUTRITION AND HEALTH. THE GEBA-HEALTH PROJECT

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Background and objectives: Individual attitudes change with age. No studies have been conducted to determine whether and to what extent attitudes towards nutrition and health presented by Polish girls change in adolescence and at maturity. The study aim was to analyze the effect of age on attitudes to nutrition and health presented by girls.

Methods: The research involved 232 girls aged 13-21 years. Attitudes to nutrition and health were assessed using the Health Concern Scale (HCS) and the Health Taste Attitude Scale (HTAS).

Results: In HCS neutral attitudes (score of 30-50points) were identified in 72% girls, negative attitudes (10-29points) in 19% girls, positive attitudes (51-70points) in 10% girls. In HTAS neutral attitudes (114-190points) were found in 93% girls, positive attitudes (191-266points) in 6% girls. No girl showed a negative attitude (38-113points). In girls aged 19-21 the odds ratio for attitudes classified in the upper-positive tercile for the subscales HTAS-1:interest-in-health was 2.97 (95%CI 1.24; 7.11), HTAS-3:natural-product was 2.91 (95%CI 1.28; 6.62), HTAS-6:pleasure was 3.60 (95%CI 1.56; 8.30), while in HTAS it was 4.31 (95%CI 1.87; 9.92) in comparison to girls aged 13-15 (OR=1.00). In girls aged 19-21 the odds ratio for attitudes classified in the lower-negative tercile of the subscales HTAS-2:light-food was 2.74 (95%CI 1.19; 6.31) in comparison to girls aged 13-15 (OR=1.00). The relation between age and attitudes of girls measured in HCS and subscales HTAS-4:sweets and HTAS-5:food-as-a-reward was non-significant.

Conclusions: With age in girls an increase was observed for interest in health and positive attitudes to natural products and nutrition as well as negative attitudes to light food. Changes in attitudes were most evident in girls aged 19-21 years. Age of girls did not influence their attitudes to sweets or perception of food as a reward.

Key words: age, attitude, girls, health, nutrition

Acknowledgements: The study was financed within the framework of project no. N N404 068540.

PO314

PROTECTIVE EFFECTS OF ERGOTHIONEINE AGAINST METHYLGIYOXAL-INDUCED NEURON CELLS INJURIES AND ITS POSSIBLE MECHANISM

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Background and objectives: Patients with long-standing diabetes commonly develop diabetic encephalopathy, which is characterized by cognitive impairment and dementia. Methylglyoxal (MGO) is a toxic precursor of advanced glycated end-products (AGE) that are responsible for protein glycation. Ergothioneine (EGT) is an antioxidant components of many mushrooms especially Lentinus edodes. In this study we investigated whether EGT protects against MGO-induced neuronal cell damage.

Methods: murine pheochromocytoma (PC12) cells were incubated with MGO with or without EGT. Levels of protein carbonyl, reactive oxygen species (ROS) and the expression of AGE, AGE receptor (RAGE), and nuclear factor kappa-B (NF-kB) were analyzed.

Results: cell viability of PC12 cells treated with 30 uM MGO for 72 h was decreased to 64%. Co-incubation with EGT (2 uM) for 72 h significantly restored the viability. MGO markedly increased protein carbonyl and ROS production, which was strongly reduced by EGT (71% and 64%, respectively). These effects of EGT were equal to 100 nM aminoguanidine (an AGE inhibitor) and 10 uM Epalrestat (an aldose reductase inhibitor). AGE, RAGE and NF-kB expression was increased 3.2-, 4.5- and 2.4-fold, respectively, by MGO, but was significantly attenuated by EGT co-treatment.

Conclusions: the neuroprotective effect of EGT is likely attributed to a decrease of ROS production by inhibition of the AGEs/RAGE signaling pathway.

Key words: Ergothioneine, methylglyoxal, neuron cells, advanced glycated end-products

PO315

EFFICACIOUS OF SYNBIOTIC AND NUTRIENTS SUPPLEMENT ON STIMULATED OF SECRETORY IMMUNOGLOBULIN A (SIGA) IN TREATED PULMONARY TUBERCULOSIS PATIENTS

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Background and objectives: Administrations of Tuberculosis chemotherapy probably disturbed of normal microflora balance, therefore it decreased mucosal defense system. The study objective was to analyze the efficacy of milk based protein supplement (MBP) with synbiotic and micronutrients on improving microflora balance and secretory IgA among treated adult PTB patients.

Methods: A double-blind randomized treatment-control trial design was applied in this study. Ninety four new cases of PTB aged 20-45 years old were selected and divided into two groups; the treatment group was treated daily supplement with MBP (13.9 g protein), synbiotic (35x10 log10 cfu of Lactobacillus acidophilus and 5x10 log10 cfu of Bifidobacterium longum and 120 mg fructo-oligosaccharides) and micronutrients (5,000 IU vitamin A and 15 mg zinc); and the control group was treated daily with MBP only during 2 months intervention. All patients received a standard TB chemotherapy. Parameters of gut microflora and titer sIgA were collected at baseline, after 1, 2 and 6 months of intervention. Population of Lactobacillus sp in fecal was counted using plate count method and population of Bifidobacterium sp in fecal was counted using direct count method and counting chambers. Titer of sIgA was measured using ELISA method.

Results: After first month intervention total colony of Lactobacillus sp and Bifidobacterium sp were higher in treatment group than control groups ($p<0.05$). In addition titer of sIgA was also higher in treatment group than control group ($p<0.05$).

Conclusions: There was positive effect of these supplements to maintain balance of gut microflora and stimulating sIgA secretion during TB chemotherapy.

Key words: protein, synbiotic, vitamin A, zinc, sIgA.

PO316

THE ASSOCIATION OF THE FTO GENE SNP RS 9939609 WITH DIETARY ENERGY INTAKE AMONG BEIJING HAN CHILDREN

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Background and objectives: Fat-mass and obesity-associated (FTO) gene is a gene located in chromosome region 16q12.2. Genetic variants in FTO are associated with the obesity phenotype in European and Hispanic populations. This association was also confirmed among Chinese children. However, the role of FTO variants in the regulation of energy balance is unknown. We aimed to test the role of FTO genetic variants on dietary energy intake.

Methods: We genotyped FTO variants rs9939609 in 670 children (332 girls and 338 boys) aged 8-11 years living in Beijing, and analyzed the role of FTO genetic variants in modulating of energy intake.

Results: Compared with the TT genotype, we found marginally increasing level of dietary energy intake in the AA/AT genotype subjects (P=0.095). The consumption of fat, energy from fat and the percentage from fat were also found obviously higher.

Conclusions: Influence on the energy intake of dietary is one of the ways of FTO gene affects energy balance.

Key words: FTO; child; Chinese; obesity; dietary energy intake

PO317

USE OF LOCAL NUTRIENT-RICH FISH IN DEVELOPING A COMPLEMENTARY FOOD AND ITS CONTRIBUTION TO RECOMMENDED NUTRIENT INTAKES OF INFANTS

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Background and objectives: Timely introduction of nutrient-rich complementary foods among infants aged 6-23 months, when breastmilk is no longer sufficient to meet energy and nutrient requirements is essential for optimal child growth and development. In developing countries, complementary foods are often low in macro- and micronutrients, contributing to low nutrient intake and resulting in undernutrition in infants. Processing and combining local foods to optimize nutritional value in production of a pre-prepared complementary food could be an important food-based strategy to improve nutrient intakes of infants aged 6-23 months.

Methods: Based on nutrient composition, small fish, rich in iron and zinc; and orange flesh sweet potato, rich in vitamin A were selected along with the staple food, rice for product development. These foods were dried and combined to: optimize nutrient content, minimize anti-nutrient content and ensure an acceptable product. Nutrient content of the product was estimated and compared to recommended nutrient intakes (RNIs) for infants, and nutrient composition of two fortified blended complementary foods used in Bangladesh.

Results: Two serves per day of the complementary food meet: 80% (infants 6-12 months) and 129% (1-2 years) of iron RNI; 81% of zinc RNI (6 months - 2 years); 99% (6-12 months) and 79% (1-2 years) of calcium RNI; and 52% of vitamin A RNI (6 months - 2 years). In comparison to the two fortified complementary foods, the product developed is similar in macronutrient and higher in iron, zinc and calcium content.

Conclusions: Local nutrient-rich foods, particularly small fish, incorporated in a pre-prepared complementary food can contribute significantly to the RNIs of infants, 6-23 months. This product is particularly suitable for use during initiation of complementary feeding, and as a food-based strategy for prevention and treatment of undernutrition in infants and young children.

Key words: complementary food, small fish, food-based strategy, Bangladesh

PO318

VARIANTS IN THE C-TERMINAL REGION OF PCSK9 AFFECT LDL-C LEVELS IN A BLACK SOUTH AFRICAN POPULATION (THE PURE STUDY)

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Background and objectives: PCSK9 is a serine protease that promotes the degradation of the LDL receptor. Mutations in the PCSK9 gene that affect the C-terminal domain of the protein have been associated with LDL-c levels. Variants A443T and C679X are loss-of-function mutations and have been associated with lower LDL-c levels. Variant H553R is a gain-of-function mutation associated with increased LDL-c levels. The aim of this study was to investigate the genotypic distribution of variants A443T, C679X, H553R and A594D (a novel variant) in the PCSK9 gene and determine their association with LDL-c in a black South African cohort.

Methods: A cross-sectional, observational study within the PURE study was conducted on 1600 randomly chosen; apparently healthy subjects aged 35 to 60 years. LDL-c levels were

determined by means of the Friedewald formula. Screening of these SNPs was achieved by the use of the Illumina's VeraCode™ Golden Gate Genotyping Assay on a BeadXpress™ Reader system. The SNPs were tested for adherence to HWE. Univariate analyses were used to determine if associations were present between the different genotypes and LDL-c levels.

Results: All four of the variants were detected in the study population with minor allele frequencies of 0.04, 0.03, 0.04 and 0.05 for A443T, C679X, H553R and A594D, respectively. All variants adhered to the assumptions of HWE. Both A443T (p=0.04) and C679X (p<0.01) were significantly associated with lower LDL-c levels. H553R (p=0.09) and A594D (p=0.10) were not significantly associated with LDL-c levels.

Conclusions: Even though these variants are present at low frequencies they do contribute to the inter-individual differences of LDL-c levels in the study population. These mutations may be indicative of the as yet undetermined genetic architecture responsible for the lowered cardiovascular disease risk encountered in the black South African population.

Key words: LDL, LDL receptor, PCSK9

PO319

EFFECTS OF SPIRULINA PLATENSIS ON APOPTOTIC GENE EXPRESSION IN AGE-RELATED HEARING LOSS

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Background and objectives: Spirulina platensis was demonstrated to be effective in treating hyperlipidemia, immunedeficiency, and inflammatory processes. However, the effects and related mechanisms of Spirulina platensis on degenerated disease are still unclear. This study was aimed to examine the effects of Spirulina platensis on age-related hearing loss.

Methods: Eleven-month old SAM mice were randomly divided into Senescence-accelerated-resistant (SAMR1) normal control, senescence-accelerated prone-8 (SAMP8) normal control, and Spirulina platensis (400 mg/Kg BW) SAMP8 groups, respectively, and fed with the experimental diets for six weeks. The auditory brainstem response (ABR) test was performed at the baseline and the end of experiment. After sacrificed, the poly ADP-ribose polymerase-1 (PARP-1) and apoptosis inducing factor (AIF) protein expressions of brain stem and cochlear were analyzed.

Results: Spirulina platensis could lower the ABR threshold and hearing degeneration in SAMP8 mice. Spirulina platensis supplementations significantly decreased the cleavd-PARP1 expression in brain stem, and reduced the PARP-1 expression in spiral ganglion neurons and hair cell of cochlear. The AIF expression of brain stem and cochlear in Spirulina platensis diet group were also lower than the SAMP8 control group.

Conclusions: Our results indicated that the Spirulina platensis could retard the age-related hearing loss, which might due to moderate the apoptosis related gene expression in aged SAMP8 mice.

Key words: Spirulina platensis, age-related hearing loss, poly ADP-ribose polymerase-1, apoptosis inducing factor

PO320

EFFECT OF VANADIUM ON THE OXIDATIVE STATUS OF DIABETIC RATS

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Background and objectives: Due to growing exposition of the population to vanadium compounds, the study of the metabolism of this trace element is an important area of current investigation. Vanadium is an essential element for some living organisms although there are controversies about its essentiality in the human body. There is an increasing use of nutritional supplements of vanadium as an anabolic agent by body builders and athletes. V also showed hypoglycaemic effects and is being investigated for the treatment of diabetes. There are many aspects that remain to be determined like digestive and metabolic interactions with other elements involved in the antioxidant defence .

Methods: Four study groups were examined: Control; Diabetic; Diabetic treated with 1mgV/day (DMV); and Diabetic treated with 3mgV/day (DMVH). The vanadium was supplied in drinking water as bis(maltolato) oxovanadium (IV)(BMOV). The experiment had a duration of five weeks. Superoxide dismutase (SOD), catalase (CAT), NAD(P)H:quinine-oxidoreductase1 (NQO1) activity, protein carbonyl groups levels and malondialdehyde (MDA) levels in the liver were determined.

Results: In the diabetic animals, we recorded higher protein carbonyl groups levels and NQO1 activity, together with decreased CAT activity, in comparison with the control rats. In

DMVH, there was a significant decrease in NQO1 activity, and increased CAT activity and MDA levels, in comparison with the diabetic rats.

Conclusions: Treatment with 3mgV/day provokes a deterioration of antioxidant defences in the tissues.

Key words: Pathology, antioxidant defence

PO321

RAMA PEDIATRIC BLENDERIZED FORMULA

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Background and objectives: To develop the Pediatric Blenderized tube feeding formula with optimum viscosity for tube feeding containing 10 % protein, 30 % fat, and 60% carbohydrate. The recommened dietary allowance for nutrients, vitamins and minerals were also added.

Methods: Calculate the Blenderized Formula that the percentages of total weight for protein, fat, and carbohydrate is 10%, 30%, and 60%, respectively. The raw material used for the preparation are chicken liver, eggs, chicken meat, rice, cane sugar , banana, dextrin and soybean oil. The nutrition value was calculated based on the nutrition database from Food Table Composition using Microsoft Excel. Some nutrients, vitamins and minerals in medication form were added if necessary. Concerning the recommend dietary allowance for children, We developed 9 formulas. Then the pediatrician team selected 1 formula from 9 formulas.

Results: The Pediatric Blenderized Formula was able to flow continuously through the 14 French feeding tube in the simulation scenario. When we fed the patients through feeding tube in the pediatric ward, We found that flow rate is slower and sometimes feeding tube obstruction was occurred and bag shaking is needed. Therefore, the type and portion of raw material has modified without changing the nutrient value. The optimum formula for preparing blenderized diet was then published.

Conclusions: We developed the blenderized diet for the pediatric patients called "Ramathibodi Pediatric Blenderized Formula" available for the patients admitted in Ramathibodi hospital. This formula can be ordered through the Ramathibodi hospital diet ordering program by using code "Pediatric BD".

Key words: Blenderized formula, Tube feeding, Pediatric BD

PO322

EXAMINATION OF THE IMPACT OF USING GENERIC NUTRITIONAL COMPOSITION DATA, ON NUTRIENT INTAKE ESTIMATION AT MEAL AND DAILY FOOD-INTAKE LEVELS

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Background and objectives: Currentlydietary data, using food diaries or recalls,iscollected and analysed at an individual food item level, seeking specifics such as brand, food weight and time of consumption, which can be time consuming and cumbersome.It remains to be seen whether such detail is requiredand how generic information application impacts on nutrientintake.

Methods: Dietary data, based on 4-day semi-weighed food diaries from the Irish National Adult Nutrition Survey (NANS) was used for this analysis. The data contained133,068 food occasions and2552 food items. Each food item had details includingmeal code, study day andfood-weight amongst others. Meal-type "Breakfast"was selected consisting of683food items. These were coded into 21 food groupse.g. "Breads", "Milks". Dietary intake modelling was performed by substituting generic nutritional compositions of specific foods/food groups and the impact of altered compositions was assessed at meal and daily mean intakelevels. Food groups examined included "Milk", "Fruit", "Bread" and "Cereal".

Results: Dietary intakemodelling demonstrated no significant differences in mean nutrient intakewhen substituting "Breads" or "Fruits" with generic compositionsat both mean daily and meal intake levels. Using generic compositional data within the food group "Milks", there were no significant differences for the majority of nutrients, except phosphorus ($p \leq 0.001$) and saturated fat ($p \leq 0.05$). "Cereals" (split), at a daily level, producedno significant differences for most nutrients, other than calcium ($p \leq 0.001$) and NSP ($p \leq 0.05$). However,for cereals,many significant differences were found at a meal level ($p \leq 0.001$).

Conclusions: For many food groups at breakfast,a generic nutritional composition may be adequatewhen examining nutrient intakes in the population, giving promise to the idea of meal assessment in the future.

Key words: Meal, Meal variability. Acknowledgements:Funded by Food4me (KBBE.2010.2.3-02,Project no.265494), http://www.food4me.org/

PO323

GENOMIC PROFILING IN SUBJECTS WITH COMMON OBESITY IN BULGARIAN POPULATION

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Background and objectives: Obesity is an important factor contributing the global burden of morbidity and mortality. Data from the national nutrition survey in Bulgaria from 2004 showed the prevalence of overweight (BMI 25 - 29.99) among the adult population from 34% to 40% and obesity rate (BMI> 30) was from 16.7% to 21.3%. For the past 15 years, candidate gene and genome-wide linkage studies have been the main genetic epidemiological approaches to identify genetic loci for obesity, while in last four years, 52 genetic loci were identified to be unequivocally associated with genes for common obesity and related traits as a result of development of genome-wide association studies (GWAS).

Methods: For the purpose of the study will be used clinical methods (assessment of nutritional status by anthropometric, laboratory tests , BIA) and genetic methods (target next-generation sequencing of 12 genes associated with the regulation of body weight, body composition, BMR, lipid metabolism). From the found associations, 12 genes are repeated constantly in ten or more studies: ADIPOQ, FTO, ADRB3, GNB3, HTR2C, NR3C1, LEP, LEPR, PPARG, UCP1, near-MC4R , NRXN3.

Results: The study aims to investigate genetic variants in a panel of 12 genes associated with the regulation of body weight in 200 patients (well phenotyping) with common obesity and compared with a 100 healthy controls: to find new variants of defined genes and their frequency distribution in the Bulgarian population, as the influence of environmental factors on their clinical manifestation; to establish clinical and genetic algorithm for the prevention and control of obesity.

Conclusions: It is expected that new data will enrich scientific knowledge about frequency and diversity of risk gene pool for common obesity in the Bulgarian population and contribute to the creation of multigenous panel for early diagnosis and prevention of obesity.

Key words: Common obesity, genetics, gene - environment interactions

PO324

A DIET ENRICHED WITH SULFUR-CONTAINING ANTIOXIDANTS IMPROVES NK ACTIVITY AND DIGESTION OF PERITONEAL LEUKOCYTES IN DOUBLE-TRANSGENIC MICE FOR ALZHEIMER´S DISEASE

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Background and objectives: Previous studies have shown in triple-transgenic mice for Alzheimer's disease (AD) a premature immunosenescence in comparison to non transgenic animals (NTgAD). In addition, they have proposed the analysis of the functional state of peripheral immune cells as a useful tool for measuring the progression of AD. Since the ingestion of diets enriched with sulfur-containing antioxidants have been shown to slow down immunosenescence and improve longevity, the aim of the present work was to study the effect of an ingestion of these antioxidants in several relevant functions of immune cells from double-transgenic mice for AD (2xTgAD), a model in which the possible presence of a premature ageing of the immune cell functions have not been studied.

Methods: Female (4 months of age) 2xTgAD and control (NTgAD) mice were used. The 2xTgAD were divided in two groups. One group of animals was fed a diet supplemented with N-acetylcysteine + thioproline (0.1% w/w) (2xTgADA) and the other a standard diet (Panlab A04) (2xTgADC). After 2 and 8 months, the peritoneal leukocytes were obtained and two key immune functions were studied, i.e.: natural killer (NK) activity and digestion capacity measured by tumor cell lysis and intracellular superoxide anion levels, respectively.

Results: The functions studied were decreased in 2xTgADC in comparison to NTgADC and the ingestion of antioxidants increased the values of these functions bringing them close to those in the NTgADC group.

Conclusions: 2xTgAD mice show a premature immunsenescence. Moreover, since the immune system is a marker of health and a predictor of longevity, an adequate treatment with sulfur-containing antioxidants could be useful in these animals to slow down the effects of the aging process and the progress of AD.

Key words: Antioxidants. Alzheimer´s disease. Leukocyte functions. Mice

PO325

UNIDIRECTIONAL FLOW TECHNIQUE USING TRACERS FOR RESEARCH NEW NUTRIENTS-METABOLITES BIOMARKERS IN EARLY STAGES OF THE DISEASE

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Background and objectives: Biomarkers with higher sensitivity, specificity and predictive value than those used so far is of vital importance in decisions about health spending. Diagnostic in the accounts represents 1-2% of health care costs, the decisions made up 70% of health care. Current

Methods to detect levels of biomarkers that reflect the final stages of the disease when treatment options are limited.

Methods: Comparing Nuclear Magnetic Resonance Spectroscopy [NMR] Mass spectrometry [MS] (refined by chromatographic techniques) with unidirectional flow technique perfused using paired cultures tracers [UFTTP] modified by Peran y MacGee for analyzing metabolites-nutrients and other biological molecules. UFTTP involves the absorption kinetics in the range of seconds, the absorption is measured by comparing the concentrations output profiles of [14C]-D-mannitol (extracellular tracer) either with [3H]-Nutrient-Metabolit s, following a bolus infusion liquid containing intrainput [14C]-D-mannitol and [3H]-Nutrient-Metabolit.

Results: The relative levels of pathophysiological concentration of these compounds are in the ultra trace interval (picomolar or less) at millimolar levels or even higher. These conditions are satisfied either by NMR, MS and UFTTP. The dietary manipulation is possible because the nutrients-metabolites are contained in foods. NMR and MS must still find significant correlations between metabolomes, its sensitivity is so high that it is able to identify the compounds detected which requires a subsequent stage for validation. UFTTP directly addresses the possible treatments and nutritional adjustments applied (dietetics plan).

Conclusions: UFTTP technique is practiced under patho and/or physiological conditions in the range of seconds and give results of the absorption kinetics and competitive inhition. This also provides a new technique suitable for discovering new biomarkers, design of new drugs, therapeutic techniques and dietetic plans to nutrient content adjusted to prevent, treat or mitigate disease.

Key words: biomarkers, nutrients, dietetic, phase, early.

PO326

DIETARY HABITS OF POSTPARTUM MOTHERS DURING BREASTFEEDING

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Background and objectives: The main purpose of the study was to identify the changes postpartum mothers of infants aged 0-2 months made in their nutrition with the aim of increasing their milk production.

Methods: The 120 postpartum mothers enrolled in this study came to the care center base at Ariana city. Dietary data were collected from the mothers via a questionnaire prepared by the researchers to elicit details about what kind of foods or nutrition supplements women added, avoided or were recommended to avoid or add to their diets and why.

Results: All the mothers made changes in their diets while breastfeeding. The number one change that mothers made in their diet in order to increase milk production was to increase their fluid intake (64%) while the second was to increase their consumption of dried legumes, grains and nuts (27%). Increased consumption of milk and milk products is mentioned by only 8% of mothers. The main type of food mothers were advised to avoid were vegetables (30%). The most important reason for this was the belief that they increased the chance of newborn colic (75%). The main source for information was their mother (58%) and mother in law (17%). Nutritional advice for health workers are not followed (4%). There were not statistically significant differences between foods avoided by breastfeeding mothers related to their age, education and socioeconomic level.

Conclusions: All of the mothers adapted specific practices, and had been given recommendations by others about their nutrition while breastfeeding. Mothers need another form of education by health workers to better monitor nutritional advice.

Key words: Nutritional habits – breastfeeding – food intake - nutritional information.

PO327

DEVELOPMENT OF A NEW SOFTWARE SPECIALIZED IN NUTRITION RESEARCH (FIRST PHASE: OBTAINING INFORMATION)

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Background and objectives: New technologies must be part of the development of science and should be user-friendly to allow the researcher streamline and optimize their work. Currently there is no tool that meets with these characteristics in the field of nutrition, so it is being developed a computer application (CA) that incorporates all the processes through which knowledge is generated.

Methods: The different stages of information search have been integrated into the CA: the software is able to obtain and process the information from the variables of interest to the researcher. The CA works with one or several questions simultaneously, in ordinary language, which is then translated into controlled vocabulary (MeSH, Thesaurus ...) for your search in specialized databases (MEDLINE, Cochrane ...). The CA organizes this information and integrates concepts of evidence-based medicine and CONSORT criteria that allow assessing the power and quality of information. At the same time this tool incorporates a system of alerts about the existence of new information on the net. The browser is also able to identify and assess related images.

Results: In the first phase of its development, the software has shown good results when it is compared with the usual practice of seeking information. The speed of finding information with CA is better, and the assessment of the quality of the information is appropriate.

Conclusions: This new software for support of scientific research will streamline and optimize the work of the researcher in the nutrition area, improving the quality of the process and the results of the search for new knowledge.

Key words: Software, Nutrition Research

PO328

MEAL CONSUMPTION, DIETARY PATTERNS, PHYSICAL ACTIVITY AND COGNITIVE ABILITY AMONG MALAYSIAN ADOLESCENTS

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Background and objectives: Adolescence is a transitional period where the brain matures to achieve its adult structure and functions. Many factors tend to influence cognition in a multidirectional manner. This cross-sectional study aimed to determine meal consumption, dietary patterns, physical activity and cognitive ability among Malaysian adolescents aged 12 to 13 year-old (N=416).

Methods: Adolescents were randomly recruited from five public schools in an urban area of Selangor, Malaysia. Socio-demographic background was obtained from parents. Height and weight were measured, and body mass index was calculated. A questionnaire on meal consumption and physical activity was administered in class. A semi-quantitative food frequency questionnaire (S-FFQ) was used to determine habitual dietary intake. Dietary patterns were constructed using principal component analysis based on servings per day intake of the food items in the S-FFQ. Cognitive ability was assessed using Wechsler Nonverbal Scale of Ability (WNV) in a one-to-one manner.

Results: Adolescents who consumed dinner at least five days a week (M=103.5, SD=12.0) had higher scores on the cognitive test compared to those who consumed dinner less than 5 days a week (M=98.0, SD=12.5). Four major dietary patterns were identified and labelled as refined-grain pattern, snack-food pattern, plant-based food pattern and high-energy food pattern. The high-energy food pattern was found to be negatively associated with cognitive ability ($r=-0.15$, $p<0.01$). There was a significant positive association between physical activity and cognitive ability ($r=0.10$, $p<0.05$). Consumption of dinner, high-energy food pattern and physical activity were found to contribute significantly towards cognitive ability after controlling for socio-economic status as indicated by monthly household income and parents' educational attainment.

Conclusions: Adolescents should be encouraged to consume dinner regularly, decrease intake of high-energy foods and increase physical activity level to enhance their cognitive ability.

Key words: Cognitive ability; dietary patterns; physical activity

PO329

THE ROLE OF FORESTS, TREES AND BIODIVERSITY IN NUTRITION-SENSITIVE FOOD AND AGRICULTURE SYSTEMS

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Background and objectives: Experts note that improving global nutrition will require conscious and sustained efforts in health, education, economics and agriculture (Pinstrup-Andersen 2009; Swaminathan 2012). Forests and conservation have often been overlooked in these calls for cross-cutting attention to nutrition, despite their significant influence over land use planning and policy.

Methods: Review emerging literature.

Results: Recently, researchers have investigated ways that forests contribute to nutrition (in addition to contributions to income, safety-nets and sustainability). Wild foods make important contributions to dietary diversity, often increase nutrient-density of local diets, and are culturally importance in many traditional food systems. Although less important for staple crop production, forests and tree-based agricultural systems provide many under-consumed and nutritionally-important foods (fruits, vegetables and meat). An emerging body of research shows links between tree cover and fruit and vegetable consumption (Ickowitz et al. in preparation; Powell 2012), adding to previous research asserting their importance for fruit production (Jamnadass et al. 2011) and improved micronutrient intake (Jones et al. 2005). Agricultural landscapes that include significant tree cover frequently provide bush-meat. Forests provide fuelwood, an essential component of many food systems. Some ecosystem services that forests supply are particularly important to nutrition: loss of genetic resources found in crop varieties and crop wild-relatives could have repercussions for bio-fortification. Fruit and vegetable crops (among the most nutritionally important foods) are more sensitive to loss of pollination services (Eilers et al. 2011; Gallai et al. 2009).

Conclusions: Overcoming global malnutrition will require food systems that are simultaneously productive, sustainable and nutrition-sensitive, through management of complex landscapes for optimized nutrition, not just agricultural production and biodiversity conservation. Trees and forests not only contribute to biodiversity conservation and sustainability of agricultural systems, but also to enhanced nutrition-sensitivity of food systems.

Key words: Forets, trees, agricultural systems, nutrtion-sensative, review

PO3297

ROLE OF SLOW DIGESTING CARBOHYDRATES DURING PREGNANCY FOR IMPROVING BONE HEALTH IN OFFSPRING OF OBESE RATS. (NIGO-HEALTH STUDY)

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Background and objectives: Maternal obesity and accompanying obesogenic dietary intake prior to and throughout pregnancy and lactation program offspring physiological system predisposing not only to a higher risk of developing metabolic syndrome, but also to be at increased risk of low bone mass and fracture development later in life. We examined the effects of two mixtures of carbohydrates (CHO) consumed by pregnant rats, exposed to high fat diet, on bone architecture of adolescent offspring.

Methods: Virgin rats were assigned to one of three experimental groups: control (C) dams fed a standard rodent diet before mating and throughout pregnancy; dams fed a high fat 6 weeks before mating and then fed a HF diet containing either CHO with high (HF/HC) or low (HF/LC) digestion rate throughout pregnancy. At delivery all the animals were fed with the standard rodent diet for the remainder of the study (13 weeks). At adolescence, bones were isolated and analyzed by Micro-CT technology.

Results: Micro-CT analysis of bone showed that maternal HF/HC diet induced alterations in the trabecular architecture of femur of male offspring. HF/LC offspring had significantly improve bone mechanical properties as it is showed with the increase of bone volume fraction and trabecular thickness parameters and the decrease in bone surface-bone volume ratio and Structure model index parameters (t-test; $p<0.1$ vs HF/HC).

Conclusions: Data show that nutritional intervention with a slow digesting carbohydrate system during gestational period, results in improved bone architecture and bone strength of their progeny. This improvement on offspring trabecular bone must be a key determinant for preventing bone fragility later in life.

Key words: Early programming, dietary carbohydrate, bone

PO330

EFFECTS OF CRYSTALLINE CELLULOSE AND PECTIN IN DIGSTA ON THE BEHAVIOR OF GLUCOSE IN THE INTESTINAL LUMEN

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Background and objectives: Our mathematical simulation in flow behavior in the gastrointestine suggested absence of turbulence, which might suggest poor mixing in the molecular levels in the intestine. In poor mixing condition, the diffusion rate of glucose in the digesta should be the rate-limiting factor for the overall glucose absorption. If the condition is valid, greater digesta viscosity should make the glucose gradient steeper in the lumen because the diffusion should depend negatively on the viscosity of the digesta. Therefore, we observed the glucose gradient in the intestinal lumen along the radial axis in artificial digesta including crystalline cellulose and pectin in the suncus.

Methods: We prepared 4 types of artificial digesta containing 20g/L CMC, 100g/L glucose in phosphate buffer and supplemented with both 100g/L crystalline cellulose and 13g/L pectin, 100g/L crystalline cellulose, 13g/L pectin, or containing no additives (control). The viscosity of the atrificial digesta were in the order of of the control < crystalline cellulose additive = pectin additive < both cellulose and pectin additive. We infused the artificial digesta into the suncus duodenum via the stomach after hematostasis. After 15 min, the intestine was sampled and froze on dry ice, and then cross section of the intestine was made using a cryostat.

Results: Glucose on the center and peripheral site was sampled and measured the concentration of glucose. The glucose level in the centre of the lumen of cross-section of the small intestine was in the order of the control < either crystalline cellulose or pectin additive < both cellulose and pectin additive.

Conclusions: Glucose gradients should suggest the predominance of glucose diffusion in digesta in overall glucose absorption. Crystalline cellulose and pectin should reduce glucose absorption rate by decreasing the diffusion of glucose on the radial axis of the intestinal lumen.

Key words: cellulose, pectin, viscosity, digesta, diffusion

PO331

PROTEIN-ENERGY WASTING MODIFIES THE ASSOCIATION OF PLASMA LEPTIN WITH INFLAMMATION IN HAEMODIALYSIS PATIENTS

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Background and objectives: Plasma leptin concentrations may contribute to anorexia and the pathogenesis of protein energy wasting (PEW) in hemodialysis patients (HD). The aim of this study was to investigate the interaction between PEW, systemic inflammation, and plasma leptin concentrations in HD patients and to analyze whether these factors were associated with clinical outcome.

Methods: Cross-sectional study of 45 HD patients (25 males, 55.6%) aged of 68.1 ± 14.5 y. and mean time on HD: 57.2 ± 37.4 months. Clinical PEW assessment, leptin and interleukin-6 (IL-6) were evaluated. Plasma leptin concentrations were stratified into tertiles (lower tertile, T1; medium tertile, T2; higher tertile, T3). Results were tested using the SPSS statistical packet.

Results: PEW was present in 35.6 % of HD patients. PEW was more prevalent in T1 and T2 vs. T3. Multivariate analysis of variance adjusted by gender showed interaction of IL-6, waist circumference (WC), percentage of fat body mass (%FBM) and Charlson comorbity index (all, $p<0.01$) with tertiles of plasma leptin. PEW patients in T3 were overweight and had abnormally higher plasma leptin concentration and comorbidities compared to well-nourished patients when both, nutritional status and tertiles of plasma leptin concentration were studied. Significant interactions were found between Plasma leptin tertiles and nutritional status on BMI, WC, IL-6, %FBM and comorbities values (all, $p<0.01$).

Conclusions: Plasma leptin concentrations are influenced by nutritional and inflammation status. Results suggest that plasma leptinemia should be analyzed and discussed in the context of PEW and systemic inflammation in HD patients.

Key words: Plasma leptin, protein-energy wasting, inflammation, hemodialysis

PO332

NEW APPROACH OF ESTIMATING THE RISK OF TYPE-2 DIABETES USING OVERWEIGHT-YEARS METRIC

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Background and objectives: Recent study reported that combined the severity and the duration of obesity into a single measure of obese-years was a better predictor of the risk of type-2 diabetes than using the intensity or the duration of obesity alone. However, the analysis, the notion that obese-years was only "switched on" when BMI reaches 30 Kg/m2, ignored the effect of overweight - BMI from 25 Kg/m2. This study aimed to examine the total impact of "overweight-years" metric – combining the severity of bodyweight and number of years lived with BMI above 25 kg/m2 on the risk of type-2 diabetes.

Methods: 5036 participants of the Framingham Heart Study were examined. The severity and the duration of each participant lived with overweight were measured every two years for up to 48 years. Overweight-years was defined and its relationship with the risk of type-2 diabetes was modelled using time-dependent cox regression and compared using the Akaike's information criterion.

Results: The study found that adjusted hazard ratios of type-2 diabetes increased significantly as overweight-years increase and a dose response relationship was clear. hazard ratios for the categories of 0, 1–24.9, 25–49.9, 50–74.9, and ≥75 overweight-years were 2.38 (95% CI:1.73-3.29), 2.79 (95% CI:1.97-3.94), 3.45 (95% CI:2.41-4.94) and 6.00 (95% CI:4.44-8.10) respectively. The risk of type-2 diabetes increased by 6% (95% CI:5%-7%) per additional 10 overweight-years. AIC values indicated overweight-years model was better predictor than the intensity and the duration of overweight alone. Compared with the current model of obese-years, overweight-years model provided a slightly better risk of type-2 diabetes.

Conclusions: Overweight-years is more concisely estimate the risk of type-2 diabetes and it is suggested to consider as an alternative model in estimating the population health burden related with total effect of obesity.

Key words: Overweight, overweight-years, Risk factor, type-2 diabetes

PO333

DIETARY METHIONINE REGULATES THE EXPRESSION OF ASPARAGINE SYNTHETASE AND 3-PHOSPHOGLYCERATE DEHYDROGENASE IN RAT LIVER

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Background and objectives: We found that the expressions of Asparagine synthetase (AS) and 3-phosphoglycerate dehydrogenase (PHGDH), a late-limiting enzyme for Ser biosynthesis were changed in response to protein requirement in rat liver. Since the change occurred immediately after dietary shift and depended on protein content in diet, we hypothesized that some amino acids regulate the gene expression. In the present study, we examined the hypothesis to feed rats amino acids mixture lacking in a single amino acid.

Methods: Male SD rats (500~600 g B.W.) were fed protein free diet for several days to induce the expression of AS and PHGDH. The diet was removed at 8 AM and re-feeding was started at 8 PM with the diet contained 12% amino acids mixture based on the amino acids composition of casein, or the mixture lacking in any one of amino acids. Then rats were killed 12 h after re-feeding and the gene expression was determined. In contrast, we maintained rats on amino acids mixture for 4 days to examine whether the gene expression was induced by lack of any one of amino acids.

Results: Protein free diet induced the expression of AS and PHGDH significantly and the diet contained amino acids mixture reduced the expression rapidly to the basal level within 12h after dietary shift. Among amino acids mixtures examined, only the mixture lacking in Met did not showed such decrease. On the other hand, the expression of these enzymes was induced when rats were maintained on the diet lacking in Met but not other single amino acids.

Conclusions: These results suggested that dietary Met regulates the expressions of AS and PHGDH. In addition, our results also showed very similar response of AS and PHGDH gene expression to protein/amino acid nutrition.

Key words: Asparagine synthetase, 3-phosphoglycerate dehydrogenase, methionine

PO334

DETERMINATION OF LIPID COMPOSITION OF CHERIMOYA (ANNONA CHERIMOLA) CULTIVARS GROWN IN ANDALUSIAN REGION

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Background and objectives: Cherimoya is a tropical fruit. Nowadays, cherimoya is consumed as fresh fruit, although its industrial use is being currently evaluated. Recently, the number of studies related to economic exploitation of seeds and other by-products proceeding from new oleaginous vegetable sources has increased. Therefore, the aim of this work was the characterization of lipidic fraction of the edible portion of the cherimoya and their by-products.

Methods: Pulp, seed and skin of two different varieties of cherimoya were crushed, liophilizated, and lipids were extracted with the Folch procedure. Several chromatographic techniques were used to determine fatty acid, tocopherol, sterol and phospholipid composition.

Results: Different fatty acid compounds were identified in pulp, seed and skin. The major fatty acids were palmitic, oleic, linoleic and linolenic acid. Appreciable differences were detected in pulp, skin and seed fatty acid composition; seed reported as principal fatty acids oleic, linoleic n6 and palmitic acid, respectively. Skin and pulp contained higher content of linoleic n3 fatty acid. alpha-tocoferol and delta-tocoferol were identified only in seeds; moreover alpha-tocoferol was also detected in skin. No tocopherols were quantified in pulp. Three different phospholipid, as phosphatidylethanolamine, phosphatidylinositol and phosphatidylcholine, were identify. Total phospholipid content varied between 8.2 and 184 mg/g of fat. As expected the major content was found in pulpa and skin. Finally, sterols were determined in all samples. Beta-sitosterol was the first sterol in all samples. Surprisingly, gamma-sitosterol was detected only in pulp and skin of Fino de Jete cultivar.

Conclusions: The results obtained confirmed that the lipid distribution depends on the cultivar and, in the same cultivar, it varied in the different zones of the fruit. These preliminary results suggested that gamma-sitosterol can be used as marker of Fino de Jete cultivar. However further investigations are needed.

Key words: Cherimoya, fatty acids, tocopherols, phospholipids, sterols.

PO335

B-VITAMIN INTAKES AND RELATED BIOMARKER STATUS AND ASSOCIATION TO FOOD CONSUMPTION IN EUROPEAN ADOLESCENTS PARTICIPATING IN THE HELENA STUDY.

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Background and objectives: B-vitamins are key adolescence health nutrients. The association between food consumption

and vitamin B6, folate, and B12 intakes and biomarkers was examined in healthy adolescents participating in the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) cross-sectional study.

Methods: 1,664 individuals met the eligibility criteria for analysis of food and vitamin intakes and 494 for biomarker analysis (47% males for both). Foods and vitamin intakes were assessed by two non-consecutive 24-h recalls. Biomarker concentrations were measured by chromatography and immunoassay. Discriminant analysis, expressed as canonical coefficients (from 31 food groups best discriminating individuals in extreme tertiles of intakes and biomarker levels), and linear regression models adjusted for body mass index, maternal education (obtained by self-administered questionnaire), age and total energy intakes, were performed.

Results: Canonical coefficients (males and females) indicated that, apart from typical sources, fruits (0.437 and 0.398), fruit & vegetable juices (0.344 & 0.400), starch roots and potatoes (0.511 and 0.502), vegetables (0.304 for females), and oily fruits (-0.584 for females) for vitamin B6; bread & rolls (0.450 for females), starch roots & potatoes (0.312 for males), fish products (0.588 for females), soft drinks (0.489 for males), and soups (-0.604 for females) for folate; and fruit & vegetable juices (0.505 for females), snacks (1.0 for males), cakes (-0.514 for males), and vegetable oils (0.901 and 0.710) for vitamin B12; were by far the food groups which best discriminated individuals in the lowest and highest tertile of the distribution of vitamins both intakes and biomarkers. Linear regression analysis confirmed these associations between food groups and B-vitamins, intakes or biomarkers.

Conclusions: Some food groups, like snacks in relation to vitamin B12, and not only of their major sources, discriminated individuals by tertiles of the distribution of vitamin B intakes and biomarkers.

Key words: Food groups, B-vitamins, adolescents

PO336

METABOLIC AND CARDIOVASCULAR RISKS AFTER PEDIATRIC LIVER TRANSPLANTATION

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Background and objectives: More than 500 pediatric liver transplants (LT) have been performed in our hospital since the begining of the program. Patients with LT adults show an increased prevalence of premature cardiovascular disease (PCVD), but studies in the pediatric population are scarce. The objective was to study the prevalence of cardiovascular risk factors in children with LT treated at a pediatric hospital.

Methods: A descriptive,prospective,cross-sectional.Consecutive patients with LT,more than 5 y age,1 year or more post transplant,since June 2009-June2010 were included. Variables related to transplantation,clinical,laboratory including OGTT and carotid thickness intima-media were analyzed. Results are expressed as mean and standard deviation for normally distributed variables. t test, Pearson chi square, multiple regression were used.

Results: 133 pediatric LT patients were studied. Mean age at study 12.8(4.4SD) years , mean age at transplant 5.2(4.2SD) years. Mean time after transplant 7.7(3.6SD)years. All received corticoids .At study 12 p were receiving corticosteroids, 85 cyclosporine, 27 FK, sirolimus 25 p and mycophenolate 71 p.Mean BMI Zscore -0.27(0.9SD) . Mean Height Zscore 0.02 and mean weight Zscore -0.3. 6 p were stunted, 36 p low weight for height, 4 p obese, 12 p overweight. 80 p normal weight / height . The mean basal glucose 79.9 mg%(12.8SD) .Basal insulin 9.5 U/ml(12.4SD). The insulin resistance (HOMA IR)2.1(5SD).Mean total cholesterol was 145 mg%(54.8SD), and triglycerides 94mg%(43.3SD) for obesity, 9% of overweight, the prevalence of impaired fasting glucose 3.9%, the prevalence of diabetes 1.6%.

Conclusions: Prevalence of abnormal glucose metabolism 13.4%. There was strong statistically significant association between alterations in glucose metabolism and insulin resistance. No association was found between different immunosuppressive regimens.

Key words: Liver transplantation, risk factor cardiovascular disease

PO337

ULTRAFILTRATION AS MILK CONCENTRATION METHOD FOR THE ELABORATION OF A PROBIOTIC FERMENTED GOAT'S MILK

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Background and objectives: Our aim was to improve the whey retention and rheology of a probiotic fermented goat's milk by using ultrafiltration rather than other traditional concentration Methods such as the addition of powdered milk.

Methods: We measured synaeresis, rheology and pH in the following experimental fermented goat's milks: control (skim-

med goat's milk + starter culture), A (skimmed goat's milk + 2% powdered goat's milk + starter culture), B (skimmed goat's milk + 4% powdered goat's milk + starter culture), C (skimmed ultrafiltered goat's milk + starter culture) and D (skimmed ultrafiltered goat's milk + starter culture + Lactobacillus plantarum strain C4). 50 KDa ultrafiltration membrane was used and the fermentation process was stopped at pH 4.7 and 4.2.

Results: Dry extract = 9.94 (control), 11.4 (A), 13.67 (B), 12.5 (C) and 13.38 (D). Least synaeresis was found in C and D (0%), which may be due to the fact that caseins, which are responsible for the coagulum formation, are more concentrated in ultrafiltered milk. In fact, caseins remain unaltered by ultrafiltration, unlike when subject to desiccation processes. As far as control, A and B fermented goat's milks are concerned, synaeresis decreases concomitantly with the addition of powdered milk (14%: control; 5% in A and B samples) and with pH 4.2 (5% in the control yoghurt, 2% in A and B). This may be due to the higher quantity of casein coagulated, the isoelectric point of caprine proteins being 4.2, leading to an improvement in whey retention. Finally, the fermented goat's milk at pH 4.2 showed the best rheology performance.

Conclusions: We consider that ultrafiltration is a better way of concentrating fermented goat's milk than the addition of powdered milk because it affords an improvement in whey retention and higher protein quality in the final product.

Key words: ultrafiltration; synaeresis; fermented goat's milk.

PO338

IMPACT OF VARIOUS DIETARY OILS ON FADS1 AND FADS2 GENE EXPRESSION IN WHOLE BLOOD: A RANDOMIZED CROSSOVER CONTROLLED NUTRITIONAL INTERVENTION

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Background and objectives: Fatty acid desaturase (FADS)-1 and FADS2 genes play a major role in tissue polyunsaturated fatty acids (PUFA) homeostasis. Little is known regarding the impact of different dietary fatty acids on the expression of FADS1 and FADS2 in human. Our objective was to investigate the impact of dietary oils containing various amounts of alpha-linolenic acid (ALA), linoleic acid (LA), oleic acid (OA) and docosahexaenoic acid (DHA) on the expression of FADS1 and FADS2 in adults.

Methods: In a randomized, crossover controlled full feeding trial, 118 men and women with abdominal obesity and at least one other component of the metabolic syndrome were fed with 4 experimental isoenergetic diets (15.5% protein; 35.7% fat; 50.6% carbohydrate) of 4 weeks each. Diets were formulated to provide 60 g/3000 kcal of different oils: 1-CONTROL (10.6g OA; 0.2g ALA; 41.6g LA), 2-FLAX (10.7g OA; 19.2g ALA; 22.5g LA), 3-High oleic canola (HO-CAN, 42.8g OA; 1.4g ALA; 8.8g LA), 4-High DHA canola (DHA-CAN, 37.9g OA; 1.2g ALA; 7.6g LA; 3.5g DHA). FADS1 and FADS2 gene expression in whole blood cells was assessed in a random sample of 10 subjects (6 men, 4 women) by real-time polymerase chain reaction from samples collected at the end of each diet.

Results: Consumption of DHA-CAN down-regulated whole blood FADS1 and FADS2 mRNA expression versus CONTROL (-20.7% and -12.4%, respectively), versus HO-CAN (-25.5% and -14.2%, respectively) and versus FLAX (-24.5% and -23.7%, respectively, all $P<0.03$). No other difference in FADS1 and FADS2 gene expression was observed between the various diets.

Conclusions: Data from this controlled feeding study suggest that consumption of a DHA-enriched canola oil down-regulates the PUFA desaturation pathway compared with n-6 PUFA, monounsaturated fat as well as plant source n-3 PUFA.

Key words: docosahexaenoic acid, fatty acid desaturase, gene expression, nutritional intervention

PO339

SCALING-UP HIGH IMPACT NUTRITION INTERVENTIONS: EXPERIENCES WITH THE ESSENTIAL NUTRITION ACTIONS FRAMEWORK

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Background and objectives: Inadequate nutrition practices during the critical 1,000-day period from conception to the child's second birthday harm both women and children. Modifying such practices requires advocacy, training, systems strengthening, and behavior change communication strategies that address pertinent barriers and support doable actions. The Essential Nutrition Actions (ENA) framework provides universal, science-based guidance (Lancet 2008) for all these areas, utilizing key contact points across the life cycle and seven priority areas shown to improve nutrition and survival.

ENA has potential to support the Scaling Up Nutrition (SUN) movement.

Methods: This review summarizes the adaptation of the ENA framework over a period of fifteen years that guided broad scale implementation across numerous countries in Africa and Asia.

Results: In Ethiopia, Liberia, Niger, Madagascar and Uganda, ministries of health applied the framework in partnership with multiple non-governmental, bilateral and international partners. Benin, Ethiopia, Madagascar and Senegal carried out large-scale programs and documented impressive results. Burkina Faso, Liberia, Mali and Niger deliver this preventive strategy together with the Integrated Management of Acute Malnutrition, while in Nepal and Bangladesh, ENA has encouraged cooperation between the health and agricultural sectors to address nutrition and food security together at broad scale. In Côte d'Ivoire, ENA promotes the appropriate use of a fortified complementary food while protecting optimal breastfeeding. In some countries, careful, structured formative research has been conducted to tailor ENA messages to each local context; in others the generic messages have required only modest adjustments to be used effectively.

Conclusions: The ENA framework promotes key nutrition actions to be taken at key contact points in the life cycle. Maximizing contacts through multiple program opportunities within existing systems and community structures can achieve large-scale coverage to achieve a public health impact in reducing under-five mortality and morbidity.

Key words: high impact nutrition interventions, ENA framework

PO340

NATIONAL AND SUB-NATIONAL ESTIMATES OF CHILD AND ADULT NUTRITIONAL STATUS RELATED TO LATER LIFE NUTRITION-RELATED NON-COMMUNICABLE DISEASE (N-RNCD)

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Background and objectives: Recent studies have demonstrated that many common manifestations of under-nutrition have significant associations with development of hypertension, insulin resistance, and obesity, particularly in an environment of growing calorie availability. These are pre-conditions related to the development of N-RNCDs. Addressing maternal and child under-nutrition is therefore important not only to prevent immediate threats of child morbidity/mortality, but also to reducing risk of N-RNCDs later in life. To gain insight into where future risk of N-RNCDs may lie in low-income countries, SPRING analyzed a set of Demographic and Health Surveys for sub-national patterns, using supplementary national-level data to provide context.

Methods: Nationally, data were analyzed for trends in prevalence of pre-conditions, diabetes, calorie availability, and anthropometrics. Sub-nationally, data on low birthweight at term, stunting, overweight, stunted and overweight, stunted with an overweight mother, and overweight women were weighted and stratified by: education, wealth, location and region. Estimates were mapped and compared for co-existing conditions.

Results: In Southeast Asia, prevalence of overweight women is low but growing in several countries, as is calorie availability and projected diabetes prevalence. In Africa, prevalence of hypertension and female and child overweight is high and growing quickly in many countries. Particularly within Sub-Saharan African countries, there are surprising overlaps in low birthweight, stunting, and overweight, irrespective of household wealth, education, or region. Southeast Asian sub-national estimates followed more traditional patterns of status, with under-nutrition primarily among the poor and less educated and overweight among the wealthier and better educated.

Conclusions: This descriptive analysis explores where future risks may lie for N-RNCDs in low-income countries, identifying where under-nutrition programs may be tailored to avoid later life conditions. SPRING is building additional evidence on why certain sub-populations are more at risk and how this can be used to advise nutrition programs.

Key words: Stunting, Overweight, NCDs

PO341

PLASMA FATTY ACIDS INFLUENCE LIPID PROFILE AND BLOOD PRESSURE IN INDIVIDUALS WITH DIFFERENT CARDIOVASCULAR RISK

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Background and objectives: Heart diseases are the main death cause all over the world. Therefore interventions in the risk factors, and specially, in diet, have been focal points in many public health interventions. Objective: Evaluate the influence of fatty acids (FA) percentage in plasma over lipid profile and blood pressure in different cardiovascular risk level individuals.

Methods: Adults and elders (n=374), from a clinical, prospective, randomized and double blind study based in nutritional intervention, were included in this clinical trial. After 12h

fasting, blood samples were collected. Lipid profile was analyzed from plasma (Total Cholesterol–TC; Low Density Lipoprotein–LDL; High Density Lipoprotein–HDL; Triglycerides–TG). Content of FA was determined through HPLC analysis and the areas were presented as percentage. All analyses were controlled by internal and external standards and two replicates. The blood pressure was measured based on the IV Brazilian Heart Society Guidelines. The statistical analysis evaluated the linear trend of TC, LDL, HDL, TG, Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) stratified in low, medium, and high levels, and these related to age, BMI, Linoleic Acid (AL), Alfa Linolenic Acid (ALA), EPA, DHA and the sum of EPA and DHA percentage in plasma. The Statistical Package for the Social Sciences® (SPSS Incorporation, 2006), 16.0 version was used and the significance level was $p<0.05$.

Results: The patients from the highest tertile of HDL had higher DHA content. Patients in the lowest tertile of DHA content were associated to higher levels of TG. When analyzing DBP, the individuals in the highest range presented lower levels of EPA and EPA+DHA plasma content.

Conclusions: Individuals with higher plasma fatty acid content of w-3 metabolites (DHA and EPA), present better lipid profile (lower TG and higher HDL) and lower DBP.

Key words: Blood Pressure, omega 3, fatty acids, lipid profile, cardiovascular risk.

PO342

SALIVA OSMOLALITY PREDICTS RESPONSE TO 4 WEEKS OF HIGHER WATER INTAKE IN HEALTHY FREE-LIVING MEN

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Background and objectives: No one gold standard index of hydration is sensitive to all aspects of optimal hydration. This study considered saliva osmolality (SaOsm) as an index of longer-term, usual status.

Methods: This secondary analysis used 6 weeks of longitudinal data from a clinical study where 5 healthy men (20-25y), with baseline 7d-mean total water intake below 2L/d, increased intake of drinking water by +0.8(0.3)L/d over weeks 3 and 4, and then +1.5(0.3)L/d over weeks 5 and 6, and significantly altered usual hydration status, based on serial 24-hr urine measures. Each week, fasting saliva, blood, urine, and body weight were collected after overnight water restriction. Following ingestion of D2O, the 7-day deuterium elimination rate was estimated at baseline, and during weeks 5 and 6.

Results: At baseline, hydration status defined relative to SaOsm>100mmol/kg (3 out of 5 participants) did not agree with status defined relative to serum osmolality>285mmol/kg (5 out of 5 participants) or urine osmolality>800mmol/kg (5 out of 5 participants). Over the weeks of higher water intake, the participants who were initially classified as hydrated based on SaOsm<100mmol/kg responded differently from the other participants. They responded with a significantly greater increase in deuterium elimination (Mean SE: +51(0.3)% vs. +8(3)%), no change in RBC K:Na content, and no increase in serum sodium. In contrast, participants who were initially classified as dehydrated based on SaOsm>100 mmol/kg significantly decreased RBC K:Na content (Mean SE: -1.7(0.5), and increased serum sodium (Mean SE: +2(0.6)mmol/l) and body weight (Mean SE: +1.2(0.3 kg).

Conclusions: Baseline SaOsm measured at a single point in time discriminated between participants' responses to 4 weeks of higher water intake. Further work is needed to pursue if and how saliva osmolality can be used to distinguish usual hydration status.

Key words: Saliva, osmolality, water intake, hydration, healthy men

PO343

THE ALTERATION IN THE PALATABILITY OF SWEET SUBSTANCES IN MICE BEFORE AND AFTER ONSET OF DIABETES

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Background and objectives: Sucrose causes the higher level of satisfaction in comparison with the other sweet substances. Therefore, it seems difficult to find the perfect sweetener to alternative to sugar. It is supposed that such feeling of contentment is arisen from both signals of sweet stimuli and calories. It is also well-known that the alteration in energy metabolism affect the preference and the sensitivity of sweet taste. The purpose of this study was to investigate the contribution of caloric content to the palatability of sucrose and other sweet taste substances by using diabetic animals.

Methods: We investigated the effect of various concentrations of a sucrose or saccharin on fluid intake as well as mice's preferences in a licking test. As the most common animal model of human diabetes, streptozotocin (STZ)-induced diabetic mice (C57/BL6) were used in this experiment. The licking test were conducted before (BD) and after (AD) the onset of diabetes.

Results: The licking rates for the serial concentration of sucrose and saccharin were increased in a concentration-dependent manner in BD and AD mice. In the initial licking for 1 min, the number of lickings of AD mice were significantly higher than BD mice in lower concentration of sucrose. It is suggested that the sensitivity for the sweet stimuli were increased after the onset of diabetes. On the other hand, the results in licking rate in saccharin solution were not similar to sucrose.

Conclusions: It is suggested that the caloric stimuli generates the feeling of satisfaction not only by post-ingestion but also within the oral cavity.

Key words: Diabetes, Sucrose, Sweet, Oral Sensitivity

PO344

IS THE RELATIONSHIP BETWEEN THE BLOOD-GROUPS AND FOOD ALLERGY IN CHILDREN AND YOUNG PERSONS?

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Background and objectives: The aim of the study was to exam the relation between select food allergens and blood-groups (A,B,AB,0) in children and young persons living in Poland.

Methods: The study comprised 973 questionnaire fulfilled by parents of Polish children aged 0.12-23.3years (mean age: 7.7+/-3.9 years) treated because of allergy disease in the period 1999-2008. The examinations were done at the consulting rooms of physicians cooperating with the Polish Help Society for Children with Asthma and Allergic Diseases in the whole Poland. The parents of the allergic and the asthmatic children with disease symptoms after food intake were chosen. Several data were collected. The study was approved by two independent Ethical Committees (2002).

Results: The allergenic symptoms after food intake had 467 children (48%; 275 boys and 192 girls comprised the selection criterion). There was no differences between blood types of boys and girls (A:41%, 0:27%, B:18%, AB:14%). However, taking into account food allergic symptoms (FA) the significant differences were found (FA: A:55%, AB:47%, B:38%, 0:44%; NFA: A:45%, AB:53%, B:62%, 0:56%; $p<0.01$). Three common food allergens were recognized – milk (351 children), egg (286 children) and citrus fruit (277 children). The boys with A blood-group had more often allergic symptoms (FA: A:54%, AB:49%, 0:44%, B:35%,; $p<0.01$). More girls had egg allergy than boys (G:67%, B:53%; $p<0.01$). The allergy for milk and milk products was related with blood groups (FA: AB:79%, A:76%, 0:68%, B:54%; $p<0.01$) and respectively to gender groups: AB and A groups of girls (AB:72%, 0:70%; $p<0.01$). Also citrus fruit allergy was more often in girls with AB blood group (78%, $p<0.01$).

Conclusions: The blood-group maybe an independent predictor for the possibility of the food allergy occurrence. However, more epidemiological study in different population is needed.

Key words: food allergy, blood-groups, children

PO345

EFFECTS OF LYCOPENE AND RED PALM OIL ON OXIDATIVE STRESS IN STREPTOZOTOCIN-INDUCED DIABETIC RATS

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Background and objectives: Red palm oil and lycopene are potent anti-oxidant, known to assist to defend against oxidative damage and free radicals. This study was conducted to investigate the effects of red palm oil and lycopene on oxidative stress in streptozotocin- induced diabetic rats.

Methods: Diabetes was induced by injection with 55 mg/kg body weight of STZ (Streptozotocin) dissolved in 0.05 M citrate buffer (pH4.5). Lycopene (10 and 20 mg/kg bw) and red palm oil (10 and 20 mg/kg bw) were given to the diabetic rats by force feeding for six weeks supplementation. Parameters studied included fasting blood glucose level, oxidative stress biomarkers (superoxide dismutase and glutathion peroxidase), lipid profiles (low-density lipoprotein cholesterol, triglycerides, total cholesterol and high-density lipoprotein cholesterol) and body weight.

Results: Supplementation with red palm oil and lycopene significantly ($p < 0.05$) increased the level of HDL-C and reduced the plasma low-density lipoprotein cholesterol, triglycerides and total cholesterol of diabetic rats as compared to control diabetic (un-treated and super olein oil) animals. Superoxide dismutase and glutathione peroxidase activities were enhanced in diabetic treated groups with lycopene and red palm oil compared to that in control diabetic rats. The supplementation of lycopene and red palm oil (significantly prevented body weight loss starting from 3rd week of lycopene and red palm oil administration in treated animals. Level of oxidative stress markers were also reduced with administration of red palm oil.

Conclusions: Lycopene may have considerable therapeutic potential as an antioxidant but there was no lipid lowering effect in Type 2 diabetes mellitus. These findings also indicate antidiabetic capability of red palm oil.

Key words: Red palm oil, lycopene, antioxidant, oxidative stress

PO346

RESULTS OF THE "BACTEREMIA ZERO" PROTOCOL IN CRITICAL CARE PATIENTS WITH A NUTRITIONAL SUPPORT BY (PARENTERAL WAY INTRAVENOUS) AFTER A YEAR OF IMPLEMENTATION

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Background and objectives: The bacteremia associated with the central intravenous catheters is the second most acquired medical complication in the ICU. Its prevalence can be modified with the incorporation of special insertion measures and through the exhaustive compliance of the Bacteremia Zero protocol through manipulation of the catheters. Objectives: To study the prevalence of bacteremia in critical care patients that received nutritional support via Parenteral Nutrition (PN) through a central intravenous catheter. Test the results after a year of implementation of the nursing care protocol, both in canalization of the central intravenous catheter as with subsequent care.

Methods: From the report made by the Microbiology Service with all records of the cultivated central intravenous catheters from 01/01/12 until 30/11/12, those that were contaminated and that belonged to patients that received Parenteral Nutrition were selected.

Subsequently, the microbial development in blood culture samples was studied, confirming the presence of the bacteremia when the culture was positive and with the same germ-polluting agent of the catheter.

Results: The culture was made in 126 central catheter tips from which 33 (26,1%) resulted positive. The 18,18% presented polymicrobial pollution before the implementation of the protocol. From January 1st until November 30th in 2012, 92 patients received Parenteral Nutrition (PN). of those, 10 displayed bacterial pollution (10,86%), confirming the presence of bacteremia. From these 10 patients, 30% displayed polymicrobial pollution; being the most common: St. Coagulasa (30%), Candida Albicans (20%), Enterobacter Cloacae (20%), Klebsiela Pneumoniae (20%), Enterococus Faecalis (10%).

Conclusions: Comparing with the results of 13,4% catheter pollution from the previous year, this year a decline was observed, bringing the number of pollutions down to 10,86% since the implementation of the "Bacteremia Zero" protocol.

Key words: bacteriemia, protocol, catheter infection, prevention, UCI patients, parenteral nutrition

PO347

DO OUR PATIENTS WITH CYSTIC FIBROSIS IMPROVE THEIR HABITS AND DIETARY INTERVENTION NUTRITIONAL STATUS AFTER PLANNED?

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Background and objectives: Malnutrition is common clinical findings in patients with cystic fibrosis (CF), as their energy and nutrient requirements are high, indicating an increase of 120% of the RDA for their age and sex. Nutritional intervention is compensated with obvious benefits both in growth and development as a respiratory function. To assess if CF patients improve their eating habits after following a nutritional intervention plan.

Methods: The study included patients with CF diagnostic criteria for conducting regular checks at our Hospital. Dietary intake was measured using the 'reminder 48 hours', supported by a photo book of food and further analysis with the software Food and Health. In order to access eating habits a frequency questionnaire was applied to validate the food consumption of the Spanish population. We also conducted a nutritional assessment, including weight and height measurements, arm circumference and skin folds (triceps, biceps, abdominal and subscapular), comparing our values with the graphs (under 14) and tables (over 14 years) with reference to the Spanish population.

Results: We included 27 patients, 59.3% male, 40.7% were under 14. From the dietary and nutritional intervention, we improved nutritional habits, especially the consumption of fruit and fish, reducing industrial bakery and carbonated drinks. With respect to energy and nutrient intake, we obtained an increase of 526.7 kcal / day, which impacted positively on nutritional status and the same improvement was observed in subsequent assessments. Regarding nutritional assessment, malnutrition was found in 25.9% of patients, the most affected parameters arm circumference and triceps skin fold.

Conclusions: Despite achieving significant changes in eating behaviours, we believe it is appropriate to strengthen their knowledge in each of the reviews to see a change of attitude towards the consumption of fatty acids, seeing as even the drinking pattern is wrong.

Key words: Cystic fibrosis. Nutritional assessment

PO348

IDENTIFICATION OF PATHWAYS INVOLVED IN THE SYNTHESIS OF INCREASED FATTY ACID IN ESSENTIAL FATTY ACID DEFICIENCY

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Background and objectives: The omega-3 fatty acid alpha-linolenic acid (ALA) and the omega-6 fatty acid linoleic acid (LA) are essential fatty acids (EFAs) as they cannot be produced by the human body. Both LA and ALA are metabolized by the same desaturases and elongases to form AA and EPA. Under EFA deficiency state, mammals synthesize 5,8,11-ecosatrienoic acid (Mead acid, 20:3n-9) from oleic acid. It is thought that Mead acid is formed by the same enzymes for AA and EPA synthesis. However, the enzymes and pathway involved in the conversion of oleic acid to Mead acid have not been fully elucidated.

Methods: In this study, we examined the genes and pathway involved in the synthesis of Mead acid using a cultured cell line.

Results: Generally, the polyunsaturated fatty acids (PUFAs) content of cultured cell line is very low, possibly because of low amounts of PUFAs in fetal bovine sera. In fact, we found that some cell lines accumulated Mead acid, a marker of EFA deficiency. Then, we examined the effect of knockdown of fatty acid desaturases (Fads 1-3) and elongases (Elovl1-7) on the level of Mead acid in cultured cells using siRNA-mediate silencing. In culture cells, siRNA-mediated knockdown of Elovl5, Fads1, and 2 decreased the Mead acid level. We next measured intermediate productions of Mead acid in knockdown cells of these genes and identified pathways for the synthesis of Mead acid. Mead acid was synthesized from oleic acid through two synthetic pathways; 1) 18:1n-9 ¨(Fads2)¨ 18:2n-9 ¨(Elovl5)¨ 20:2n-9 ¨(Fads1)¨ 20:3n-9; 2) 18:1n-9 ¨(Elovl5)¨ 20:1n-9 ¨(Fads2)¨ 20:2n-9 ¨(Fads1)¨ 20:3n-9. The changes of intermediate production via the pathway1 were larger than those via the pathway2.

Conclusions: It was showed that Mead acid was mainly synthesized through pathway1. Moreover, the expression of these genes was increased in EFA deficiency, suggesting Mead acid was required in cell membranes in place of omega-3 and omega-6 PUFAs.

Key words: polyunsaturated fatty acids, desaturases

PO349

CONSUMPTION EFFECT OF CALORIC AND NON-CALORIC BEVERAGES IN FOOD INTAKE IN RATS

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Background and objectives: the effect of consumption of caloric and non-caloric beverages in food intake are controversial and studies in this issue are sparse and inclonclusive. The present study aimed to evaluate the effect of caloric and non-caloric soft drink on the quantitative and qualitative intake of solid food in rats.

Methods: we treated 30 male rats, divided into 3 groups: control group (standard diet and water ad libitum), caloric soft drink group (standard diet, caloric soft drink and water ad libitum) and non-caloric soft drink group (standard diet, non-caloric soft drink and water ad libitum). The animals received treatment within 17 weeks.

Results: the consumption of caloric and non-caloric soft drink at the end of treatment did not cause changes in total energy intake, body weight and intra-abdominal fat. However, the caloric soft drink consumption resulted in a reduction in solid food intake, increased carbohydrates consumption and high total liquids intake. While the non-caloric soft drink intake didn't influence the total intake of solid food at the end of treatment.

Conclusions: based on the results, it was concluded that exposure to caloric and non-caloric soft drink caused no changes in total energy intake, body weight and intra-abdominal fat during the evaluation period. However, the caloric soft drink intake influenced the amount and the quality of solid food consumed. The non-caloric soft drink intake didn't influence the food intake.

Key words: Soft drink. Food intake. Macronutrients. This work was supported by the Pró-reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa reitoria de Pesquisa (PROPESQ) (PROPESQ) (PROPESQ) (PROPESQ) Federal University of Rio Grande do Sul – Brazil.

PO350

EFFECT OF CARBOHYDRATES DIETS ON EATING BEHAVIOR AND OXIDATIVE STRESS IN RATS

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Background and objectives: The high consumption of carbohydrates increases the presence of chronic noncommunicable diseases (NCDs) and additionally modifies eating behavior. NCDs are characterized by increased production of oxidative stress markers. However is it no clear how simple carbohydrates consumption affects eating behavior and oxidative stress. The objective of this project was to evaluate the effect of simple carbohydrates consumption on eating behavior and oxidative stress markers.

Methods: Nine adult rats of Wistar strain, divided into three groups, were exposed to diets with different simple carbohydrates diets: Control group (standard diet), Group 1 (diet high in simple carbohydrates), Group 2 (diet low in simple carbohydrates). Subsequently lipid peroxidation products MDA (oxidative stress markers) and production of advanced composite glycation (AGE) were measured at the beginning and end of the experiment. It is expected to identify the effects of the different models of diets on eating behavior and assess oxidative stress markers present in adult rats.

Results: Results showed that experimental diets increased eating behavior in comparison of control diet.

Conclusions: However, it was no clear the relation between experimental diets with oxidative stress markers. These findings suggest that high carbohydrate diets can modify eating behavior patterns.

Key words: carbohydrate, feeding behavior, markers of oxidation

PO351

PROCESSING METHODS AND NUTRIENT COMPOSITION OF FLOURS MADE FROM FERMENTED SOYABEANS(GLYCINEMAX), FERMENTED MAIZE(ZEAMAYS) AND UNFERMENTED GROUNDNUT(ARACHISHYPOGEA) USE IN COMPLEMENTARY FEEDING

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Background and objectives: In Nigeria, the commonly accepted complementary food for babies are porridges prepared with unsupplemented starchy foods like Maize(zeamays) Sorghum(sorghum bicolor) and tubers. Animal protein is rarely given due to its high cost. This study aims at assessing the processing methods and nutrient content of fermented Soyabean , fermented maize and unfermented groundnut flours for use in complementary feeding.

Methods: Soyabean grains were fermented for 24h, maize 24h. The Soyabean was dehulled by rubbing between palms and sundried, roasted until it turned light brown and drymilled into fine flour, (70mm meshscreen). The maize was wet milled, sieved and sundried. The groundnut sample was soaked in water for 10 minutes, drained, roasted until it turned light brown, then milled into groundnut paste. The proximate, mineral, vitamin and antinutrient composition of the flours were determined using official methods of analysis of AOAC.

Results: Fermented Soyabean flour and Groundnut flour had higher levels of protein (40.9g and 48.6g respectively) against the corn flour that had(0.53 g). Phytate, oxalate and tannins were highest in Soyabean (0.8 mg, 0.6 mg and 0.5 mg/100 g portion) while corn flour recorded least (0.2 mg, 0.1 mg and 0.1 mg/100 g portion). Calcium, Potassium , Sodium, Zinc, Iron and phosphorus were highest in Soyabean (220.16 mg, 214.39 mg, 275.62 mg, 8.3 mg, 7.14 mg and 585 mg)while corn flour recorded the least (78.15 mg, 178.31 mg, 168.53 mg, 5.53 mg and 3.62 mg).

Conclusions: Soyabean and groundnut flours are highly nutritious, they are good sources of protein , calcium, potassium, iron and zinc in formulating high nutrient dense complementary foods.

Key words: processing, fermentation, nutrient , complementary food.

PO352

EFFECTS OF SJAMP ON DEVELOPMENT AND IMMUNE FUNCTION OF EXPERIMENTAL HEPATOCARCINOMA IN RATS

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Background and objectives: Whether the Stichopus japonicus acid mucopolysacharide(SJAMP) has an effect on inhibiting tumor development is uncertain. We utilized hepatocarcinoma-induced rats¡¯ model to determinate the effects of Stichopus japonicus acid mucopolysaccharide(SJAMP) on tumor growth and immune function.

Methods: Rats in blank model group and SJAMP intervention groups (A, B, C) were treated by gavage with DEN saline

solution (10 mg/kg) for 80 days to induce liver tumor. Meanwhile, the SJAMP intervention groups were treated by gavage with different SJAMP doses . Rats were killed at the 16th week. The number of the nodules and the size of the largest nodule among groups were noted to calculate the inhibition rate of the antitumor. The phagocytosis function of macrophages was detected by neutral red method. The tumoricidal function of spleen macrophage and natural killer cell activity were assayed by methyl thiazolyl tetrazolium (MTT). T lymphocyte subsets in peripheral blood of rats were examined by flow cytometry method.

Results: Compared with blank model group, in SJAMP intervention groups, the number of the nodules and the mean volume of the largest nodule significantly lessened (P<0.05), the indices of the spleen and thymus increased (P<0.05) and the capability of macrophage's phagocytosis and killing improved (P<0.05).Compared with normal control group, natural cell killer activity and the levels of CD3+, CD4+T lymphocyte and ratio of CD4+ and CD8+ in blank model group were significantly lower, while with the gradual increase in SJAMP doses, natural killer cell activity£¬the levels of CD3+, CD4+T lymphocyte and ratio of CD4+ and CD8+ in three SJAMP intervention groups increased gradually.

Conclusions: In this study, SJAMP can inhibit the growth of tumor obviously, perhaps by stimulating the proliferation of immune organs and tissues to enhance the body cell immunity.

Key words: Diethylnitrosamine; Stichopus japonicus acid mucopolysaccharide; Macrophage; Natural killer cell; T lymphocyte subsets

PO354

DNA METHYLATION CHANGES INDUCED BY ZINC DEFICIENCY IN 0-2M-OLD RATS

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Background and objectives: Zinc is a component of the activity site of enzymes that epigenetically modify DNA. There is little information on the effects of zinc on DNA methylation in the hippocampus. The effects of zinc deficiency on the DNA methyltransferases (DNMT) expression and the methylation patterns of brain-derived neurotrophic factor (BDNF) gene were examined in this study.

Methods: Nine mother wistar rats were randomly divided into zinc-adequate group (ZA), pair-fed group(PF) and zinc-deficient group (ZD) and fed a diet containing 30 , 30 and 1 mg /kg diet of zinc, respectively. Ten neonatal rats in each group were randomly selected according to their body weight at the time of weaning and fed the same diet as their mothers and then sacrificed at the age of 60 day. The mRNA levels of DNMT1, DNMT3A, DNMT3B were measured by RT-PCR. qMS-PCR was used to screen methylation of BDNF exon IX DNA in the hippocampus of rats. Another independent assessment of altered methylation, Bisulfite sequencing PCR was used to examine site-specific methylation of 11 CpG dinucleotides within the same region of BDNF exon IX screened by qMS-PCR.

Results: Gene expression analysis showed increased DNMT1 and decreased BDNF mRNA levels in the hippocampus of ZD rats compared with ZA and PF rats (P<0.05). Furthermore, zinc deficiency during 0-2 months produced a prominent increase in DNA methylation level in BDNF exon IX (P<0.05) as compared with ZA and PF rats. Bisulfite sequencing PCR demonstrated that CpG sites of BDNF exon IX were mostly absolutely methylated in the hippocampus of zinc deficient rats compared with ZA and PF rats.

Conclusions: These results suggest that zinc deficiency in rats aged 0-2 months old influences the modification of DNA methylation.

Key words: Zinc deficiency£¬DNA methylation£¬hippocampus£¬BDNF£¬DNMT

PO355

FOOD INTAKE ASSESSMENT OF THE 'BOM PRATO' PROJECT USERS

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Background and objectives: To face the hunger and malnutrition problem in the low income population in Brazil, the Government of the State of São Paulo, aligned with the actions of the "Fome Zero" (Zero Hunger) Program, has created initiatives such as "Bom Prato" (Good Meal) Project, to offer complete, balanced and high-quality meals to low income families (elderly, unemployed, underemployed, homeless and itinerant). In spite of having a low cost (about US$0,50), the meals have a high caloric value (400 kcal for breakfast and 1200kcal for lunch). Objectives: Assess the nutritional status by food intake analyses, of the 'Bom Prato' Project users and its suitability according to FAO/WHO/2003 and the project itself.

Methods: There have been evaluated 315 people between 19 and 59 years old, who has reported going to the restaurant at least three times a week. The assessment of dietary intake was done with 24 hours dietary recall and following the food intake in the restaurant.

Results: The energy intake in the restaurant was above than the recommended by FAO/OMS/03, being the average of

948.55 kcal (SD=108.75), lower than proposed by the project. Macronutrients of the menu were adequately covered in 25.0% of carbohydrate, in 37.5% of protein and in 75.0% of lipids. In the daily food intake analysis 79.0% were below the energy needs. 78.7% had a diet normoglycidic, 59.9%, hyperproteic and 64.4% normolipidic. The saturated fat and cholesterol intake were above the recommended levels, respectively, 22.9% and 41.0%. The fiber intake was above average of 62.9%. The lunch was the most important meal of the day.

Conclusions: Most of the population does not have all the daily meals. The food intake at the popular restaurant represents a significant part of the daily intake. Therefore, this type of project is very important to offer a nutritionally balanced meal adequate for the population.

Key words: nutritional assessment, food intake

PO356

BLOOD PRESSURE CHANGES DURING PREGNANCY ACCORDING TO PRE-PREGNANCY BODY MASS INDEX: A PROSPECTIVE COHORT FROM RIO DE JANEIRO, BRAZIL

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Background and objectives: Systolic (SBP) and diastolic (DBP) blood pressure undergoes physiological changes during pregnancy. The weight status might be an important factor involved in abnormal pressure variations that can be associated with later hypertensive disorders. Objectives: To describe SBP and DBP levels during pregnancy according to pre-pregnancy BMI and compare it with post-partum blood pressure levels.

Methods: Prospective cohort of 227 women between 20-40 years of age, with singleton pregnancy and free of chronic and infectious diseases. SBP and DBP were obtained with automatic sphygmomanometer at 8-13th, 22-26th and 30-34th gestational weeks and 30 days after delivery. Pre-pregnancy BMI (kg/m²) was classified as: underweight/normal (<25.0); overweight (≥25.0 and <30.0); and obese (≥30.0). Statistical analysis comprised ANOVA (one-way and for repeated measures) and multiple linear regressions.

Results: Mean SBP and DBP were significantly lower in early pregnancy, compared to post-partum, for all strata of BMI, except in the obese group for SBP. SBP and DBP did not change throughout pregnancy for obese women, differently from other BMI groups. Although SBP and DBP were lower in underweight/normal group, comparing with obese, in all trimesters of pregnancy (p<0.001), the DBP showed no differences between groups in postpartum (p=0.3906). Regression models were adjusted for age, ethnicity, marital status, parity, smoking status, physical activity, education and weather at blood pressure measurement and showed that a variation of 1.0 kg/m² in BMI increased on average 0.96, 0.71 and 0.87 mmHg in SBP and 0.45, 0.42 and 0.61 mmHg in DBP of the first, second and third trimester, respectively (p<0.001).

Conclusions: BMI was directly associated with blood pressure during pregnancy. Obese women presented a different pattern of blood pressure variation, showed no decrease in SBP in early pregnancy, and did not present the characteristic decrease up to the second trimester.

Key words: Blood pressure; BMI; Pregnancy; Cohort.

PO357

RECOMMENDATIONS FOR IODINE CONTENT MEASUREMENT METHODS IN SALT IODIZATION PROGRAMS

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Background and objectives: Salt iodisation is the most effective intervention for the elimination of iodine deficiency. It is vital to monitor salt iodine content at various points in the supply chain for programs to be effective. Several methods of measurement have been developed, motivated by an attempt to make tests more precise, field- and user-friendly and cheaper. The objective of this paper is to review methods for iodine measurement available in order to develop recommendations for selecting the most appropriate method for salt iodisation programs.

Methods: Four validated methods for iodine measurement (Titration, WYD Iodine Checker®, Bioanalyt iCheck ® and Rapid Test Kit/RTK) were reviewed against cost, precision, user-friendliness and infrastructure requirements. These methods were then ranked considering the purpose of the different stages of a typical monitoring framework within a salt iodisation program.

Results: Titration is highly precise, requires technical user know-how and moderate infrastructure. Costs per analysis are low when a higher number of samples need analysed regularly. The WYD device is comparable to titration in most areas and is slightly more user friendly however has lower precision. The Bioanalyt iCheck® is the most user - friendly and has good precision however more costly in applications where a large number of samples have to be analysed on a regular basis. The RTK is the simplest and cheapest method. However its application is limited to qualitative results only.

Conclusions: On salt iodisation programs, the main objective of the monitoring exercise and use of the results should be considered when selecting the appropriate method for measuring iodine content in salt. Precision is not always the most important consideration. Cost and field- and user-friendliness must also be considered in order to ensure effective monitoring of iodization along the supply chain.

Key words: Salt Iodisation, Iodine, Micronutrients, Monitoring

PO358

SYSTEMATIC REVIEW AND META-ANALYSIS OF DIETARY PATTERNS AND DEPRESSION: OBSERVATIONAL STUDIES

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Background and objectives: Recent years have seen an increasing interest in the study of dietary patterns on the risk of depression. Study of whole diet rather than individual dietary components is of practical importance as nutrients are rarely eaten in isolation. This study aims to conduct a systematic review and meta-analysis of observational studies addressing the association between dietary patterns defined a priori (using diet quality scores or indices) and the risk of depression.

Methods: Six electronic databases were searched for studies published up to May 2012. Two reviewers evaluated the citations to determine eligibility. Studies assessing diet quality and depression among adults were included. Relevant studies were evaluated for methodological quality using the American Dietetic Association Quality Criteria Checklist for primary research and the European micronutrient Recommendations Aligned Network of Excellence scoring system. Only studies considered methodologically rigorous were included. Data were extracted by two reviewers to ensure accuracy. Effect sizes of eligible studies were pooled using a random effects model.

Results: One cohort and nine cross-sectional studies were included in this review. Due to the variety in diet quality scores used, meta-analysis could only be conducted for studies with similar definition of good diet quality (n=1 cohort; n=8 cross-sectional). Good diet quality is characterised by high intakes of fruit and vegetables, fish, whole-grain products, lean meat, and low-fat dairy. Results indicated that good diet quality was significantly associated with a reduced risk of depression (OR = 0.89; 95% CI: 0.85, 0.94; p<0.001).

Conclusions: This finding is clinically relevant for public health, in particular for encouraging the consumption of good quality diet for primary prevention of depression. This review also highlights the need for better designed cohort and case-control studies to clarify the role of dietary patterns and depression risk.

Key words: dietary patterns, diet quality, depression, review

PO359

BODY IMAGE PERCEPTION IN BRASILIAN ELDERLY

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Background and objectives: Body image involves perception, affect, and cognitive components. Body image is not only changed due to age but to problems experienced, such as diseases, limitations of movement and especially the influence of stereotypes. Aim: To evaluate and compare the current body image and would like to take elderly residents in a poor area of Rio de Janeiro - Brazil.

Methods: It was used an evaluation model of body image with 81 seniors conducted by trained nutrition students. This assessment contains a series of nine silhouettes for men and nine for women in a progressive scale, where each senior must observe the pictures according to their sex and to answer how many of the figure corresponds to their body image. The silhouettes are classified as underweight, normal weight, overweight and obesity. Individuals reported body image corresponding to the current physical appearance and the appearance that they would like to have. Measures of frequency and reason prevailed (RP) with confidence interval (CI) of 95% were calculated.

Results: Body image had PR of 1.37 (CI 95%1.24 to 1.63) for thinness and PR 3.69 CI 95% (2.32 to 5.87) for overweight/obesity. In relation to physical appearance, the highest percentage was observed for the eutrophic with 40.7% followed by the silhouette of overweight/obesity with 43.2% and 16.0% of thinness. The results for the appearance that the elderly would like to have had the highest percentage for the silhouette of normal weight (59.3%), but 14.8% would like overweight / obesity and 25.9% had thinness.

Conclusions: The elderly identified themselves as having a much higher prevalence of overweight/obesity. Although many older people find to be a figure equivalent to an appropriate weight, they still want to be thinner.

Key words: eldery, body image, nutritional status

PO360

PREVALENCE OF OVERWEIGHT AND OBESITY AND ASSOCIATED FACTORS AMONG SCHOOL GOING CHILDREN IN KENYA: THE CASE OF NAKURU MUNICIPALITY

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Background and objectives: Overweight and obesity are important determinants of diseases of lifestyle and other morbidity on the rise in developing countries. The aim of this study was to determine the prevalence of overweight and obesity and associated factors among school going children in Nakuru municipality. The study investigated the prevalence of overweight and obesity and associated factors including dietary patterns, types of physical activities, socio-economic factors, advertisements and home/physical environment.

Methods: A cross sectional survey design was adapted and a randomly selected sample of 200 school going children aged 10-14 years in 10 schools was used. A structured questionnaire was used to collect data and anthropometric measurements (height and weight) were taken using Seca calibrated scales. Data was analysed using Statistical Package for Social Sciences (SPSS) version 11.5. Descriptive statistics was done. Chi-square and binary logistic regression were used to determine association between variables. ANOVA and t-test were used to compare means between variables. Tests of significance were computed at $\alpha = 0.05$. The children whose percentile values were 85th to < 95th were classified as overweight and ≥95th percentile obese.

Results: The study found that 20.5% of the children were overweight and 15.5%, obese. Prevalence of overweight and obesity was high among children from high socioeconomic status ($p = 0.000$) and in private schools ($p = 0.000$) irrespective of their gender and age.

Conclusions: Dietary patterns, types of physical activities, socioeconomic factors and home/physical environment influenced the prevalence of overweight and obesity among the children. Prevention and management may be achieved through a variety of interventions targeting home/physical environment, physical activity, and diet; by stakeholders' including parents, children, policy makers and programme planners.

Key words: Overweight and obesity, School going children, Dietary patterns, Socio-economic status and physical activities.

PO361

FACTORS ASSOCIATED TO THE UNDERREPORT OF ENERGY INTAKE IN FOOD RECORDS AMONG ADULTS FROM THE RIO DE JANEIRO AREA, BRAZIL

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Background and objectives: The main consequence of misreport in dietary surveys is the attenuation of association measures of the diet-disease relationship. In order of planning and carrying out studies evaluating dietary intake, it is important to identify characteristics related to the misreporting of food consumption. This study aimed to evaluate the individual characteristics associated with underreport of energy intake (EI) in food records (FR) of adults.

Methods: The studied group included 84 individuals between 20 - 60 years old who were recruited from a sample investigated in a population-based cross-sectional study in Duque de Caxias, state of Rio de Janeiro, Brazil. Energy intake was estimated from two non-consecutive FR, and the means were deattenuated for intraindividual variability. Energy expenditure (EE) was estimated using the Doubly Labeled Water (DLW) method. Misreport in EI was estimated by calculating the 95% limits of agreement of the EI/EE ratio, and underreport of EI was defined by EI/EE < 0.62. Multivariate logistic regression models were developed to estimate the association (odds ratio – OR; 95 confidence interval – 95%CI) between individual characteristics and EI underreport.

Results: Underreport of EI was observed in 36% of subjects, ranging between 24 and 43%, with a mean of 29%, being more frequent among women. The characteristics associated with underreport of EI were: irregular habits of meals consumption (OR=8.3; 95%CI:1.3; 53.9), regularly replacing lunch or dinner by snacks (OR=11.1; 95%CI: 2.2; 54.6), and the consumption of light products (OR=4.9; 95%CI: 1.3; 18.9), independently of gender and total energy expenditure.

Conclusions: Individuals that did not maintain regular habits of meals - and those that were trying to reduce sugar/fat intake had more difficulty in reporting accurately the food consumption.

Key words: energy intake, energy expenditure, food consumption, food records, dietary surveys

PO362

THE EFFECTS OF VITAMIN A, E ON PROLIFERATION OF HUNMAN ESOPHAGEAL CANCER CELL LINE ECA-109 CULTURED WITH HUMAN SERUM

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Background and objectives: Studies on the effects of vitamins A and E on esophageal cancer are inconsistent. This study is to assess the effects of different concentrations of vitamins A and E on proliferation of human esophageal cancer cell line Eca-109, and explore the possible mechanisms.

Methods: By means of MTT assay, 3H-thymidine incorporation, cell toxicity experiment and flow cytometric analysis were used to observe the effects of vitamins A and E on cell proliferation with adding different concentrations of vitamins A and E in the medium with 5% human serum.

Results: Vitamin A could inhibit the proliferation of human esophageal cancer cell line Eca-109 in dose effect manner, affect the DNA synthesis, and block cell mitosis. The inhibitive effect of vitamin A at the level of 50mg/L was significant ($p<0.01$), but the coordinated effect of Vitamins A and E on the proliferation of human esophageal cancer cell line Eca-109 was not observed. Vitamin A may make the cell gather in S phase and destroy DNA synthesis. Therefore, the cell could not pass the regulation point of G2/M and the mitosis was blocked.

Conclusions: Vitamin A may inhibit proliferation of the human esophageal cancer cell line Eca-109 cell.

Key words: vitamin A, vitamin E, Eca-109, human serum

PO363

CHANGES IN THE ULTRASTRUCTURE OF RAT'S SURAL NERVE SUBJECTED TO BRAZIL REGIONAL BASIC DIET

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Background and objectives: Malnutrition is a disease with worldwide prevalence. Their deleterious effects lead to complications in both the central and peripheral nervous system of mammals, especially if it occurs during development. For this reason the research aims to analyze the effects of a multideficient diet, used by the population in the forest zone of pernambuco - brazil, in the ultrastructure of the rat's sural nerve.

Methods: We used animals of different ages (p13, p21, p30 and p60) from litters whose mothers underwent multideficiente diet during breastfeeding. We proceeded to ultrastructural analysis of qualitative, quantitative and statistical sural nerve, by analysis of the area of the myelin sheath and percentage of myelinated and unmyelinated fibers by electron microscopy transmission in control and experimental group.

Results: the multideficiente diet caused malnutrition in animals of the experimental group while maintaining the ultrastructure of the nerve, but, leading to a significant reduction in the area of the myelin sheath in the animals at 21 and 60 days respectively: 3.5 μm2 and 4.0 μm2 in the malnourished group and 5.0 μm2 and 7.5 μm2 in the control group ($p <0.001$). The undernourished group remained the same proportion of myelinated / unmyelinated with 21 days (43/52) and 60 days (46/50) differed from the control group that received gradual increase in myelinated fibers of the 21 (49/51) for p60 days (60/30) ($p <0.05$).

Conclusions: the research revealed that regional basic diet of Pernambuco - Brazil causes changes in the ultrastructure of the sural nerve of mammals. The changes remained present until adulthood animals may cause permanent deficits in nerve impulse transmission.

Key words: sural nerve, myelin, basic regional diet, malnutrition

PO364

INSTAPA WP6: THE EFFECTS OF MICRONUTRIENT SUPPLEMENTATION WITH REDUCED IRON CONTENT ON MOTOR DEVELOPMENT IN INFANTS IN A MALARIAL AREA

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Background and objectives: While iron deficiency anaemia is prevalent in malarial areas, iron supplementation may increase health risks in these areas. This presentation describes the impact of supplementation with micronutrient powders containing either a low iron dosage or no iron, on the motor development of infants in a double blind efficacy trial. The objectives are: (1) to compare the psychomotor performance of the INSTAPA cohort with unsupplemented infants (PNE cohort) from the same community; (2) to identify the aspects of psychomotor development most responsive to micronutrient supplementation.

Methods: The study site is a rural area on the Kenyan coast. Infants received daily micronutrient supplementation from 6 Â 18 months of age, and were assessed at six-monthly intervals to determine gross motor skill development, eye-hand co-ordination and level of motor activity. The scores of 238 supplemented infants on the Kilifi Developmental Inventory (KDI) were compared with the scores of 217 unsupplemented infants in the same area. We examined the association between KDI scores and the amount and type of motor activity observed, as well as the correlation between these measures and baseline haemoglobin.

Results: INSTAPA infants had improved eye-hand coordination relative to PNE children by 12 months of age (INSTAPA 17,2 PNE 16.1; f=16.346, p<.001) . In the INSTAPA cohort at baseline only eye-hand co-ordination scores correlated significantly with haemoglobin levels. The locomotor scores correlated with the amount of time spent mobile, but were independent of haemoglobin.

Conclusions: These analyses suggest that the development of eye-hand co-ordination is more specifically related to iron status at this age than general energy levels and exploration in infants.

Key words: Malaria, micronutrients, motor development

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PO365

VITAMIN D INSUFFICIENCY IN PRIMARY CARE POPULATION: A STUDY IN URBAN BHUBANESWAR, ODISHA, INDIA

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Background and objectives: Vitamin D deficiency is emerging as a major public health challenge globally. A number of studies have highlighted the presence of Vitamin D insufficiency among general populations. Present study aimed to assess the prevalence of vitamin D deficiency among primary care patients attending urban health dispensary of the Bhubaneswar city, Odisha and to examine the feasibility and efficacy of vitamin D replacement as a routine component of primary care.

Methods: Review of dispensary outpatient register of two month was undertaken to identify patients aged 18 years and more with at least one 25-hydroxyvitamin D level. When patients were found to be deficient (vitamin D <20) they were administered 50 000 units ergocalciferol monthly or over-the-counter calcium supplements with vitamin D. Descriptive statistics were used to calculate the prevalence rate, and paired t tests were used to compare the vitamin D levels pre and post treatment.

Results: Out of total 1790 patients 787 (44%) were found to have vitamin D deficiency, and 525 were treated with ergocalciferol or vitamin D supplements. Majority (81%) were either elderly or women. For patients deficient at baseline and treated with vitamin D supplementation, significant differences were found between baseline and follow-up vitamin D levels (p < .001). Among 525 patients deficient at baseline and treated, 357 were corrected with oral vitamin D (68%), leaving 168 patients (32%) deficient after vitamin D supplementation.

Conclusions: Study results indicate vitamin D deficiency to be highly prevalent in an urban, primary care population being more pronounced among elderly and women. This can be improved readily through oral vitamin D supplementation. The study also suggests that routine screening for vitamin D insufficiency may be useful for timely detection and treatment of vitamin D deficiency, especially in urban elderly populations.

Key words: vitamin D insufficiency, primary care, urban elderly

P366

SOCIO-CULTURAL, ORGANIZATIONAL, AND COMMUNITY LEVEL INFLUENCES ON PHYSICAL ACTIVITY LEVELS OF LATINO PRESCHOOL-AGED CHILDREN: A QUALITATIVE STUDY

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Background and objectives: As more children grow up in families with immigrant parents of Latino origin, there is need to understand key influences on physical activity behaviors of young Latino children to prevent obesity in this high risk group.

Methods: We conducted six focus groups with low-income Latina mothers (N = 33) whose preschool-aged children (2-5 years) were enrolled in the Supplemental Nutrition Program for Women, Infants and Children (WIC) program in Rhode Island.

Results: Despite understanding the importance of physical activity for overall health, physical activity was s not a top priority for the Latino mothers participating in the focus groups who face numerous barriers to establishing and maintaining healthful physical activity habits for their preschool-aged children and themselves, particularly financial and socio-cultural barriers. Analyses revealed that Latina mothers perceive the WIC as a program focused on the development and maintenance of healthy eating habits and nutritional status of children and not physical activity.

Conclusions: Recognizing the importance of socioeconomic position and the influence of cultural factors on physical activity is essential if effective prevention and intervention programs for Latino families and their children are to be designed. Study findings emphasize the importance of the family as a central unit of change and suggest that successful interventions to promote physical activity among low-income Latino preschool children must take into account the needs and constraints of the family unit as a whole. The WIC program has the potential to be a venue for promoting awareness of and educating low-income Latino parents about the importance of helping their children develop and maintain early healthful physical activity habits.

Key words: Physical Activity, Latino, Obesity, Children, WIC Program.

PO367

A NUTRITION EDUCATION INTERVENTION TO COMBAT UNDERNUTRITION: EXPERIENCE FROM A DEVELOPING COUNTRY

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Background and objectives: Undernutrition in children is a major public health concern in Pakistan. The country has one of the highest rates of infant mortality in South Asia. A number of interventions focused only on providing nutrient supplementation have failed to change child undernutrition status in the country during the last 2 decades. The present study aimed to assess the impact of nutrition education on the nutritional status of children living in resource limited environments. The hypothesis was that nutrition education can improve nutritional status of children. This study reports the results of a three month intervention (Oct – Dec 2010) on the change in nutritional status of undernourished children.

Methods: Subjects were 586 children from Tando Jam and Quetta, Pakistan aged 6 months to 8 years. Children were characterized as mild, moderate or severely wasted on Z-Scores. Anthropometry and 24 hour dietary recall was used for nutritional assessment. . The intervention strategy focused on nutrition education based on individual counseling targeting the mothers. The majority of these women could not read and wri-

te and so the sessions comprised of verbal discussions. Direct counseling sessions were also conducted with undernourished children 5 years and older. Primary outcome was decrease in severity of wasting as well as changes in feeding practices.

Results: Nearly 36% children in Tando Jam and 32% children at Quetta progressed to a normal nutritional status. There was a significant increase in the number of meals taken per day (Tando Jam- p=<0.000/Quetta-p=<0.025). At Tando Jam significant increase was reported in the intake of high starch food items, vegetables and fruits (p=<0.000). In Quetta significant increase was noted in the intake of plant protein (p=<0.005), dairy foods (p=<0.041) and vegetables (p=<0.026).

Conclusions: Nutrition education was successful in reducing undernutrition in food insecure households.

Key words: community-based intervention, nutrition education, Pakistan, undernutrition.

PO368

HEALTH BENEFICIAL CONSTITUENTS OF FOUR UNDERUTILIZED TROPICAL FRUITS

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Background and objectives: Tropical fruits are postulated to have health benefits but many lack literature to support such claims and remain underutilised. This research was to document relevant data on the health potential of selected underutilised Ghanaian fruits; Irvingia gabonensis (African mango; pulp and seeds), Artocarpus altilis (breadfruit; pulp), Annona muricata (soursop; pulp) and Annona squamosa (sweetsop; pulp).

Methods: Commercially-mature fruits were obtained when in season and edible portions freeze-dried and stored at – 20oC prior to analysis. Samples were screened for selected phytochemicals using standard methods and their total phenolics spectrometrically determined using the Folin-Ciocalteu procedure and calculated as gallic acid equivalent (GAE). The ascorbic acid contents (AAC) were determined titrimetrically using N – bromosuccinimide and the total antioxidant activity (AOA), determined spectrometrically by 2,2-diphenyl-1-picrylhydrazyl radical scavenging.

Results: Detected phytochemicals included tannins, triterpenoids, saponins, sterols, cardiac glycosides, flavanoids and coumarins. There was varying AOA (P<0.05) for the samples with values ranging from 78% (African mango pulp) to 63% for breadfruit although the total phenolic contents were low with African mango seeds (hull included) having the highest (20.96 mg/100g GAE). However, positive correlations (+1.0000; P<0.05) existed between the phenolics and AOA of all the samples except for soursop and sweetsop which recorded negative correlations (-1.0000; P<0.05). High AAC were obtained with values ranging from 20.32 mg/100g (sweetsop) to 62.52 mg/100g (soursop) except for African mango seeds with the least value of 1.04 mg/100g. Similar positive correlations existed between the AAC and AOA of soursop and African mango (pulp and seeds) while breadfruit and sweetsop recorded negative correlations.

Conclusions: The study provides evidence that the consumption of these fruits may significantly boost the health of consumers due to their free radical scavenging potential, appreciable ascorbic acid contents and inherent essential phytochemicals.

Key words: health potential, phytochemicals, underutilised fruits

PO369

EFFECT OF TRANS FATTY ACIDS ON BLOOD GLUCOSE LEVEL AND NECROSIS IN RATS

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Background and objectives: Trans fatty acids are a type of polyunsaturated fatty acid. High intake of trans fatty acids can cause inflammation and lipid peroxidation of cell membranes, which in turn damage cells and tissues by destructing cell membrane and core components of the cell. The purpose of the study was to investigate the effect of dietary trans fatty acids on blood glucose level and necrosis in the pancreatic ß cell.

Methods: An experimental laboratory, with a Randomized Pre-Post test control group design was conducted on 12 male Wistar rats were fed for 14 days with diets containing 43% energy as fat and 2% trans fatty acid.

Results: After intervention, feeding trans fatty acid was significantly increase the blood glucose level in the treatment group than in the control group (p<0.05). The destruction in the pancreatic ß cell is not obvious, however the number of normal cells in the treatment group (transfat diet) are found less than in the control group (p>0.05).

Conclusions: There are metabolic implications due to the ingestion of trans fatty acid.

Key words: trans fatty acid, blood glucose, necrosis, pancreatic ß cell

PO370

RISK FACTORS FOR PRELACTEAL FEEDING IN THE FIRST THREE DAYS OF LIFE IN SEVEN LATIN AMERICA AND CARIBBEAN COUNTRIES.

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Background and objectives: WHO recommends exclusive breastfeed for six months of life. We aim to identify the risk factors related to give other foods or liquids than breast milk (prelacteal feeding) in the first three days of life.

Methods: The present study used secondary data from seven countries (Colombia/2010, Bolivia/2008, Guiana/2009, Haiti/2005, Honduras/2005, Peru/2007 and Dominican Republic/2007), obtained from the Demographic and Health Surveys. A binomial regression (having "gave only breast milk" as reference category for the outcome) was adjusted, having country of residence, wealth index, place of residence (urban/rural), educational level, birth weight, cesarean delivery, place of delivery (home/hospital), and sex of child as confounders. All variables without statistical significance ($p<0.001$) were excluded from the model.

Results: The final sample was 58,056 children: 51.3% were male and 51.6% were living in urban areas. In the first three days of life, 67.0% of the mothers gave only breast milk to their baby, 17.9% gave infant formula, 6.4% gave tea or infusions, 5.0% gave milk (other than breast milk), 2.0% gave plain water, and 4.5% gave other foods or liquids. Considering the binomial model, the adjusted Odds Ratio (OR) of giving other food or liquids (than breast milk) in the first three days of life was higher in Haiti (OR=6.65), Dominican Republic (OR=3.57), Guiana (OR=2.76), Peru (OR=2.39), Bolivia (OR=2.35) and Honduras (OR=2.21), having Colombia as reference. The OR were also higher among the richest (OR=1.46) mothers, with higher educational level (OR=1.33), cesarean delivery (OR=2.51), and delivery at home (OR=1.29). All variables had statistical significance ($p<0.001$).

Conclusions: The high frequency of mothers that gave prelacteal feeding to their babies early in live support the investment in policies targeted to the most vulnerable countries and individuals, in order to promote, support and protect breastfeeding.

Key words: breastfeeding, prelacteal feeding, child health, nutrition, epidemiology

PO371

DEVELOPMENT OF A PREDICTION EQUATION FOR ESTIMATING FAT-FREE MASS AMONG CHILDREN WITH ACUTE LEUKAEMIA UNDERGOING IN-PATIENT CHEMOTHERAPY

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Background and objectives: Fat-free mass (FFM) is an important index for energy and fluid requirements; hence, its assessment is crucial for optimal clinical care and clinical outcomes among hospitalized patients. Objective: To validate the assessment of FFM using bioelectrical impedance analysis (BIA) Maltron BioScan 916 against deuterium dilution technique among paediatric patients diagnosed with acute leukaemia and to develop a prediction equation for estimating FFM among these patients.

Methods: Forty-seven paediatric patients aged 3-12 years, diagnosed with either acute lymphoblastic leukemia (ALL) or acute myelogenous leukemia (AML) and undergoing chemotherapy treatments participated in the study. FFM was measured using BIA and deuterium dilution technique was the criterion method. For the development of prediction equation, patients were randomly divided into developmental group (n = 32) and validation group (n =15). Prediction equation was generated from the developmental group using stepwise multiple regression analysis, which was then applied to the validation group.

Results: There was no significant difference between predicted FFM (17.4 ± 4.6 kg) and measured FFM (17.3 ± 4.8 kg) in the validation group ($p>0.05$), with a pure error of 2.0 kg, relatively close to the standard error of estimate (SEE) of 1.6 kg in the developmental group. Therefore, the total sample (n = 47) was used to develop a final prediction equation as FFM = (0.418 x impedance index) + (0.152 x height) + (0.088 x waist circumference) – 12.2, ($R2= 0.935$, pure error = 1.6 kg and SEE=1.7 kg).

Conclusions: Impedance index was the strongest predictor of FFM and its usage improved the accuracy and validity of BIA in predicting FFM. The prediction equation developed for estimating FFM among paediatric patients with acute leukaemia may be useful for a more effective prescription and monitoring of treatment among this patient cohort.

Key words: children, acute leukaemia, fat-free mass, stable isotope

PO372

INAPPROPRIATE NUTRITION PRACTICES AMONG CHILDREN IN NORTHEAST BRAZIL

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Background and objectives: Feeding in the first years of life has vital importance for the full development of children. Both exclusive breastfeeding until six months old and the proper introduction of complementary feeding contribute to prevent diseases and nutritional deficiencies. This study investigated dietary patterns among children under two years of age.

Methods: This cross-sectional study included 360 children, randomly selected residents in Redenção, Brazil. Mothers answered a closed questionnaire concerning breastfeeding and introduction of complementary feeding and a 24-hour dietary recall.

Results: It was found 24.7% of children under 6, 25.0% of 6-11,9 and 50.3% of 12-23.9 months of age. Some mothers were adolescents (13%) and only 32.2% finished high school. The prevalence of exclusive breastfeeding under six months was 34.8%. The average and median duration of it was 73.9 (SD = ±67.9) and 60 days, respectively. Regarding the introduction of complementary feeding, 69.1% of children received it in addition to breast milk, regular amount considered by WHO. Early introduction was common, occurring in 78.6%. The feeding consistency was: liquid (91%), for under 6; solid or semi-solid (72.2%), for 6-11,9 months; the family meal (67.4%) for children older than one year of age. The most mentioned foods were milk and dairy products (83.6%), cereals (82.5%) and fruits (52.8%). Meat and eggs were present in the diet of only 43.4%. The minimum frequency of meals, the WHO indicator, was observed in 98.2% of the children. The evaluation of diet quality through Diversity Food Minimum indicator showed that only 56.5% of them had a diversified diet. Only maternal education was associated with the early introduction of foods ($p = 0.017$).

Conclusions: The exclusive breastfeeding and complementary feeding are far from that recommended by the WHO, mainly due to fluid delivery. The feeding of children was not very diverse.

Key words: breastfeeding; complementary feeding.

PO373

DEVELOPMENT OF CEREAL ENRICHED WITH ACITAN

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Background and objectives: During several stages of life the organism requires certain components as vitamins, minerals, dietary fiber and antioxidant substances, which play an important role in the health benefit. The present work had as an objective to rehearse some technological variants comparatively to obtain a cereal enriched with Acitán (powder of banana pseudosterm), which is achieved as a sub product, during the culture of banana tree. -

Methods: Observational tests firstly with different concentrations of rice flour, sugar, maltodextrine, vanilla and cocoa as scents were performed .The presence of Acitan was among 5-10% in the studied formulation. Tests were designed to laboratory scale with the purpose of obtaining a product of long life whose quality indexes resembled each other to a traditional cereal. The selected product was elaborated in pilot lots and its main indexes of general quality were characterized. The nutritional information was designed according to the requirements of the Registration Office of the Nutrition and Hygiene of the Foods Institute, of the Cuban Public Health Ministry.

Results: organoleptic Characteristics: fine powder, homogeneous, appearance; brown color and smell to a fresh product. Nutritional composition ,humidity % 4,67 ;protein % 10,06 ;ashes % 1,65 caloric value Kcal 375,42 ;carbohydrate % 83,48.

Conclusions: It is concluded that the cereal enriched with Acitan to 10% ,constitutes an option for the healthy feeding of children and adults.

Key words: Acitán, functional foods, cereal

PO374

IMPACT OF HOMESTEAD FOOD PRODUCTION ON THE NUTRITIONAL STATUS OF CHILDREN 12-48 MONTHS AND THEIR MOTHERS IN BAITADI DISTRICT, NEPAL

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Background and objectives: In Nepal, stunting, wasting, underweight and anemia affects 41%, 11%, 29% and 46% of preschool children, respectively. The impact of nutrition-sensitive agriculture interventions on child growth and anemia has not been clearly elucidated. We assessed the effect of a 3-year homestead food production (HFP) project on anthropometrics and anemia among children 12–48 months and their mothers in Baitadi district, Nepal.

Methods: This study utilized a multi-stage cluster randomized, controlled design. Cross-sectional data were collected from 2,106 and 2,614 mother-child pairs at baseline and post-intervention, respectively, in villages assigned to receive HFP activities (treatment) or not (control). Bivariate results are presented; multivariate results will be ready later.

Results: Between baseline and post-intervention, food secure households improved by 26 percentage points in treatment compared to 9 percentage points in control communities. The proportion of treatment children fed the WHO-recommended minimum acceptable diet improved by 44 percentage points compared to 6 percentage points among control. Stunting and wasting were similar for baseline and post-intervention in either group. Underweight was significantly lower post-intervention (40.6%) compared to baseline (48.0%) in control, but remained the same among treatment children (43.4% vs. 41.0%). Anemia was significantly higher post-intervention than at baseline among control (42.5% vs. 31.6%), but remained similar among treatment children (30.8% vs. 28.2%). While underweight did not change among treatment mothers (28.2% vs. 26.6%), post-intervention underweight (23.0%) was significantly higher than baseline (17.5%) among control mothers. Anemia was higher post-intervention than at baseline in both treatment (24.6% vs.19.6%) and control (35.8% vs. 21.1%) mothers, but increased less in the treatment group.

Conclusions: This study indicates HFP improved household food security and child feeding practices, and had a potentially positive impact on childhood and maternal anemia and maternal underweight. However, there was no demonstrated impact on childhood stunting, underweight and wasting.

Key words: children, homestead food production, anemia

PO375

EFFECTS OF A FERMENTED MILK PRODUCT ENRICHED WITH PROTEIN AND FIBRE TO SATIATION AND WEIGHT REDUCTION

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Background and objectives: Weight management is aided by limiting calorie intake, which in turn is achieved by controlling meal/portion size and appetite and reducing hunger pangs. The desire to eat (appetite) is influenced by the contrasting feelings of hunger and fullness. Aim of the study: To investigate the effect of consumption of a milk product enriched with protein and fibre on self-reported measures of appetite in subjects managed their weight. Study group: 200 healthy, female volunteers, aged 20 to 45 years, were divided into 2 groups of 150 subjects in the test group and 50 subjects in the control group. All of volunteers were non-smokers. Subjects with known allergy to milk proteins or intolerance to lactose were excluded.

Methods: Subjects were provided with sufficient product to eat up to 1 pot/day for 14(+1) days. They had to eat at least 1 pot per day. The total duration of the study was approximately 3 weeks for each subject, 1 week lead-in phase followed by 2 week test phase, with 2 assessments of appetite measures using a self-reported questionnaire (SRQ) at 2 and 4 weeks.

Results: Evaluation of the time of satiation after eating of investigated product was found out relationship between consummation of this product and time of satiation. Group consumed this product reported satiation longer than 2,5 hour (31,6 %) and longer than 3 hour (7,5 %) vs. group consumed normal yogurt longer than 2,5 hour (20 %) and longer than 3 hour (4%).

Conclusions: The results shoved higher satiation at group with consumed fermented milk product enriched with protein and fiber than group consumed only "normal" yogurt. It is better for obese people to eat this type of milk product for decrease of meal portion.

Key words: satiation, weight reduction, obesity, fibre

PO378

POLISH CONSUMER ATTITUDES TO REDUCE FAT CONTENT IN MEAT

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Background and objectives: Due to the presence of many diet-related diseases, which one of the causes may be eating meat, many countries take action to reduce the amount of fat in it. In Poland, in order to get to the level of consumer acceptance of innovative activities involving the lower the fat content of the meat in order to improve the nutritional value of quantitative national survey was conducted.

Methods: The survey was conducted on a sample of 1000 people. To assess the benefits and risks of using the process of lowering the fat content of the meat used 6-point scale (where 1 - high, 2 - rather large, 3 - neither big nor small, 4 - rather small, 5 - small, 6 - none).

Results: The analysis of empirical data led to the conclusion that Polish consumers are positive about the removal of foods, including meat fat to improve the health and nutritional values. Over 70% of respondents accept such an effect. More than three fifths of respondents perceived the 'big' or 'fairly large' benefits of this process, with two fifths of respondents indicated the 'small' or 'rather small' risk. The benefits of reducing the fat content in meat saw significantly more consumers coming from rural areas (64.1%), those with medium (64.4%) and higher (61.7%), education, evaluating their knowledge of nutrition as well as the financial position of the 'very bad' and 'bad' level (respectively 73.9% and 66.3% and 61.0% and 70.6%). The lack of consumer benefits from a reduction in the fat content of the meat frequently pointed out the inhabitants of large cities, evaluators and nutritional knowledge to perceive the financial position of the 'very good' level, as well as possess a basic and higher education.

Conclusions: Respondents who took part in the study empirical accept the removal of fat from the meat, but other studies have shown that consumers are generally so much they do not accept the changes used in food products because of the fear of new foods appearing on the market (Je?ewska-Zychowicz and Babicz-Zielinska , 2011; Siro et al., 2008) and adverse modification used in traditional foods (Gutkowska et al., 2009). However, interest in products with less calories found in consumers of other nationalities (McNeil et al., 2012, International Food ..., 2009, O'Dea et al., 1996).

Key words: meat, lower fat content, the level of acceptance

PO379

BAMBARA GROUNDNUT, VIGNA SUBTERRANEA AS A PANACEA FOR MALNUTRITION IN DEVELOPING COUNTRIES LIKE NIGERIA

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Background and objectives: In low- and middle-income countries, statistics revealed that approximately 925 million people are hungry, with 125 million and 195 million children underweight and stunted, respectively. Developing countries like Nigeria, though still trying to fulfil the Millenium development goal (MDG 1) in eradicating poverty and hunger are the worst hit by food insufficiency crisis in the world. However, neglected and under-utilised (NUS) plants like Bambara nut (vigna subterranea), even though beneficial, are not given adequate priority by both government and farmers in the value chain system, whereas if well tapped could solve the problems of malnutrition and food sufficiency, especially using novel biotechnology tools. This review paper accesses how this could be done.

Methods: The review addressed the utilization potential of bambara nut among the 36 states of Nigeria. Addressing the global challenge of micronutrient malnutrition requires the need for many strategies including short, intermediate and long-term sustainable approaches. Hence in addition to the conventional approaches of micronutrient supplementation and fortification, promoting sustainable food-based approaches to enable adequate intakes of micronutrients in bambara nut is researched into, to profer a way out for developing nations to solve malnutrition problems.

Results: There needs to be improved awareness among the Nigerian populace and other developing nations of the benefits inherent in the consumption of NUS plant like bambara nut, as a way of getting adequate dietary micronutrients into the body system and thus solving the problem of food insufficiency in the country.

Conclusions: This review suggests that accelerating progress toward the achievements of the MDG1 targets is about the development of novel approaches and technologies towards increased focus in utilizing the NUS, like bambara nut to solving the problems of malnutrition and food insufficiency among developing nations.

Key words: Biotechnology, malnutrition, NUS plants, developing countries

PO380

FTO GENE EXPRESSION UNDER LOW OR HIGH GLYCEMIC INDEX (GI) DIET IN PREGNANT MICE AND PUPS

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Background and objectives: Fetal tissues and organs experience critical periods of rapid development and cell division. Fetal nutrition via the placenta will program the distribution of cell types, hormonal feedback and activity. The mother's diet therefore shapes the metabolic programming of her fetus. The fat mass and obesity associated gene (FTO) is related to leptin levels and obesity-related traits. Our hypothesis is that expression of FTO gene in tissues of pups of the low glycemic index (GI) diet-fed mothers will be lower than those of high GI diet-fed mothers. We aim to examine whether different GI isocaloric diets influence FTO gene expression.

Methods: Before mating and throughout pregnancy, female mice (n=30) were fed either a high or low GI diet. Placentas from half of each group were recovered at mid-gestation. Male pups (n=40) of both groups were weaned at aged 4 weeks and were further divided into 2 subgroups, one following their mothers' diet and one following a standard diet. The pups' weight and glucose and insulin tolerance were tested regularly until aged 5 months. Pups were then sacrificed and tissues collected for gene analysis and other investigations.

Results: Preliminary results indicate that mice exposed to a low GI diet show lower glucose responses. Liver histology indicates only high GI fed mice show signs of a loss of normal architecture and signs of inflammatory cells. From all tissues, Hypothalamic FTO gene expression was significantly increased in the high GI fed mice.

Conclusions: This study allows the investigation of the effects of nutritionally different regimes on FTO gene expression in specific tissues. We show that a low GI diet can differentially regulate the FTO gene expression, therefore, the risk of obesity. Targeted interventions during pregnancy may reduce the risk of childhood and adult obesity.

Key words: Fto gene, Glycemic index, metabolic programming

PO382

MATERNAL SELF-EFFICACY AND LIFE STYLE BEHAVIORAL PROBLEMS OF THE CHILD RELATED TO WEIGHT IN DYADS RESIDING IN NORTHEASTERN MEXICO

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Background and objectives: All mothers, particularly mothers of overweight (OW) and OB children; face the child´s lifestyle behaviors related to eating, physical activity, and weight issues. Objectives were: 1) Assess differences in maternal perception of their child´s lifestyle – problem behavior (PB) and self-efficacy (SE) in managing these problems in two groups of mothers, and 2) Assess the relationship between PB and SE.

Methods: Participated 367 dyads (mother – child). Mothers answered the Lifestyle Behavior Checklist (LBC). Weight and height of mothers and children were measured. One group of mothers was mothers with normal weight children (NW) and b) mothers with OW-OB children. The reliability of the LBC scale was calculated, and were apply descriptive statistics, Test F, and Pearson's correlation coefficient.

Results: Cronbach alpha for the problems scale was $\alpha = .86$, and $\alpha = .96$ for the confidence scale. In both groups of mothers, PB with the highest mean was "watches too much television"; no significant difference was identified ($F = .232$, $p = .630$). The lowest SE mean in mothers of OW – OB children was "watches too much television" (Mean 7.83, SD = 1.81), and for de mothers with NW children was "refuses to eat certain foods" (Mean 8.32, SD = 1.78), with significant difference. Significant negative correlation between PB and SE was identified in both groups; mothers of NW children ($r = - .527$, $p = .001$) and mothers of OW – OB children ($r = - . 461$, $p = .001$).

Conclusions: The LBC in Spanish was reliable. When the mothers perceived more problems, they had lower self-efficacy in managing PB. It is necessary to work with mothers in order to increase their SE; evidence supports the conclusion that SE affects the quality of care provided to children.

Key words: Self efficacy, Life style, Behavior, Body Weight

PO383

EFFECT OF WATER EXTRACT PHYSALIS ANGULATA L ON LIPID PROFILE AND ANTIATHEROSCLEROSIS OF SPRAGUE DAWLEY MALE RATS INJECTED BY STREPTOZOTOCIN-LIPOPHOLYSACHARIDE

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Background and objectives: Prevalence of Diabetes Mellitus among adult in Indonesia reached 4,1% in 1995 and projected to 6,5 % in 2025. Hyperglycemia in patients with diabetes mellitus increases oxidative stress and endothelial dysfunction which plays role in atherosclerosis development and is an early sign of vascular disease in diabetes. Treatment of Diabetes Mellitus has done in a long period and numerous drugs mechanism action. Ciplukan herb (Physalis angulata L) is one of plants that have been used as anti-diabetic. The purpose of the research was to determine the effects of herbs water Ciplukan (Physalis angulata L) on lipid profile and antiaterosklerosis in insulin resistant rats.

Methods: This is true experiment designs with post-test only control group design, using randomized control trial. Twenty four rats, divided into 4 groups. STZ and LPS injections were given to make T2DM rats and complications. Assay of cholesterol, triglycerides, LDL and HDL using a reagent kit. Observation of atherosclerosis in the aorta preparations rats using histopathologic techniques with haematoxylin-eosin staining.

Results: Providing a wide variety of herbal extracts dose Ciplukan can decrease blood cholesterol levels, blood triglyceride levels, blood LDL levels and increase HDL blood levels of DM rats. The results of the analysis in the treatment group, showed that almost in all groups were significantly different for cholesterol, while LDL only in the K1 and K4 and significantly reduced atherosclerosis frequency in aorta.

Conclusions: Provision of varies water extracts Ciplukan herbs dose can reduce cholesterol, triglycerides, LDL, and raise HDL levels. Dose of 20 mg/kg body weight can reduce cholesterol and LDL levels and regenerates atherosclerosis injury in diabetic blood vessel.

Key words: Ciplukan herbs (Physalis angulata L), lipid profile, antihiperkolesterolemia, antiatherosclerosis.

PO384

POTENCY OF CIPLUKAN HERBS (PHYSALIS ANGULATA L) AS AN ANTIHIPERGLYCEMIA AND ANTIHYPERLIPIDEMIA IN SPRAGUE DAWLEY MALE RATS INJECTED BY STREPTOZOTOCIN-NICOTINAMIDE

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Background and objectives: Diabetes Mellitus type 2 (DMT2) is a disorder that has characteristic hyperglycemic conditions, impaired metabolism of carbohydrates, fats, and proteins are characterized by insulin resistance and or insulin deficiency. Hyperglycemia in patients with diabetes mellitus increases oxidative stress and endothelial dysfunction. Physalis angulata L is one of plants that have been used as antidiabetic. This study was conducted to find out potency of Physalis angulata L on serum glucose and lipid profile of DMT2 rats.

Methods: This research was true-experimental using pre and post test control group design. Samples were male Sprague Dawley rats, 3 months old, inducted hyperglycemia and complication, given extract water of Physalis angulata L using 20 mg/kg BW dose for 21 days. The content of blood glucose, total cholesterol, HDL, LDL, and triglyceride were measured using enzymatic method. Normality of the data were tested by Shapiro Wilks test. Data were analyzed by paired t test and Anova continued by LSD test using computer program.

Results: The water extracts of Physalis angulata L can decrease blood glucose levels, blood cholesterol levels, blood triglyceride levels, blood LDL levels and increase HDL blood levels of DM rats. The results of the analysis in the treatment group, showed that almost in all groups were significantly different for glucose levels, cholesterol levels, blood triglyceride levels, blood LDL levels and increase HDL blood levels.

Conclusions: From the above results concluded that the water extracts of Physalis angulata L herbs dose of 20 mg/kg body weight can increase the potency of antihyperglycemic and antihyperlipidemic in single use.

Key words: Ciplukan herbs (Physalis angulata L), antihyperglycemia, antihyperlipidemia, blood sugar level, lipid profile.

PO385

IN VITRO DETERMINATION OF GLYCEMIC RESPONSE

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Background and objectives: In vitro models that predict the bioavailability of dietary components have been extensively used as screening tools in nutrition. High blood glucose concentration is a risk factor for a number of diseases; therefore, blood glucose response to foods remains a very relevant biomarker on which to base values to guide selection of foods. Our objective was to develop an in vitro method that predicts the glycemic response.

Methods: An in vitro digestion procedure that predicts the bioavailability of mineral was adapted to mimic carbohydrate digestion. Index for glycemic response was the concentration of glucose in the soluble low molecular weight fraction of the digests. To evaluate our method, we compared a) published values on glycemic index (GI) or glycemic load (GL) for 13 food items and b) determined GL values for 15 meals with predicted glycemic response, obtained after subjecting these meals to our in vitro procedure.

Results: The correlations were significant when comparing predicted glycemic response, using the in vitro procedure, with published GL (Spearman's rho=0.953, p=0.000), or GI (Spearman's rho=0.883, p=0.002) for 13 foods and with glucose response in humans to 15 meals (Spearman's rho=0.736, p=0.003 at 120 min after consumption).

Conclusions: These results demonstrate a useful method to predict glycemic response in humans. Further exploitation of this approach may open up the way to the development of novel products with low postprandial glycemic responses.

Key words: glycemic response, glucose, glycemic load, in vitro, glycemic index

PO386

LIPIDOMIC PROFILING OF CHYLOMICRON TRIACYLGLYCEROLS IN RESPONSE TO HIGH FAT MEALS

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Background and objectives: Postprandial chylomicronaemia is a non-steady state condition with rapid remodelling of lipoproteins. The chylomicron triacylglycerol (TAG) composition is a function of several mechanisms including TAG hydrolysis in the gut, transfer of hydrolysis products to mucosal cells, TAG reassembly, TAG clearance from blood, and remnant uptake by the liver. These steps may be affected by differences in the molecular species of TAG ingested. Novel lipidomics, i.e. the molecular level tamdem mass spectrometric analysis methods can reveal the selective formation and/or clearance of individual TAG in humans.

Methods: Several different tandem mass spectrometric methods were applied to human chylomicron TAG samples obtained from postprandial cross over trials. The meals served to healthy volunteers included dairy fat, vegetable oil, olive oil and olive oil enriched with polyunsaturated fatty acids of the omega-3 series.

Results: The fatty acid of the sn-2 position was conserved from the meal to chylomicron TAGs. Remodelling changes were seen between the meal and chylomicron TAGs. For example, in dairy and vegetable oil-based chylomicrons, there was a loss of trisaturated- and disaturated-TAG species and an increase in some mono- and di-unsaturated TAG species compared with the food TAG. Significant differences were found in the chylomicron TAG composition during the postprandial period, especially between the first and following hours.

Conclusions: In the frequently applied analytical procedures for characterization of fats, such as in the fatty acid composition analysis, the individual TAG molecular species are overlooked. Lipidomic Methods reveal the dynamic or non-steady state of postprandial TAGs in chylomicrons. This dynamic state is likely to be a reflection of differential rates of CM secretion and clearance which is regard as a determinant of postprandial chylomicron accumulation and a risk factor for cardiovascular diseases.

Key words: Triacylglycerol, tandem mass spectrometry, lipidomics, postprandial lipemia

PO387

FATTY ACIDS PROFILE OF CAMEL MEAT

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Background and objectives: The camel is an animal often found in the Sahara. Camel meat is one of the main food resources for the autochthon population. Consumption of this meat is preferred for its organoleptic perception. This species is related to an environment with limited and random resources. In arid and semi-arid areas, this species is known for its resistance to thirst, heat and protein and mineral undernutrition. It's used for the meat production essentially. The quality of the meat depends on the content of fatty acids. The objective of this study was to determine the fatty acid composition of camel meat produced in Algeria.

Methods: The content of fat camel meat was determined from 61 samples of 61 camels in Ouargla slaughterhouse (Algeria). For these analyzes, we considered three factors in fatty acid content (age, sex and breed).

Results: Our results showed that the average content of ether extract of meat samples is equal to 16.3 ± 1.6%, and the meat has the highest levels of saturated fatty acids which represent 54.6% of total acids, predominantly of C16: 0 and C18: 0 up to 48.8% and 39.3% respectively. The meat is rich also in monounsaturated fatty acids (35.0%), with a predominance of C18: 1cis9 up to 79.7%. Camel meat represented 10.4% of polyunsaturated fatty acids of total fatty acids which 8.0% are ω 6 and 1.9% is ω 3.We also note that the PUFA/SFA equal to 0.25and ω 6/ ω 3 = 4.1 The statistical model used is covariance analysis followed by Student's test or ANOVA. No effect of age or breed could not be demonstrated for the various parameters (AGS, MUFA, PUFA, ?6, ?3, P / S and ?6/ ?3). Analysis by Student's t test showed that only the percentage of SFA (saturated fatty acids) of the total fatty acids was significantly higher in males (57.8% against 48.1% , p=0.003).Thus, the percentage of ?6 was significantly higher in females (14.6% against 4.7% , p=0.004). The same observation was made for the percentage of ?3, which is higher in females (2.95% against 1.44%, p=0.016). Overall, the percentage of PUFA (polyunsaturated fatty acids) (?6+ ?3+cis9trans11CLA) is significantly higher in females (18.0% against 6.7%, p=0.005). The P/S and ?6/ ?3 are significantly higher in females 0.499 against 0.123 (p=0.006) and 5.35 against 3.51 (p=0.006) respectively. These results show that females have interesting nutritional characteristics. This maybe related with fatness of the carcass where it appears that the leaner animals, i.e., females have often a percentage of unsaturated fatty acids higher than males.

Conclusions: Nothing is opposed, in our opinion, the establishment of channels production and marketing of camel meat for its particular nutritional characteristics.

Key words: camel meat, saturated fatty acids, polyunsaturated fatty acids.

PO388

PREVALENCE OF STUNTING AND WASTING AMONG SCHOOL CHILDREN IN A RURAL AREA OF MOROCCO

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Background and objectives: Malnutrition is one of the greatest problems facing developing countries, including rural regions of Morocco, in terms of wasting and stunting among school children. The aim of this study was to determine the prevalence and the risk factors associated with stunting and wasting among school children in a rural area of ANTI Atlas of Morocco.

Methods: The prevalence of stunting and wasting were calculated according to WHO recommended cut-off points to define stunting and wasting. Chi-square tests, logistic regression analysis were used to investigate the relationship between the prevalence of stunting and wasting and the sociodemographic factors.

Results: A total of 162 children (64 boys and 98 girls), aged 12 - 15 years. Results revealed 22.8% of stunting and 35.2% of wasting. Child age (p = 0.027), illiteracy of the mother (p = 0.004) was determinant factors with wasting. Stunting was significantly associated with gender (p = 0.03) and parents' employment (p = 0.009).

Conclusions: In this area of study, Malnutrition remains a major problem among school children. Parents' Level education and stunting were determinant factors in this health problem.

Key words: Malnutrition, stunting, wasting, school children, morocco

PO389

PREVALENCE AND DETERMINANTS OF VITAMIN D DEFICIENCY IN ADULTS AGED 65 YEARS AND OVER.

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Background and objectives: In the elderly, malnutrition is a highly prevalent condition and a major contributor to increased morbidity and mortality. Dietary intake surveys indicate that vitamin inadequacy is widespread even in apparently healthy elderly. Our aim was to assess the nutritional status of vitamin D in subjects > 65 y and its relationship with demographic and nutritional factors, acute phase reactants and renal function.

Methods: Serum 25-OH-vitamin D was determined by ultra-fast liquid chromatography in 304 subjects >65 years (75.5 y ± 7.3; 211 women). Potential determinants of vitamin D status were also recorded if available including sex, age (65-75 y, 76-85y and 86-100y), season (official calendar dates), origin of the sample (hospitalized versus non-hospitalized (outpatients)), nutritional markers (albumin, total cholesterol), acute-phase reactants (ferritin, C-reactive protein (CRP)) and renal function (serum creatinine, glomerular filtrate).

Results: Mean (CI 95%) serum levels of 25-OH-D was 48.1 nmol/l (44.3, 52.0) and the prevalence of vitamin D deficiency (<50 nmol/l) reached 63%. Serum 25-OH-D correlated with serum albumin (r= 0.31, p<0.001), CRP (r=-0.24, p=0.052) ferritin (r=-0.25, p=0.009) and creatinine (r=-0.21, p=0.014). A significant decreasing trend was observed across the three age groups and the prevalence of deficiency changed from 53% (65-75y) to 84% (85-100y). Vitamin D deficiency also varied depending on the season (48-52% in summer-fall, 73-74% in winter-spring), and according to the origin of the sample, reaching a prevalence of 94% in hospitalized patients. Subjects with low serum albumin and acute phase response (high levels of ferritin and CRP) consistently displayed lower serum concentrations of vitamin D.

Conclusions: In the elderly, prevalence of inadequate vitamin D status is high. Age, season, hospitalization, poor nutritional status and presence of inflammation significantly affect the serum levels of 25-OH-vitamin D and thus, the prevalence of vitamin D deficiency.

Key words: Vitamin D, Vitamin deficiency; elderly, malnutrition.

PO390

DETERMINATION OF 3 EPI-25-OH-VITAMIN D3 IN INFANTS: IMPACT ON VITAMIN D STATUS ASSESSMENT

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Background and objectives: In addition to bone disorders, vitamin D deficiency in infants has been associated with a wide range of adverse health outcomes in later life.

Methods: A total of 95 (surplus) serum samples of infants (< 1 year) were randomly collected. Levels of 25-OH-D3 and 3-epi-25-OH-D3 were assessed by HPLC (Tai et al., Anal. Chem., 82, 1942-48, 2010). Identification was done by chromatographic behaviour, on-line UV-Vis spectra and co-injection/co-elution of spiked samples.

Results: 3-epi-25-OH-D3 could be quantified in 70 samples (74%). Mean (95% CI) concentration of 25-OH-D3 and 3-epi-25-OH-D3 were 70.5 nmol/l (60.9, 80.2) and 32.1 nmol/l (25.8, 38.4), respectively. Mean (95%CI) of total 25-OH-D3 (sum of both epimers) was 102.6 nmol/L (90.6, 114.7). The contribution of 3-epi-25-OH-D3 (%) was 30.5 (95% CI; 25.9, 35.0; range, 4.4- 74.9%). Levels of 3-epi-25-OH-D were higher in infants <1 month (n=25) than in >1 month-12 months (n=45) (mean (95% CI); 42.1 nmol/l (30.5, 53.7) versus 26.5 nmol/l (19.3, 33.8), p=0.018). Similarly, the contribution of 3-epi-25-OH-D3 was higher in younger infants (39.8 % (31.4, 48.3) versus 25.3% (20.5, 31.0), p=0.002). Using total 25-OH-D3 levels as the reference to assess vitamin D deficiency (< 50 nmol), 71% (15/21) of infants were (mis)classified as vitamin D deficient based on 25-OH-D3 levels, reaching 85% (11/13) in those <1 month.

Conclusions: Although the physiological role of the C3-epimer remains unclear, 3-epi-25-OH-D3 should be determined for the accurate assessment of the vitamin D status in infants. Assessment of vitamin D status based on 25(OH)D3 levels may lead to misclassification compromising clinical decisions.

Key words: 25-hydroxyvitamin D3; 3-epi-25-hydroxyvitamin D3; Vitamin D deficiency.

PO391

CORRECTION OF PLASMA FERRITIN CONCENTRATIONS FOR SUB-CLINICAL INFLAMMATION IN A MALARIA-ENDEMIC AREA OF COTE D'IVOIRE

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Background and objectives: Many plasma biomarkers are influenced by inflammation resulting in either a depression or increase in their concentration. When the nutritional biomarker is increased, such as ferritin concentrations, inflammation will result in an underestimation of iron deficiency. It is therefore important to measure biomarkers of inflammation as well as of nutrition in surveys of nutritional status in apparently-healthy people. Objective: To correct plasma ferritin concentrations for inflammation in a malaria-endemic area.

Methods: Pre-school children (Pre-SAC) were recruited as part of a cross-sectional survey in a rural and urban area of Côte d'Ivoire. Plasma ferritin, C-reactive protein (CRP) and α-1-acid glycoprotein (AGP) were analyzed by ELISA. Ferritin concentrations were adjusted for inflammation using the meta-analysis of Thurnham et al (AJCN 2010,92:546). Microscope slides were examined for Plasmodium parasites.

Results: Overall, 49.8% and 39.2% of Pre-SAC had elevated AGP and CRP concentrations, respectively, with differences by residency; elevated AGP and CRP concentrations were 2.5 times and 2.8 times more prevalent in rural children ($p<0.001$). Plasmodium parasites were found in 45.8% of rural and 7.5% urban Pre-SAC ($p <0.001$). Adjusted geometric mean ferritin concentrations were significantly higher in the rural area (45.2 µg/L compared with 29.3 µg/L in the urban area; $p<0.001$). Plasmodium parasites increased mean ferritin concentrations 62.9 µg/L compared with 42.5 µg/L in non-infected Pre-SAC ($p<0.001$), and after correction for age, sex and residency there was still a residual difference in ferritin concentrations between those with and those without parasites (+12 µg/L; p<00001).

Conclusions: Concentrations of ferritin, after adjustment for inflammation, showed residual differences of +12µg/L in those with Plasmodium parasites, compared to those without, indicating that the meta-analysis correction for inflammation may not completely adjust concentrations when Plasmodium parasites are present.

Key words: malaria, ferritin, AGP, CRP, Pre-SAC.

PO392

COMPLEMENTARY FEEDING PRACTICES AND ACCEPTABILITY OF LIPID BASED NUTRIENT SUPPLEMENTS AMONG INFANTS IN RURAL WESTERN KENYA

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Background and objectives: Micronutrient-rich complementary foods are essential to meet infant nutrient requirements and improve growth.

Methods: Within the context of a pilot randomized trial of water, sanitation, hygiene and nutrition interventions, we evaluated the feasibility and acceptability of lipid-based nutrient supplements (LNS) for young children during a two-month in-home trial. In October 2011, we used a standardized 24 hr recall to estimate frequency of consumption of target food groups and generate an indicator of dietary diversity. Among a 50% subsample, we obtained a second infant 24 hr recall and a single infant and mother 7-day food frequency questionnaire (FFQ) in July 2012. In addition, we assessed LNS acceptability, usage and sharing. For this analysis, infants aged 6-24 months at baseline were included (n=269).

Results: Consumption of LNS on 6-7 days out of the prior week was reported by 73% of children and 89% of caregivers ranked the acceptability of LNS as 5 out of 5 ("Like it a lot"). Eleven percent of households reported sharing the LNS with other children. Children consumed a mean of 3.3 (SD±1.1) food groups and 40.3% consumed ≥4 food groups on the previous day. Animal source foods were consumed by 81% of infants, driven primarily by consumption of milk tea. We found an average increase of 1.0 (1.3) food groups during the study and a weak but significant correlation ($r=0.17$, $p=0.04$) between number of food groups consumed. Data from infant and maternal 7-day FFQs suggested lower dietary diversity among mothers compared to infants.

Conclusions: LNS has the potential to be highly acceptable in this region and should be incorporated into a broader behavior change package to improve complementary feeding practices. Acknowledgements: Supported by a grant to UC Berkeley from the Bill & Melinda Gates Foundation.

Key words: dietary diversity, complementary feeding, Kenya. Abstract category: Nutrition in infancy and childhood

PO393

DEFICIENCY OF SELENIUM IN CRITICAL CARE PATIENTS WITH SIRS

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Background and objectives: Deficient status in selenium, a cofactor of the antioxidant enzyme glutathione peroxidase (GPx), together with hypercatabolic state, can affect the clinical course during the patient's stay in the intensive care unit (ICU). The resulting increase in oxidative stress has been recognized as a central mechanism in the pathophysiology of critical illnesses, particularly the appearance of multiorganic failure.

Methods: 65 critically ill patients in Granada province (southern Spain) who fulfilled the inclusion criteria: SIRS, APACHE score >15. Plasma selenium was measured with inductively coupled plasma mass spectrometry (ICP-MS). GPx activity was measured by reduction of organic peroxides by c-GPx, and selenoprotein-P was measured by immunoassay.

Results: On admission to the ICU, GPx was below reference (<5.6 U/mL) in 86.5% of the patients, decreased significantly to 60% ($p<0.05$) at day 7. Normal levels were not seen in any of the patient (>24 U/mL). At admission, 67.7% of the patients were selenium deficient, increasing significantly to 100% ($p<0.05$) at 7 day. Below-normal values of SEPP1 (<3.43 μg/L) were found in 77.3% of the patients on the day of admission, increasing to 100% at the end.

Conclusions: During their ICU stay, antioxidant GPx enzyme activity increased and plasma selenium decreased in patients studied. Selenium deficiency could lead to increased oxidative stress and increased demands on endogenous antioxidans, that could exhaust the available plasma stores of selenium. In patients admitted to the ICU, selenium intake should be monitored in order to ensure optimum antioxidant response and palliate the adverse effects of this nutritional deficiency.

Key words: Critical Care Patients, Selenium, Glutathione Peroxidase, SIRS, Nutrition

PO394

IMPACT OF SPIRULINA ON THE EVOLUTION OF THE ANTHROPOMETRIC, BIOCHEMICAL AND HAEMATOLOGICAL PARAMETERS OF HIV-INFECTED ADULTS IN OUAGADOUGOU, BURKINA FASO

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Background and objectives: Malnutrition is one of the characteristics of patients infected by the human immunodeficiency virus. It is accompanied by a weight loss and a degradation of the overall condition associated with proteins and micronutrients deficiencies. Spirulina is an edible microalga, naturally rich in proteins, in vitamins, essential fatty acids, carbohydrates and other trace elements. The objective of the study is to assess the impact of a supplementation with Spirulina on the evolution of the anthropometric, biochemical and haematological parameters of HIV-infected adults in Ouagadougou.

Methods: it is about a quasi-experimental pilot study with two arms on adults infected with HIV-1 in Ouagadougou. In addition to antiretroviral treatment a group of 50 patients was supplemented with 10 grams of Spirulina per day. The control group of 50 patients received only an ARV treatment.

Results: In the two arms of the study, the anthropometric and biological parameters increased over time. The mean values were higher for the patients on Spirulina in the 9th month as far as Mid-Upper Arm Circumference (MUAC) ($p=0.007$), hemoglobin ($p=0.002$), and creatinemia ($p=0.01$) are concerned. A significant decline of gamma globulins was observed in the 6th month for the patients on Spirulina compared to the control patients ($p=0.04$). No difference in the evolution of ALAT and amylasemia was noticed between the 2 groups.

Conclusions: The 10 grams of Spirulina per day used in our study showed a positive effect on some vital biological parameters. Randomized clinical trials on large samples with longer follow-up are necessary to test these assumptions.

Key words: Spirulina, HIV, anthropometric, haematological.

PO395

PREVALENCE OF ANTHROPOMETRIC DEFICITS AND INADEQUATE PROTEIN-ENERGY INTAKE IN ADULTS WITH SICKLE CELL ANEMIA

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Background and objectives: Individuals with sickle cell anaemia have several clinical conditions that associated to frequents hospitalizations, as well as to precarious economic conditions, can negatively impact in the food intake, predisposing them to increased malnutrition risk. The objective was to evaluate the prevalence of anthropometric deficit and inadequate energy-protein intake.

Methods: It is an unpaired comparative study, including sickle cells anaemia adults and those without hemoglobinopathy, of both sexes. We used the Body Mass Index (BMI) to evaluate the anthropometric status and the body composition was identified by the body fat percentage (BF%) and by the corrected arm muscle area (CAMA). The dietary intake was measured by two 24-hour recall. To analyse the inadequate protein-energy intake risk it was used the approach proposed by the Institute of Medicine of the United States. Proportions were compared using the chi-square test or Fisher test. The associations were evaluated by odds ratio, and to compare the means it was used the Student t-test. A p-value less than 5% was considered statistically significant.

Results: We evaluated 60 individuals, 33 with sickle cells anaemia and 27 without hemoglobinopathy. Individuals with sickle cell anaemia had significantly higher underweight prevalence according to BMI (30,3% vs 7,4%; p=0,049; OR = 5,4), malnutrition by CAMA (78,8% vs 25,9%; p<0,001; OR= 10,6), lower %BF (39,4% vs 11,1%; p=0,019; OR=5,2). Both groups showed high inadequate energy prevalence, however protein inadequacy values were expressively lower.

Conclusions: The sickle cell anaemia adults showed higher anthropometric deficits when compared to patients without sickle cell disease. We observed high prevalence of inadequate protein and energy intakes that negatively affected the population studied anthropometric status, especially in individuals with sickle cell anaemia.

Key words: sickle cell anaemia, adults, anthropometric status, energy-protein intake.

PO396

FACTORS ASSOCIATED WITH WHEEZING AND ASTHMA IN ADOLESCENTS

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Background and objectives: Obesity and physical activity are interrelated lifestyle factors that may be relevant to the prevalence of asthma. Objective: Investigate the association between anthropometric and physical activity in the presence of wheezing and asthma in adolescents.

Methods: This cross-sectional study. The study consisted of adolescents aged 10-18 and enrolled in public schools in the city of Santa Maria/RS/Brazil. Symptoms of asthma were based on the ISAAC, 1998. The International Physical Activity Questionnaire (IPAQ) was used. High BMI indicates children with BMI 85th percentile (WHO, 1997). The waist circumference (WC) cutoff point was the 80th percentile (Taylor et al., 2000). The significance level adopted was 5%, and the analyses were carried out with the SPSS 11.5. The research was approved by the ethics in research committee.

Results: Have been assessed 867 adolescents with a mean age of 15.53±1.27 years, and 365(42.1%) were male. According to the ISAAC, respectively 182(20.9%) and 152(17.5%) adolescents reported having had wheezing and asthma. Of these 62(34.1%), 57(37%) were male and 120(65.9%), 95(62.5%) females (p= 0.017) (p= 0.221). 107(58.8%), 90(59.2%) watch <4 hours of television/day and 75(41.2%), 62(40.8%) >4 hours (p= 0.848) (p= 0.242). 86(47.5%), 63(41.4%) play video games <4 hour and 95(52.5%), 65(40.8%) >4 hours (p= 0.177) (p= 0.002). 131(72%), 104(68.4%) perform light physical activity, 40(22%), 34(22.4%), moderate and 11(6%), 14(9.2%) intensive (p= 0.064) (p= 0.958). Regarding BMI 128(72.3%) and 102(68%) not overweight and 49(27.7) 48(32%) overweight (p= 0.157) (p=0.399) for WC was observed that 150(84.7%), 122(81.3%) were excess and 27(15.3%), 28(18.7%) with excess adiposity abdominal (p= 0.181) (p= 0.399).

Conclusions: The wheezing was more prevalent in girls, who reported asthma more than 4 hours of play game. Although no statistical difference was observed that most practical light physical activity and a high percentage of students are overweight.

Key words: asthma, obesity, physical activity.

PO397

CHARACTERISTIC PROPERTIES OF JAPANESE FUCHA DISHES: NUTRITION, TEXTURE, AND PREFERENCE

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Background and objectives: Fucha-cooking, a style of Japanese monastic (vegetarian) cuisine, includes a method of cooking in which vegetable dishes are prepared in a manner to simulate fish and meat dishes. In this study, we prepared a vegetarian fucha (Fuc) version of broiled eel fillet (E) and chicken meatballs (C) and compared them with the original non-vegetarian (Con) dishes in terms of nutrition, texture, and preference.

Methods: The major ingredients of Fuc-E and Fuc-C were tofu and boiled bamboo shoots, respectively. Nutritional values were calculated using Japanese food composition table. Color parameters (L*, a*, and b* values) were measured by a colorimeter. Hardness and texture were determined by a creep meter-food texture measurement system. Sensory evaluation was performed by a panel of 15 individuals (age, 41.5±14.1 years) regarding five parameters using a scoring method. Data were analyzed by t-tests ($p<0.05$).

Results: Compared with the Con dishes, the Fuc dishes contained less energy and fat, more folic acid, and no cholesterol, along with a 1.6-fold higher level of polyunsaturated fatty acids (in Fuc-E), and 2.1- and 7.2-fold higher levels of calcium and vitamin E, respectively (in Fuc-C). Fuc-E had higher lightness and yellowness values, and Fuc-C showed higher values for redness and yellowness than the controls. For hardness and texture, Fuc-E was significantly ($p<0.05$) harder than Con-E, showing higher values for cohesiveness and gum load, while Fuc-C exhibited no significant difference in hardness but was more tender and cohesive than Con-C. Sensory evaluation showed no marked differences between the Fuc and Con dishes.

Conclusions: Due to their major ingredients, the Fuc dishes had different physical properties to the Con dishes, but both groups received similar scores on sensory taste evaluation. Given their nutritional values, Fuc dishes may serve as a potential anti-arteriosclerotic diet.

Key words: Fucha-cooking, nutrition, physicality, preference

PO399

RICH IN AGROBIODIVERSITY BUT POOR IN NUTRITION: FOOD SECURITY IN COMMUNITIES OF CHOPCCA, HUANCAVELICA, PERU

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Background and objectives: The high Andean communities of Chopcca are rich in agrobiodiversity, cultivating 98 varieties of potato and several other Andean crops (broad beans, ulluco, lupin), yet have some of the highest rates of stunting in Peru (40 – 55%). This study explored the relationship between agrobiodiversity, household food insecurity (HFIAS) and nutrition.

Methods: 182 families with children 6 – 42 months of age in 4 communities were surveyed for food production, diversity, income sources and HFIAS. Dietary intake of children was evaluated by 24-hour recall on 2 non-consecutive days at times of potato production abundance (July 2010) and scarcity (February 2011). Nutritional status as recorded by the local health facilities was used.

Results: 42% of children were stunted. A weak correlation was found between better height for age and number of species cultivated (Pearson correlation 0.182, $p=0.024$) but there was no correlation with other indicators of diversity or HFIAS. Dietary intakes showed infrequent consumption of animal source foods (ASF); farm produced meat, eggs and meat were mostly sold. A high proportion of children 6 – 24 months did not meet 80% of daily recommended intakes for iron (77%), zinc (81%), calcium (75%) or folate (61%). There were higher intakes of some nutrients during the period of scarcity due to greater consumption of ASF and in children who consumed the multi-micronutrient fortified infant food or sprinkles distributed through social programmes.

Conclusions: Agrobiodiversity, which is maintained on small, fragmented landholdings, was not associated with food security and did not protect against low dietary intakes of essential micronutrients. Intake of ASF, a good source of bioavailable micro-nutrients, was a main determinant of dietary quality. Adding small animal husbandry is considered as an option to improve diets and prevent stunting.

Key words: Agrobiodiversity, dietary diversity, food security.

PO400

THE EFFECTS OF MATERNAL ARGININE SUPPLEMENTATION DURING LACTATION ON VISCERAL OBESITY AND INSULIN SENSITIVITY OF OFFSPRING

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Background and objectives: Overnutrition during lactation is known to cause obesity in later life, and also, it is reported that arginine-supplemented pigs accumulated lipid into muscles. These facts suggest that early life nutrition might affect obesity in later life, and arginine, whose functions are related to growth, may have an important role in early life. We previously found that pups, whose dams were arginine-supplemented during lactation, were often obese when fed a high-fat diet in later life.

Methods: To investigate the mechanism of visceral fat accumulation, we performed DNA microarray analysis on mesenteric fat. Lactating Wistar rat dams were divided into 2 groups (CN and ARG) and fed a normal diet or an arginine-supplemented diet (2%). After weaning, the pups were further divided into 2 groups (CN and HF) and fed either a normal diet or a high-fat diet. The four groups are designated as CN-CN, CN-HF, ARG-CN, and ARG-HF. Oral glucose tolerance test was performed at during the 11th week. Total RNA was extracted from mesenteric fat of 12-week-old offspring and applied to DNA microarray GeneChip Rat Genome 230 2.0 Array (Affymetrix).

Results: ARG-CN and ARG-HF exhibited elevated insulin secretion after glucose loading, significant increases in body weight and visceral fat were observed only in ARG-HF. Ingenuity Pathway Analysis 7.5 of DNA microarray data suggested that genes related to inflammatory response in mesenteric fat underwent the most remarkable change in ARG-CN and ARG-HF. Representative changes were confirmed with qPCR.

Conclusions: It is suggested that maternal excessive arginine intake during lactation affected gene expression programming and led the fat cells of offspring to increase expression of inflammation-related genes, whose consequence became apparent during consumption of a high-fat diet.

Key words: arginine supplementation, visceral fat accumulation, lactation, insulin resistance

PO402

CALCULATING CHILD AGE WITHOUT BIRTH RECORDS: A NEW METHOD FOR ESTIMATING DATE OF BIRTH

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Background and objectives: An accurate birthdate is vital for assessing child nutritional status and adequate feeding practices. Caregivers in communities without an effective system of birth registration often cannot recall their child's birthdate, especially if they are illiterate. When the Food Security and Nutrition Surveillance Project was begun, no comprehensive method of estimating date of birth without birth records was indentified so the project set out to devise an accurate method.

Methods: To devise a new method of estimating child birthdates, the project organized a workshop with 130 experienced Bangladeshi surveyors and field tested multiple methods.
Results: All surveyors are equipped with a daily calendar prospective for survey period and retrospective for the five preceding years. This daily calendar contains the three date systems used in Bangladesh - Bengali, English, and Arabic – as well as important and memorable events such as natural disasters and religious festivals. The enumerators are trained to ascertain the child's date of birth through four questions and to guide respondents if they have difficulty answering: On what day of the week was the child born? In what month was the child born? What was the birthweek's relative position in the month? How old is the child (in running years)? The resulting birthdate is probed through reference to events in the calendar and other factors, such as the age of other children, the mother's birth spacing, etc. The birthdates are also used to calculate child age in the field to ensure that the age matches with caregiver's perceptions. This method has been used in multiple surveys in Bangladesh since 2009.

Conclusions: Based on the success of this model in Bangladesh, field tests should be undertaken in other countries which have low coverage birth registration systems coupled with high illiteracy.

Key words: Anthropometry, date-of-birth, household-survey

PO403

DIETARY IRON INTAKE AND TYPES 2 DIABETES

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Background and objectives: In recent years the prevalence of type 2 diabetes mellitus (T2DM) has increased worldwide. Diet is one of the components of lifestyle that has most been studied in the prevention of T2DM. Prospective studies have observed associations between the intake of red meat and processed meats and T2DM. This food group is a source of iron, especially of heme iron. The objective was to evaluate the link between iron intake and the incidence of T2DM in a Mediterranean population at high cardiovascular risk.

Methods: We conducted a prospective analysis of the PREDIMED cohort. We followed 1073 non-diabetic subjects (42.87% men) aged between 55 and 80 years at high cardiovascular risk, from the Reus and Pamplona centres. Diet was assessed at the study baseline using a validated, semi-quantitative food frequency questionnaire.

Results: During 8 years of follow-up, we ascertained 131 new cases of T2DM. At baseline, incident T2DM subjects consumed less coffee (P=0.001), and more heme iron (P=0.036) than non-incident. Intake of heme iron showed a positive association with T2DM incidence using Cox proportional hazards models after adjusting for dietary, anthropometric, socio-demographic and lifestyle variables. The Hazard Ratio was 1.299 (95% confidence interval, 1.016 to 1.660). In addition, we found no association between non-heme iron and the risk of T2DM.

Conclusions: Greater dietary heme iron, but not non-heme iron, is associated with an increased risk of T2DM in a Mediterranean population at high cardiovascular risk.

Key words: Heme iron, nonheme iron, iron, Type 2 diabetes mellitus, PREDIMED study.

PO404

THE MEASUREMENT OF HOUNSFIELD UNITS ON COMPUTED TOMOGRAPHY IMAGES AS A METHOD TO ASSESS FAT QUALITY

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Background and objectives: Recently, it has been proposed that the measurement of the fat density in absolute Hounsfield units (HU) directly on Computed-Tomography (CT) images may be used as a proxy to assess fat quality. However, this methodology has not been validated with histologic data. The aim of the current work was to demonstrate the validity of HU measurements for the assessment of fat quality in CT scans in 76 obese patients (50 women and 26 men) who had undergone abdominal surgery.

Methods: We assessed HU variability on CT images in comparison with Adipose Tissue (AT) characteristics including fat-cell-data (diameter, weight, area). CTs were digitalized using scanning densitometry. Absolute HU values within the range of -45 to -195 of pixels were measured in 8 regions of interest (~1 cm2 each, 2 front superficial, 2 visceral, 2 back deep, 2 back superficial) to study fat density variability.

Results: Fat quality as assessed by HU variability was significantly correlated to fat-cell-characteristics. In particular, HUs values in visceral fat were inversely related to fat-cell-data of visceral AT samples (r=-0.23; P=0.050). Moreover we found a negative association between HUs values in back deep region and adipocyte size data (r=-0.28; P=0.02) and its variability (r=-0.29; P=0.01) in epiplon fat samples. Overall, worse fat quality as assessed by lower HU values was associated with an increased adipocyte size. Similar associations were found with adipocyte size variability: lower HU was associated with increased variability and as a consequence with a less organized (more chaotic) AT.

Conclusions: The measurement of fat density in absolute Hounsfield units on computed tomography images is associated with fat-cell-characteristics and may be used as a proxy for fat quality.

Key words: Computed-tomography, visceral-fat, adipose-tissue.

PO405

HIGH EFFICIENT ANALYSIS FOR LONG FREE FATTY ACID PROFILE BY ULTRAHIGH-PERFORMANCE LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY

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Background and objectives: Free fatty acids (FFAs) have various physiological functions which depend on FFA structure. The change in FFA profile has been observed with numerous disorders such as obesity. Peroxisome proliferator-activated receptor α (PPARα), a ligand-dependent transcription factor, regulates lipid metabolism. Activation of PPARα is estimated to affect FFA profile. FFAs are frequently analyzed by gas chromatography mass spectrometry. However, fatty acid derivatization is necessary, which spends much time for sample preparation. The aims of this study are (a) the establishment of a high efficient analysis for FFA profile by liquid chromatography-mass spectrometry and (b) the application of this method to the analysis of the alteration of the FFA profile in mouse plasma and liver treated with bezafibrate, a PPARá agonist.

Methods: Male KK-Ay mice were fed a high fat diet or supplemented with 0.2% (w/w) bezafibrate for 4 weeks. Sample preparation of mouse plasma and liver was deprotenation in organic solvent solution. The quantification of FFAs is achieved using ultrahigh-performance liquid chromatography coupled with time-of-flight mass spectrometry optimized the separation and ionization parameters.

Results: Here, we report a new non-derivatization method (analysis time: 15 min/sample) for the analysis of individual FFAs including myristic acid, palmitic acid, palmitoleic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid. A high-sensitivity assay enables the quantification of FFAs using trace amounts of samples (plasma: 2 ìL, liver: 10 mg). We applied this method to the analysis of the FFA profile in mouse plasma and liver treated with bezafibrate and demonstrated a change in the profile of FFAs, particularly palmitoleic acid and oleic acid, with bezafibrate treatment.

Conclusions: It is suggested that the concentrations of palmitoleic acid and oleic acid in mouse plasma are markers of PPARα activation.

Key words: free fatty acid (FFA) profile, lipid metabolism, peroxisome proliferator-activated receptor α (PPARα) ultrahigh-performance liquid chromatography (UPLC), time-of-flight mass spectrometry (TOFMS)

PO406

EFFECTS OF IMPROVED-FAT-CONTENT FRANKFURTERS AND PÂTÉS ON INSULIN SENSITIVITY/RESISTANCE MARKERS OF VOLUNTEERS AT INCREASED CARDIOVASCULAR RISK. A PLACEBO-CONTROLLED STUDY

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Background and objectives: Meat products are an important group of nutritionally dense foods of many consumers around the world. Reformulation of meat products is one of the strategies used in order to develop meat-based functional foods. Waist perimeter (WP) is considered an important marker for abdominal obesity diagnosis. Aim: To study the effect of modified frankfurters and pâtés: a) reduced-fat products (RF) (15.3%, 15.2% fat, respectively); b) n-3-enriched reduced-fat products (n-3 RF) (15.1%, 15.5% fat, respectively) and c) normal-fat products (NF) (18%, 30.8% fat, respectively) on glucose, insulin, different HOMAs and QUICKI of volunteers at high CVD risk classified according to low-normal and increased WP.

Methods: Twenty-two volunteers were enrolled in a sequential study of 3 consecutive 4-wk periods separated by 4-wk washout periods. Cutoff points for WP: 102 and 90 cm for men and women respectively.

Results: Glycemia, insulinemia, HOMA-IR, HOMA-S, HOMA-D, HOMA B and QUICKI were non-significantly affected in any of the considered periods. Changes in insulin, HOMA-S and QUICKI in the RF period tended to be different ($P<0.07$) in volunteer with low and high WP. With respect to the low WP population, in the RF period HOMA-S ($P<0.09$) and QUICKI ($P<0.05$) increased; in the n-3 RF period, the insulin and HOMA-IR tended to decrease ($P<0.08$) while QUICKI and HOMA-B to increase ($P<0.09$); not significant change or tendency ($P<0.1$) was observed for any parameter during the NF period. The RF and the n-3 RF periods did not induce any significant change or tendency, while the NF decreased the glucose/insulin ratio in high WP volunteers.

Conclusions: The low WP population appears as the target population because consumption of RF or n-3 RF-meat products slightly improved some glucose homeostasis markers.

Key words: reduced-fat, omega-3 enriched-meat, Frankfurters, pâtés, glucose, insulin, HOMA, QUICKI.

PO407

RURAL-URBAN DIFFERENTIALS IN LIFESTYLE AND FOOD SECURITY OF OLDER PERSONS IN IBADAN, NIGERIA

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Background and objectives: Healthy lifestyle and good nutrition are essential to promote active ageing. Knowledge of rural/urban differentials in lifestyle and food security is essential to design locality-driven programmes.

Methods: This study assessed rural/urban differences in lifestyle and food security of older people in Ibadan, Nigeria. This comparative cross-sectional survey involved 168 and 178 respondents from two urban and two rural Local Government Areas (LGAs) of Ibadan. A three-stage sampling technique was used to select LGAs, wards/communities and respondents respectively. A semi-structured questionnaire was used to collect information on socio-demographic and lifestyle profile of the respondents. Socio-Economic Status (SES) was categorised as low (6-13), moderate (14-21) and high (22-29) and lifestyle was assessed using levels of smoking, alcohol intake and physical activity. Food security was determined using household coping strategies. Data were analysed using descriptive statistics and logistic regression at 5% level of significance.

Results: Mean age was 68.9±4.7 and 69.7±4.4 years in urban and rural areas respectively. Respondents in low SES were more (6.7%) in rural than urban areas (2.4%) ($p<0.05$). Prevalences of heavy alcohol intake (16.1%, 16.9%) and irregular physical activity (1.8%, 9.6%) were lower in urban than rural areas. Current smokers were thrice higher (13.5%) in rural than urban areas (4.8%). Food insecurity with hunger was nine-times higher in rural (16.9%) than urban areas (1.8%) while food insecurity without hunger was 17.4% and 7.1% in rural and urban areas respectively. Smoking and alcohol intake had no significant relationship with food security in both areas. The likelihood of being food insecured reduced in urban than rural when respondent had at least moderate-SES (OR: 0.15 versus 0.10) or married (OR: 0.6 versus 3.5) among other results.

Conclusions: Poor lifestyle and food insecurity were higher in rural than urban areas. Intervention programmes should direct attention to older persons in rural areas.

Key words: food security, survey

PO409

EFFECTS OF PRENATAL DHA SUPPLEMENTATION ON ATTENTION AND BEHAVIOR OF OFFSPRING AT AGE 5 Y: RANDOMIZED CONTROLLED TRIAL IN MEXICO

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Background and objectives: Docosahexanoic acid (DHA) is an important constituent of the brain that accretes during the first 1000 days of life. Evidence from well-designed intervention trials of long-term benefits of increasing DHA intakes during pregnancy is sparse. We have completed the age 5 y follow-up of offspring of women who participated in POSGRAD, a double-blind randomized controlled trial of prenatal DHA supplementation in Cuernavaca, Mexico.

Methods: Pregnant women received 400 mg/d of DHA or a placebo from 18-22 weeks of pregnancy until delivery. We assessed attention and behavior in 795 offspring at age 5 y (82% of 973 live births) using the computer-based Conners' Kiddie Continuous Performance Test (K-CPT), and the Spanish version of the Behavior Assessment System for Children (BASC-PRS) administered to the primary caregiver. We compared the groups on standardized T scores (% omissions, % commissions, HIT Reaction Times) and inattention, impulsivity and sustained attention measures for the K-CPT, and standardized summary scores for scales of hyperactivity, aggression, anxiety, depression, attention problems, executive functioning and social skills (BASC-PRS).

Results: Attrition did not differ by treatment group. The groups were balanced for maternal and infant characteristics. In intent to treat analysis, the DHA group showed improved T scores compared to the placebo group for omissions (DHA: 47.6 + 10.3; Placebo: 49.6 + 11.2; $p < 0.01$) and sustained attention (HIT RT Block Change: DHA: 50.2 + 12.2; Placebo: 52.0 + 12.5; $p=0.04$; HIT SE Block Change: DHA: 48.2 + 10.0; Placebo: 49.9 + 9.4; $p=0.01$). There were no differences significant at $p<0.05$ for the other K-CPT scores, the % clinically at risk for Attention Deficit Hyperactivity Disorders, or any of the scales based on the BASC-PRS.

Conclusions: Exposure in utero to DHA may contribute to improved sustained attention in preschool children.

Key words: DHA, prenatal, supplementation, attention, preschool

PO410

NUTRIENT ADEQUACY AND ORGANOLEPTIC QUALITY OF COMPLEMENTARY FOOD MIXES MADE FROM COMBINATIONS OF DIGITARIA EXILIS, SESAMUM INDICUM AND GLYCINE MAX

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Background and objectives: Low-quality of traditional infant complementary food and inadequate feeding practices predispose under-five children in poor resource communities to under nutrition. This study evaluated the nutrient adequacy and organoleptic quality of complementary mixes made from Digitaria exilis (D), Sesamum indicum (S) and Glycine max (G).

Methods: Digitaria exilis was soaked and sundried; Sesamum indicum roasted and Glycine max boiled, fermented and sundried before milling separately into flours. The flours were combined at different ratios on protein basis to produce five multi-mixes (D70S30; D70G30; D70S15G15; D70S20G10 and D70G20S10) which were quantitatively analyzed for nutrients and their gruels organoleptically assessed for acceptability. A commercial product was used as control. All analyses were done in triplicates using standard methods. ANOVA and Duncan's multiple range tests were used to separate/compare the means. A nine-point hedonic scale was used to rate the organoleptic attributes of the mixes.

Results: D70G30 mix had significantly ($p<0.05$) higher protein (19.26%) and folate (108.71mg) than the D70S30. The D70G20S10, D70S15G15 and D70S20G10 had 18.10%, 17.16% and 16.90% protein, respectively. The energy content of all the mixes was above 400kcal. The iron values ranged from 11.25mg in D70G30 to 13.01mg in D70S30; the calcium values ranged from 190.28mg in D70G30 to 198.34mg in D70S30. D70S30 also had the highest (7.32mg) zinc value while the D70G30 had the least (3.24mg). The protein, iron, zinc and folate values of most of the mixes met 50 – 100% of the daily requirements for the age group. The D70G30, D70S15G15, D70S20G10 and D70G30 had the highest ratings in terms of colour (6.80), texture (7.90), flavor (6.50) and general acceptability (6.70), respectively.

Conclusions: The formulated mixes had attributes of adequate complementary food but D70G30 had the best nutritional and general acceptability attributes.

Key words: leguminous oil seeds/cereals, complementary food, nutrient adequacy, acceptability

PO411

EFFECTS OF DIETARY SUPPLEMENTS; PEDIASURE AND CARNITINE ON THE ANTHROPOMETRIC INDICES IN CHILDREN WITH ALL UNDER CHEMOTHERAPY, IN AFZALI POOR HOSPITAL , KERMAN, IRAN

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Background and objectives: Malnutrition is a common complication of cancer and cancer treatment.This occurs in 50% of patients.Dietary supplements may have a significant effect on the response to treatment,survival,recurrence, mortality and complications induced by chemotherapy. The effects of Pediasure and Carnitine intake on anthropometric indices in children with ALL have been investigated in this study.

Methods: This clinical trial study was conducted in 34 new cases of childhood ALL under chemotherapy,in Afzali Poor hospital.The patients were divided by randomized design into two groups;17 cases and 17 controls(mean age5.79±3.97and7.17±3.66 years).100-150 cc Pediasure in every other day for one month and 50mg/kg/day Carnitine were given to case group. Anthropometric indices ;Skin Fold Thickness(SFT),Weight,Height and Arm Circumference were measured at the beginning of the study and 6 months later. Anthropometric indices were compared in these two periods. Data were analyzed by using Paired t. test.

Results: Mean of SFT(mm),Weight(Kg),Height and Arm Circumference(cm) at the beginning of the study in case group were 7.2±3.3,18±9.7,107.3±24.5 and 15.88±4.2 and in control group were 10.57±6.2,22.48±11,115.82±22.3 and 16±4 respectively. After 6 months of study these indices in case group were 7.3±0.8,18.3±2.3,108.1±5.88 and 15.98±1 and in control group were 10.6±1.5,22.88±2.7,116.3±5.4 and 16.2±0.97 respectively. No statistically significant differences were noticed between groups in two periods. Although ,the differences of SFT were not statistically significant,but this finding was clinically important ($p=0.052$).

Conclusions: In spite of observed acute malnutrition in both groups,effects of dietary supplements on anthropometric indices did not show significant difference between groups.This may be related to many factors like the:1- case group consumed only 100-150 Kcal/day energy more than the control group (we are not allowed to be free on using dietary supplement because of relapse risk and other unknown adverse effects of supple-

ments),2- the number of studied patients and 3- the duration of intervention.Further studies are recommended.

Key words: Acute Lymphoblastic Leukemia, Anthropometric indices, Pediasure, Carnitine

PO412

THE GINGER AS A DIET INGREDIENT AGAINST TOXICITY INDUCED BY CHROMATE

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Background and objectives: The evaluation of the effect of ginger on the modulation of toxic effects and oxidative stress induced by chromate is the objective of our study.

Methods: 50 male rats Albinos wistar were divided to five groups as follow: Group I (T) is served as control, received a mineral water by gavage (per os); group II (G) received an experimental diet with 2 % of ginger; group III (Cr) received an oral dose of potassium dichromate (15 mg/kg) and normal diet; group IV (CrG): received an oral dose of potassium dichromate (15 mg/kg) and an experimental diet containing 2 % ginger; and group V (Cr+G) received an oral dose of potassium dichromate (25 mg/kg) and an experimental diet with 2 % of ginger.

Results: The results of this study indicate that the chromate provoked a haematoxic effect (anemia), nephrotoxic (increase concentrations of urea, creatinine, and uric acid), hepatotoxic (increase of total and direct bilirubin concentrations, ASAT, ALAT, LDH and PAL activities). The results showed also increase concentrations of cholesterol, triglyceride and total lipids. In addition, chromate has a pro-oxidant effect, which was indicated by decrease of reduced glutathione (GSH) levels in different tissues. However, the administration of ginger revealed a reduction of the intensity of oxidative stress induced by the chromate resulting in the decrease of the majority of the previous parameters concentrations.

Conclusions: We demonstrated that ginger has potent antioxidants activity, revealed by the amelioration of chromate's toxic effects. We can say that ginger has a protective effect towards damages induced by the chromate.

Key words: Potassium dichromate, Oxidative stress, Toxicity, Ginger diet

PO413

MATERNAL FOLIC ACID SUPPLEMENTATION INDUCES DIFFERENTIAL CHANGES IN THE HEPATIC TRANSCRIPTOME OF YOUNG ADULT MALE PROGENY

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Background and objectives: Maternal folic acid supplementation is regarded as a preventative measure against neural tube defects in the newborn. With folic acid being a methyl donor, maternal supplementation of which could potentially impose changes to the fetal epigenome in gestation, thereby leading to perturbations in gene expression after birth. Metabolic deregulation, as observed in non-alcoholic fatty liver disease (NAFLD), is often characterised by aberrant hepatic transcriptional profile. To assess whether this maternal dietary change may predispose progeny towards developing NAFLD in adulthood, the hepatic transcriptional profile of young adult male progeny was determined.

Methods: Female Wistar rats were fed one of two diets: Control (n=7, 2mg folic acid/kg) or Folic Acid Supplemented (n=7, 6mg folic acid/kg), from two weeks before mating until delivery. Male offspring were weaned onto a standard diet and were sacrificed on postnatal day 90 with their liver collected. Global transcriptional profiling was performed with Affymetrix Rat Gene 1.0ST Array. Data was analysed on BRB-Arraytools using class comparison. Molecular networks modulated by the differentially expressed genes were identified with Ingenuity Pathway Analysis.

Results: Twenty two genes were differentially expressed in the liver of young adult male offspring of folic acid supplemented mothers, with 10 being upregulated and 12 being downregulated. Maternal folic acid supplementation significantly upregulated the hepatic expression of acyl-coA synthase member 3 (Acsm3) in the young adult male offspring (1.76 fold; $P < 0.05$). While aldo-keto reductase family 1 member B7 (Akr1b7) expression was detected to be significantly downregulated (0.43 fold; $P < 0.05$). One network with cardinal functionalities in lipid metabolism was found to be closely associated with the differentially expressed genes.

Conclusions: Maternal folic acid supplementation may promote lipogenesis in the young adult male offspring through modifying hepatic expression of the enzymes involved.

Key words: Folic Acid, Fetal Epigenome, Lipogenesis

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HEPATIC TRANSCRIPTIONAL CONSEQUENCES FOR YOUNG ADULT FEMALE PROGENY FOLLOWING FOLIC ACID EXPOSURE IN GESTATION

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Background and objectives: There is increasing epidemiological evidence to suggest prenatal nutrition to be a major determinant of metabolic health in adulthood. The underlying molecular mechanisms remain elusive; however, epigenomic and transcriptomic changes have been proposed. As the establishment of epigenetic signatures first occurs in gestation, changes in the availability of methyl donors could modify fetal epigenome, in turn conferring to differences in gene expression and metabolic phenotype after birth. Folic acid, a potent methyl donor, is widely supplemented in pregnant women to prevent neural tube defects. Given the facilitating role in which folic acid plays in the establishment of epigenetic signatures, we therefore examined whether maternal folic acid supplementation may define metabolic phenotype of adult female progeny through hepatic transcriptomic changes.

Methods: Female Wistar rats were fed one of two diets: Control (n=6, 2mg folic acid/kg) or Folic Acid Supplemented (n=6, 6mg folic acid/kg), from two weeks before mating until delivery. The liver of one young adult female offspring from each dam was collected. Transcriptional profiling was performed with Affymetrix Rat Gene 1.0ST Array and analysed with BRB-Arraytools. Upstream regulators were identified with Ingenuity Pathway Analysis.

Results: Thirty six genes were differentially expressed in the liver of young adult female offspring of folic acid supplemented mothers, with 8 being upregulated and 28 being downregulated. The expression of two significantly upregulated genes ($P<0.05$), Scd1 and Tsku, were identified as being transcriptionally responsive to insulin. The expression of three significantly downregulated genes involved in cholesterol biosynthesis (Idi1, Msmo1, and Sqle) was found to be under the transcriptional control of PPARA, a pivotal regulator in lipid oxidation. Consistently, lipid metabolism was identified as the most overrepresented function.

Conclusions: Maternal folic acid supplementation may disrupt lipid and cholesterol homeostasis in the young adult female progeny through modifying hepatic transcriptomic landscape.

Key words: Folate, Cholesterol Biosynthesis, Transcriptomics

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STABLE ISOTOPE RATIOS OF CARBON AND NITROGEN IN THE SCALP HAIR OF PATIENTS RECEIVING ENTERAL NUTRITION

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Background and objectives: We analyzed the stable isotope ratios of carbon (δ13C) and nitrogen (δ15N) in the scalp hair of patients receiving enteral nutrition to estimate the nutritional conditions of patients, because lower δ13C and higher δ15N in the hair were reported in the starvation for long term and the anorexia.

Methods: The δ13C and δ15N in the scalp hairs of patients receiving enteral feeding formula for long term and healthy persons were analyzed using isotope-ratio mass spectrometry (IRMS).

Results: The δ13C and δ15N values (‰) in the scalp hair of patients (n=11) were - 20.4 ± 1.2 and 10.3 ± 0.7, respectively, and significantly lower and higher than those of healthy persons (- 19.1 ± 0.6 and 9.3 ± 0.5 ‰, n=114), respectively. The δ15N value in the hair of patients decreased with increases of total energy, protein and carbohydrates received from the enteral feeding formula, while the δ13C value tended to increase. In contrast, the body mass index (BMI) and serum albumin of the patients did not correlate to those increases received from the enteral feeding formula.

Conclusions: The values of δ13C and δ15N in the hair of patients receiving the enteral nutrition for long term appear to be good indicators for the nutritional conditions.

Key words: stable isotope ratio of carbon (δ13C), stable isotope ratio of nitrogen (δ15N), scalp hair, body mass index (BMI), enteral nutrition.

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ABNORMAL INTESTINAL HANDLING OF SORBITOL AND MANNITOL IN PATIENTS WITH IBS: POTENTIAL CLINICAL IMPLICATIONS

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Background and objectives: Sorbitol and mannitol are polyol isomers widely distributed in food. Major dietary sources include stone fruits and pears (sorbitol), cauliflower and mushrooms (mannitol). Whilst sorbitol is poorly absorbed and induces symptoms in patients with Irritable Bowel Syndrome (IBS), the gastrointestinal effects of mannitol are unknown. We aimed to compare the absorption and symptom response of sorbitol and mannitol in patients with IBS and in healthy individuals.

Methods: A randomised, double-blinded, placebo-controlled, crossover study was conducted in 20 IBS subjects (Rome III) and 21 healthy controls. Subjects were challenged on separate occasions in randomised order with 10g of either sorbitol, mannitol or glucose (as control) in 100ml solutions and responses measured in 4-h breath hydrogen tests. Gastrointestinal symptoms during the tests were assessed using visual analogue scales.

Results: Similar proportions of healthy (67%) and IBS subjects (60%) had sorbitol malabsorption, but fewer subjects with IBS malabsorbed mannitol (20% vs 57%; p=0.02). Majority of healthy subjects (86%) had either concurrent malabsorption or absorption of both polyols. In contrast, 40% of IBS patients were discordant for sorbitol and mannitol malabsorption, with less than 20% malabsorbing both. Symptoms increased significantly after both polyols compared with the placebo glucose (≤0.05) in IBS only, but were independent of their malabsorption.

Conclusions: discordant absorption of sorbitol and mannitol occurred in patients with IBS compared to that in healthy individuals, with sorbitol more likely being malabsorbed. Polyols induce symptoms in IBS independently of their malabsorption, implying dietary restriction of polyols are warranted, irrespective of the individual's absorptive capacity.

Key words: Mannitol, sorbitol, malabsorption, irritable bowel syndrome, breath hydrogen tests

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SIZE AND BODY COMPOSITION OF SWEDISH INFANTS IN RELATION TO THE NUMBER OF RISK ALLELES IN THE FTO-GENE

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Background and objectives: Several genes are associated with human obesity. A common variant (rs 9939609) in the fat and obesity (FTO) gene has a particularly strong association with obesity. Carriers of the FTO risk allele tend to have a high body mass index (BMI) and a high body fat content. Some studies suggest that the relationship between FTO genotype and obesity becomes apparent during childhood while the effect of the risk allele in infancy rather is a decrease in BMI. However, the number of risk alleles has also been found to be associated with heavier and fatter infants. We studied size and body composition at 1 and 12 weeks of age in Swedish infants in relation to the number of FTO risk alleles. Materials and

Methods: Healthy full term girls (n=96) and boys (n=109) were studied for weight, length, fat mass and fat free mass at 1 and 12 weeks of age. Body composition was assessed using air displacement plethysmography. Saliva samples for identification of the FTO-genotype were collected. Regression analyses was used.

Results: The number of risk alleles was not associated with infant fat mass (g,%) but was positively associated with infant length (cm) (P=0.007-0.033). The interaction term "FTO-genotype x sex" was significant at 12 weeks (P=0.047), but not at 1 week (P=0.067), reflecting a relationship in boys (P=0.001) but not in girls. The number of risk alleles was also positively associated with fat free mass (g) (P=0.008-0.036) but this relationship was not significant when adjusted for infant length.

Conclusions: Our results do not confirm a previous report that the FTO risk allele is associated with more body fat in infants but suggest instead that this allele is associated with an increased body length in infant boys.

Key words: air displacement plethysmography, body composition, FTO, infancy, obesity genetics

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INFLUENCE OF PHYSICAL ACTIVITY ON THE NUTRITIONAL STATUS OF OVERWEIGHT ADOLESCENTS MEASURED BY CD4+/CD8+ RATIO

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Background and objectives: CD4+/CD8+ ratio is a sensitive immunological marker of the nutritional status, whose optimal values range from 1.5-2.0, and might be altered by obesity. Some studies have shown that engagement in physical activity (PA) might have some benefits on the immune system, especially in obese subjects. Therefore, the purpose of this study was to examine whether meeting PA guidelines (i.e. 60 minutes/day in moderate-to-vigorous PA) may improve the nutritional status in overweight/obese adolescents by measuring the CD4+/CD8+ ratio.

Methods: 188 adolescents (96 females) of 2000 who were enrolled in the AFINOS study were assessed. Body mass index was calculated and the adolescents were classified according to Cole's cut-off points into two groups: overweight/obesity (n=49) and non-overweight (n=139). PA was measured by accelerometry, and adolescents were classified as active and inactive according to public health guidelines. CD4+ and CD8+ lymphocyte subset percentages were determined by flow citometry and CD4+/CD8+ ratio was calculated. The Student's-t test was used to analyze the differences of all parameters between weight status and both PA groups.

Results: The prevalence of overweight/obesity was 26.1%. CD4+/CD8+ ratio was 1.5±0.5 in the non-overweight group and 1.4±0.5 in the overweight/obesity group ($p>0.05$). No significant differences were found in non-overweight adolescents between active and inactive adolescents respectively, with regard to CD4+ (36.1±6.8 vs. 37.7±6.2) and CD8+ (25.7±5.9 vs. 25.9±6.6) percentages, and CD4+/CD8+ ratio (1.6±0.5 vs. 1.5±0.5) ($p>0.05$). However, overweight/obesity adolescents who were active had more favourable levels in all parameters (CD4+: 37.2±6.6 vs. 32.5±8.5; CD8+: 26.5±6.2 vs. 31.1±8.1 percentages and also CD4+/CD8+ ratio: 1.5±0.5 vs. 1.1±0.5) than those overweight/obese adolescents classified as inactive ($p<0.05$).

Conclusions: PA by meeting public health guidelines might have some benefits on the immune system in adolescents with overweight/obesity, enhancing their nutritional status, measured by CD4+/CD8+ ratio.

Key words: Physical activity, overweight/obesity, CD4+/CD8+ratio, adolescents.

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A COMPARISON OF FOOD INTAKE PATTERN OF INTELLECTUALLY CHALLNGED AND NON-CHALLENGED SCHOOL CHILDREN IN DHAKA CITY

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Background and objectives: The intellectually challenged children suffer undesirable nutritional outcomes compared to their counterpart. No reliable data on the food intake pattern of these children are available in Bangladesh. The objective of the study was to identify if there is any food intake differences between intellectually challenged and non-challenged children of school, aged 4-12 years in Dhaka city.

Methods: 24 intellectually challenged children of the age group 4-12 years were selected randomly from a special school in Dhaka City and age, sex matched another 24 non-challenged children were selected from another school. All the children underwent measurement of height and weight. A structured questionnaire including food frequency was administered to the caregivers.

Results: The study findings show that the mean Height for age z score (HAZ) for the 1st and 2nd group were -0.9 and 1.1 ($p = 0.00$) and mean Weight for age z score (WAZ) for intellectually challenged children and normal children were -0.3 and 1 ($p= 0.00$). Less frequent meal taken by these children was also noticed ($p= 0.016$). The intellectually challenged children were more likely to replace the main meal ($p= 0.008$) with the intake of chips, biscuits and they had more prolonged eating time ($p= 0.04$). These children suffer more ($p= 0.039$) from feeding difficulties than the normal children. The non-challenged children showed the significantly higher consumption of fast foods ($p= 0.045$) and the intellectually disabled children had a significant higher intake of medicine ($p= 0.005$).

Conclusions: Thus the study provides an important priority of the establishment and maintenance of adequate nutrition of the intellectually challenged children for their "catch up" growth. The study also highlighted inadequate food intake among these children; which place them more at risk for further malnourishment in their later life.

Key words: intellectually challenged children, food intake, Bangladesh

PO420

THE COMPARISON OF DETECTION SYSTEMS IN HPLC DETERMINATION OF CAROTENOIDS FROM SPINACH AND KALE LEAVES

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Background and objectives: For the determination of carotenoids in plant extracts the useful technique is HPLC–UV–Vis. The presence of the long chromophore of conjugated double bonds (polyene chain) in carotenoid structure, provides the distinctive light-absorbing properties. Other detection method like Corona CAD gives possibilities to determine carotenoids, chlorophylls as well as polyphenols during the one-step analysis. Moreover, the development of advanced LC/MS method has been observed especially in qualitative and quantitative analyses. Based on innovative detection technology, the useful detectors for qualitative and quantitative analyses of carotenoids have been indicated. The method validation including method linearity, precision, recovery, limits of detection and quantitation has been presented.

Methods: Methanolic extracts of fresh or frozen of spinach and kale leaves were analyzed by means of RP HPLC. An improved and simplified analytical method was optimized. Compounds were separated on C18 column. For the calibration procedure, standards mixtures of lutein, beta-carotene, cryptoxanthin in methanol were prepared.

Results: During LC/MS method, SIM mode analysis allowed to obtain LOD for lutein 0.20 ug/mL. MRM mode allowed to track the formation of fragmentation ions 551,6 - 119,2 m/z (collision energy 15), the LOQ for lutein below 0.60 ug/mL was confirmed. The values of LOD and LOQ for the lutein by means of HPLC-UV-Vis detection were 0.5 ug/mL and 1.5 ug/mL, and for Corona-CAD were 0.6 ug/mL and 1.7 ug/mL, respectively. The high concentration of lutein in extracts from frozen and fresh spinach (from 0.43 to 0.88 mg/g) was determined. The content of lutein in red kale leaves (2.04 mg/g) is higher than in green kale (1.10 mg/g).

Conclusions: HPLC-UV-Vis method allows for the selective determination of xanthophylls in plant extracts. Kale Redbor F1 (red-violet leaves) is more biological resistant, than usually cultivated green leaf kale (Winterbor F1).

Key words: xanthophylls, HPLC, detectors, mass spectrometry

PO421

DIETARY PLASMA PROTEIN SUPPLEMENTATION AMELIORATES LUNG AND INTESTINAL INFLAMMATION INDUCED BY LPS AND STAPHYLOCOCCAL ENTEROTOXIN B ADMINISTRATION IN MICE

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Background and objectives: Previous experiments have shown that dietary supplementation with spray-dried animal plasma (SDP) can attenuate intestinal inflammation induced by S. aureus enterotoxin B (SEB) in rats. Plasma supplements can also alleviate the inflammatory response in a mouse model of lung inflammation induced by lipopolysaccharide (LPS). We now wanted to assess whether supplementation with SDP or with the immunoglobulin concentrate fraction (IC) are effective in mice exposed to a double challenge induced by the administration of SEB and LPS.

Methods: Male C57BL/6 mice were fed diets supplemented with 8% SDP, 2% IC, or milk proteins (Control group) from day 19 (weaning) until day 33. The challenge consisted of the intranasal administration of LPS from E. coli (12.5 ug) at day 32 and 6h later they received an intraperitoneal injection of SEB (25 ug). Samples were collected 24h after the LPS administration. Leukocyte populations were analysed in broncoalveolar lavage fluid (BALF) and in mesenteric lymph nodes (MLN). Cytokine expression in lung and jejunum mucosa was determined by real time PCR.

Results: The toxins challenge increased leukocyte recruitment into BALF and MLN, as well as the percentage of activated monocytes and neutrophils (all $P<0.05$). Both SDP and IC attenuated the effects on MLN (all $P<0.05$) but only SDP reduced the SEB-LPS effects on lung inflammation (all $P<0.05$). The double challenge also increased the expression of TNFa, IFNg and IL1b in lung tissue and jejunum mucosa (all $P<0.05$). Both supplements attenuated the effects of toxins administration in both tissues (all $P<0.05$). These effects were accompanied by increased expression of IL-10 in both lung and jejunum (all $P<0.05$) but only SDP increased the expression of TGFb in both tissues ($P<0.05$).

Conclusions: Supplementation with animal plasma proteins attenuated intestinal and lung inflammation by increasing the expression of anti-inflammatory cytokines.

Key words: intestinal inflammation, lung

PO422

DARK CHOCOLATE SWEETENED WITH STEVIA REDUCE BLOOD GLUCOSE AND CHOLESTEROL OF DIABETIC RATS

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Background and objectives: Stevia is herb with incredible sweetening power rated from 70 to 400 times of white sugar. The study aimed at find out the effect of dark chocolate sweetened with Stevia on blood glucose among diabetic rats.

Methods: Dark chocolate were made with standard methods, but Sugar were substituted with Stevia as a natural sweetener. The produced chocolate was evaluated through panel test and we used the product with high score. The produced chocolate was added to rats' diet in different concentration (5%, 10%, and 15% respectively). Forty eight male albino rats (weight 100±10 gram) were injected with alloxan for induction of diabetes and rats with high blood glucose were used in this study. The study was carried out on five normal rats (Negative control) and twenty five diabetic rats. The diabetic rats were subdivided into five equal groups (5 rats for each); positive control, 5% dark chocolate group, 5% sweetened dark chocolate group, 10% sweetened dark chocolate group, and 15% sweetened dark chocolate group. The experiment continued for 28 days, at the end, rats were anesthetized and killed by exsanguinations. Blood samples were collected and used for determination of glucose, total cholesterol, urea, creatinine, ALT, and AST.

Results: Food intake for the groups fed on 10, 15 % sweetened dark chocolate group was decreased. However there were no significant changes in body weight between all studied groups. In comparison with positive control group, the results showed that rats fed on 15% sweetened dark chocolate group had the lowest concentration of blood glucose, cholesterol, creatinine, ALT, and AST ($P<0.05$) followed by rats fed on 10% sweetened dark chocolate group.

Conclusions: The higher the dark chocolate sweetened with stevia intake the lower the level of blood glucose and cholesterol.

Key words: Stevia, Chocolate, Glucose, Cholesterol, Rats

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IDENTIFICATION OF BLOOD CELL TRANSCRIPT-BASED EARLY BIOMARKERS OF METABOLIC HEALTH IN AN ANIMAL MODEL LESS PRONE TO OBESITY

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Background and objectives: Moderate maternal calorie-restriction during lactation has been shown to protect rat offspring against obesity development in adulthood, due to an improved capacity to handle and store excess dietary fuel. We used this model to find early biomarkers of metabolic health, focusing on molecular markers of lipid handling. To identify transcript based biomarkers we used peripheral blood mononuclear cells (PBMCs), which are easily accessible in humans.

Methods: Male and female offspring of control and 20% calorie-restricted lactating dams (CR) were studied. At weaning, a set of pups were killed, PBMCs were isolated and whole genome microarray analysis was performed. White adipose tissue (WAT) and liver were also collected for mRNA expression analyses by qRT-PCR. The remainder of the pups were sacrificed at the age of 6 months.

Results: CR-animals displayed lower body weight, food intake and fat accumulation, and improved levels of insulin, leptin and leptin/adiponectin ratio in plasma throughout life. Microarray analysis of weaned rat PBMCs identified 278 genes differentially expressed between the CR and control groups (≤0.01). Among lipid metabolism-related genes, expression of Fasn and Rxrb was decreased and Cpt1a and Lipe increased in CR animals versus controls, and changes were fully confirmed by qRT-PCR. At an early age Fasn and Cpt1a expression levels in PBMCs correlated with their expression levels in WAT. Notably, Cpt1a expression in PBMCs correlated with hepatic expression at all time points examined, even in adult animals.

Conclusions: These findings reveal the possibility of using transcript levels of lipid metabolism-related genes in PBMCs as early biomarkers of metabolic status, potentially providing a valid biological readout for the study of metabolic processes in humans.

Key words: early biomarkers, PBMCs, calorie-restriction, lactation

PO424

NUTRITION RELATED CARDIAC RISK FACTORS IN PATIENTS WITH CORONARY ARTERY DISEASE IN A SELECTIVE HOSPITAL AT DHAKA CITY

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Background and objectives: Coronary artery disease is one of the leading causes of death in developed and developing countries including Bangladesh. This study was aimed to explore the association between Nutrition related cardiac risk factors in patients with coronary artery disease.

Methods: A case-control study. Two hundred (100 CAD) subjects in Lab aid cardiac hospital and 100 healthy subjects with different ranges of BMI (starting <18.5 BMI-27) were studied. Anthropometric data collected by standard techniques. Nutrient profile was taken by 24hr recall method and serum glucose by glucose-oxidase method, serum lipid by enzymatic-colorimetric method. Statistical analyses were performed by appropriate univariate and multivariate techniques using SPSS windows 11.5.

Results: Level of high physical activities and Waist circumference was found higher among the non-CAD subjects than non CAD subjects. Total energy and fat intake are strongly correlated with BMI (p<0.023) and (p=037). Carbohydrate and total energy also strongly correlated with Waist circumference (p<0.0001) and (0.030). Logistic regression analysis was performed against the confounding independent variables like consumption of beef (> 2 times/wk), chicken (> 2 times/wk), egg(> 2 times/wk), fish (<1time/day), junk food (>1time/day) fruits and vegetable (<1time/day). Most of the respondents among CAD group preparation their food by fried process and non-CAD groups were used boiled food. Majority respondents among CAD group were taking extra salt (p=0.001). Body mass index (p=0.004), WC (male) (p=0.004) and WHR (male) (p=0.020) were significantly higher in CAD group than that of their counterpart non CAD subjects.

Conclusions: This study revealed that consumption of beef, egg, chicken, junk food, fish, fruits and vegetables is significantly higher risk of coronary artery events. It is clear that nutrition related cardiac risk factors should be emphasized for the prevention of coronary artery disease in our country.

Key words: Nutrition and CAD, Diet and CVD, cardiac risk factors

PO425

GASTROINTESTINAL PEPTIDE RESPONSE TO FAT AND CARBOHYDRATE: IMPLICATIONS FOR SATIETY CONTROL

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Background and objectives: The macronutrient composition of foods can affect both satiation and satiety. Fat is a major risk factor for overconsumption when consumed ad libitum due to its weak effects on satiation, but its effect on satiety are less clear. Fat and carbohydrate are often used interchangeably in food and this may affect satiety. The present study examined the gastrointestinal peptide and subjective appetite response to foods high in fat or carbohydrate, eliciting normal physiological responses rather than supra-physiological levels attained during infusion studies.

Methods: Sixteen (5M;11F) healthy overweight/obese adults (Age:46y;BMI:29.8kg/m2) took part. Plasma was collected before and periodically for 180 minutes after consuming high fat (>50% energy from fat) or high carbohydrate (>80% energy from carbohydrate) meals of equal energy (590kcal), weight (685g) and protein content (~12%). Simultaneous ratings of hunger, fullness and satiety were tracked. Satiation was measured from a mixed macronutrient meal.

Results: CCK showed a greater response to the fat breakfast ($F(1,15)=11.178$, $p<0.01$) whereas insulin showed a greater response to the carbohydrate breakfast ($F(1,15)=32.688$, $p<0.001$). Ghrelin was suppressed equally by fat and carbohydrate ($F(1,15)=0.658$, $p=0.433$). Neither hunger, fullness or satiety responses differed after consumption of fat or carbohydrate ($p>0.05$) and the resulting energy intake did not differ (947kcal or 939kcal; $p=0.844$).

Conclusions: When delivered in fixed amounts, fat and carbohydrate meals eliciting markedly different peptide profiles can produce similar effects on satiety and satiation. This demonstrates that the same degree of satiety can be mediated by distinctly different peptide profiles and implies that no single peptide can be regarded as the sole biomarker of satiety. Control over satiety can be achieved via different patterns of meal related peptides.

Key Words: peptides, appetite, satiety, satiation

PO426

ALKYLRESORCINOLS AND Â-CAROTENE IN PLASMA AS DIETARY BIOMARKERS FOR HEALTHY NORDIC DIET

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Background and objectives: Biomarkers of dietary intake can be important tools in nutrition research. The aim of the present study was to assess alkylresorcinol (AR) and â-carotene plasma concentrations during a controlled dietary intervention with healthy Nordic diet (ND); rich in whole-grain, fruits and vegetables.

Methods: Participants (n=166), 30-65 years with BMI 27-40 kg/m2 and two more features of metabolic syndrome (International Diabetes Federation definition, slightly modified), were recruited through six centers in the Nordic countries and randomized to ND or control diet for 18-24 weeks. Plasma AR and â-carotene were analyzed and nutrient intake calculated from 4-day food records.

Results: Median fiber intake increased in the ND group from 2.5 g/MJ to 4.1 g/MJ (P<0.001), and total AR fasting plasma concentration from 72.6 to 106 nmol/L, or 68% (P<0.001). AR concentration was significantly higher in the ND group at 18/24wk (P<0.001) than in the control group. β-Carotene intake increased slightly in the ND group (P=0.073) but plasma â-carotene concentration did not change significantly throughout the study and did not differ between the groups at follow-up.

Conclusions: The ND diet results in higher dietary fiber intake and increased total plasma AR concentration compared with the control diet, suggesting AR might be a valid biomarker for a ND. No significant difference in plasma â-carotene concentrations was observed between the ND and control groups suggesting that â-carotene may not be sensitive enough biomarker of ND.

Key words: Nordic diet, dietary biomarkers, alkylresorcinols, β-carotene

PO427

INFLAMMATION AND BLOOD FATTY ACIDS IN EUROPEAN CHILDREN: THE IDEFICS STUDY

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Background and objectives: Inflammation markers are present even in the pediatric population. In adults, studies showed that some fatty acids (FA) have antiinflammatory properties like omega-3 polyunsaturated fatty acids, whereas others promote the inflammatory state like saturated fatty acids. The main objective is to assess the relationship between blood fatty acids and inflammation, measured by hs-C reactive protein (CRP), in European children.

Methods: The IDEFICS study (Identification and prevention of Dietary- and lifestyle-induced health EFfects In Children and infants) was a multicenter epidemiological study in eight European countries (Belgium, Cyprus, Estonia, Germany, Hungary, Italy, Spain and Sweden). Out of the total, 16,224 participating children, 2,600 subjects had blood fatty acids measured. Those children who had taken medication within the last week or the last 24 h were deleted due to the sensitivity of the CRP; therefore 1,413 children were used for the statistical analysis.

Results: There was no significant correlation between CRP and saturated fatty acids. Some monounsaturated fatty acids and CRP were inversely correlated ($p<0.001$) i.e. oleic acid, eicosaenoic acid and docosaenoic acid; also there was a positive correlation with palmitoleic ($p<0.001$). Regarding polyunsaturated FA, most of the omega 6 types had a positive correlation ($p<0.001$) while some of the omega 3 types presented inverse correlations with CRP: ALA ($p<0.001$) and EPA ($p<0.05$), except DHA where the relation was positive.

Conclusions: No relation was found between saturated fatty acids and inflammation as a priori was expected. However, a strong inverse association was found between monounsaturated fatty acids (except palmitoleic) and CRP. Also, as it is described in the scientific literature, there was a marked difference between polyunsaturated acids; the relation was different if they were omega 3 (mostly inversely correlated with CRP, except DHA) or omega 6 (positively correlated with CRP).

Key words: inflammation, fatty acids, children

PO428

INTEREST OF SLOWLY DIGESTIBLE STARCH ON CARBOHYDRATE METABOLISM: META-ANALYSIS

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Background and objectives: Decreasing glycaemic response is interesting in the prevention of metabolic diseases and has been considered as relevant by the EFSA. However, process and food composition influence dramatically the carbohydrate fate and then the metabolic consequences of carbohydrate rich foods. High slowly digestible starch (SDS) foods have been shown to provide low glycaemic response. A meta-analysis of 5 intervention studies has been done to evaluate the strength between SDS and glycaemic response, and SDS and appearance rate of carbohydrates of cereal foods.

Methods: The five selected clinical trials included from 12 to 38 non diseased subjects. All studies were randomised clinical trials with well characterised cereal products regarding macronutrient and starch digestibility (SDS content). We extracted the data to a database, and synthesized the evidence via meta-analyses and meta-regression models. The odd ratios (OR) with 95% of confidence for the adjusted random-effects models investigate the association between SDS and postprandial metabolism as glycaemic response, insulin response and appearance rate of carbohydrates (Ra).

Results: Cereal products containing high SDS ((ranging from 9 to 16g/portion), are 4,4 times more likely to generate low glycemic response and 2,6 times more likely to generate low insulin response than cereal products containing low SDS. The link between slow exogenous Ra and high SDS was even stronger with an OR of 14,6, while it was slightly lower with disappearance rate (OR=4,2). Strong link (69%) was obtained between exogenous Ra and glycemia.

Conclusios: High SDS (> 8g/portion) in cereal foods induced a lower postprandial glycaemic response, through a slower appearance rate of exogenous carbohydrates, and with a concomitant low insulin response. This meta-analysis reinforces the interest of SDS on its impact on carbohydrate metabolism in order to prevent the risk of metabolic disease genesis.

Key words: cereal foods, carbohydrates, glycaemic response, slowly digestible starch

PO429

AWARENESS, KNOWLEDGE AND BEHAVIOR OF USING FOLIC ACID SUPPLEMENTATION TO PREVENT NTDS AMONG RURAL WOMEN IN CENTRAL SOUTH CHINA

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Background and objectives: Neural tube defects (NTDs) are the most common birth defects which contribute to infant mortality and serious disability. This pilot study is to investigate the awareness, knowledge and behavior of using folic acid supplementation to prevent NTDs among rural women in Changsha County.

Methods: Multiple-stage sampling was used to select four townships randomly, and then three villages were selected from each township. Face-to-face interview was conducted between 6th, April and 15th, June, 2012, with a sample of 130 pregnant women, 163 women who took a birth in last 12 month and 41 women at childbearing age.

Results: Most of the total sample (98.5%) reported that they had heard about folic acid but only 60% could tell folic acid can decrease birth defects risk. Intake of folic acid supplements was reported by 60.5% of the entire sample of women who plan to be pregnant. Out of these 41 respondents, 58.5% were taking folic acid supplements (56.1%) or multivitamins (2.4%) but only 14 women adhere to taking folic acid daily. The multiple logistic regression analysis results indicate that for the full sample, women who gave birth in last 12 months were 5 times (OR=5.34, 95%CI: 2.43~12.58) and women who were currently being pregnant women were 3 times (OR=3.16, 95%CI: 1.40~7.12) likely to use folic acid supplements, controlling for those who plan to be pregnant; women with awareness of continuing using folic acid for 6 months± were nearly 2.6 times (OR=2.56, 95%CI:1.47~4.44) likely to use folic acid supplements than others.

Conclusions: Special attention must be given to those who with lower education, who plan to have a baby and who are in the first trimester when intervention programs planning to be developed.

Key words: folic acid, NTDs, women, knowledge

PO430

HIGH SENSITIVITY C-REACTIVE PROTEIN AND TOTAL ANTIOXIDANT STATUS IN PATIENTS WITH CHRONIC KIDNEY DISEASE, DIABETES AND HYPERTENSION

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Background and objectives: Low grade systemic inflammation and total antioxidant status can be assessed by the levels of high sensitivity C-reactive protein (hs-CRP) and Total antioxidant capacity (TAC). The study was carried out to evaluate the levels of hs-CRP and antioxidant status in chronic kidney disease, diabetic and hypertensive subjects in the presence of traditional risk factors. The relationship between total antioxidant capacity, C-reactive protein and other risk factors like blood pressure and Anthropometric measurements were also evaluated.

Methods: A total of 180 patients (90 control, 90 test(45 males ; 45 females respectively) aged 18-76years old, diagnosed as having chronic kidney disease, Diabetes and hypertension, but clinically stable were recruited from University of Benin Teaching Hospital. The controls were apparently healthy individuals. Anthropometric measurements were carried out (weight and height to calculate the Body mass index (BMI). Serum samples were collected for hs- CRP and TAC assays.

Results: BMI increased significantly ($P<0.05$) in hypertensive and Diabetic patients but no change was observed in CKD. Blood pressure was increased in CKD subjects. The Diabetic subjects had normal Blood Pressure values while it was uncontrolled in the hypertensive. The results revealed that hs-CRP levels were significantly increased ($P<0.05$) while TAC levels were decreased in all the subjects recruited for the study. The CKD subjects showed no correlation ($P>0.05$) between CRP, BMI and TAC. However, in hypertensive and Diabetic patients, CRP and TAC correlated positively with BMI and blood pressure. TAC correlated negatively with CRP.

Conclusions: Low grade systemic inflammation as measured by hs-CRP and TAC was increased in the chronic kidney disease, diabetes and hypertension subjects. CRP correlated positively with BMI in hypertensive and diabetic patients.

Key words: High sensitivity CRP, Total antioxidant capacity, chronic kidney disease, Diabetes, hypertension

PO432

SIMULTANEOUS DETERMINATION OF SYNTHETIC DYE, PRESERVATIVE, ANTIOXIDANT AND CAFFEINE IN ENERGY DRINKS BY HPLC

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Background and objectives: A novel high performance liquid chromatographic method was proposed for the simultaneous determination of synthetic dye (allura red), preservative (potassium sorbate), antioxidant (ascorbic acid) and caffeine in energy drinks.

Methods: The use of a reversed –phase C18 column (4.6mmx150mmx5ìm) using a gradient elution system enabled four compounds to be separated simultaneously in a single chromatographic run in less than 10 minutes.

Results: The method was successfully validated following ICH guidelines, and it has been demonstrated to be reliable for the assay of allura red, potassium sorbate, ascorbic acid and caffeine in energy drinks. The limit of quantitations were found as 0.33,0.77,1.21,0.63 ìg/mL for allura red, potassium sorbate, ascorbic acid ,caffeine, respectively.

Conclusions: A reliable analytical method is validated to measure allura red, potassium sorbate, ascorbic acid and caffeine in energy drinks.

Key words: HPLC, allura red, potassium sorbate, ascorbic acid, caffeine

PO433

ENHANCING MICRONUTRIENTS SOURCING MECHANISMS TO IMPROVE EFFICIENCY OF LARGE-SCALE OIL FORTIFICATION PROJECTS IN INDONESIA

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Background and objectives: Access to high-grade micronutrients is a recurring challenge which often threatens the long-term sustainability of food fortification programs. Objective. To assess the efficiency of the GAIN Premix Facility in procuring quality, affordable vitamin A for fortification of edible oil in Indonesia.

Methods: Use a global approach to procurement of standard items by combining volumes across various demand streams in order to reduce the total cost of acquisition through economies of scale. The GAIN Premix Facility undertook a detailed analysis of vitamin A requirements across its existing customer base which served as basis for developing a reliable demand forecast. A consolidated, competitive tender was launched which resulted in the setting up of a long-term commercial agreement with the selected supplier to lock-in the most competitive price for a given period of time.

Results: The direct benefit for oil manufacturers fortifying with vitamin A is that the cost of fortification went down significantly compared to prices they would have been offered had they ordered vitamin A individually. In Indonesia, this consolidated procurement approach has allowed a 14% decrease to the unit price of vitamin A.

Conclusions: The GAIN Premix Facility demonstrated its effectiveness in acting as a global procurement platform by aggregating demand across different customers and leveraging improved prices through increased volumes. Building on the success of this effort, the GAIN Premix Facility is replicating this global approach for procurement of other standard items being procured across fortification programs worldwide.

Key words: micronutrients, oil fortification

PO434

CARDIOVASCULAR RISK FACTORS AMONG TYPE 2 DIABETIC SUBJECTS ATTENDING SELECTED DIABETES CARE FACILITIES IN BANGLADESH

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Background & objectives: There are many risk factors for cardiovascular disease which are responsible for the majority of deaths in diabetic patients. To assess the proportion of cardiovascular risk factors among DM subjects attending different diabetes care centers at the capital city and at northern part of Bangladesh.

Methods: Under an analytical cross-sectional design 754 type 2 diabetic subjects (age >20 years) were selected from different diabetic centers situated in the capital city and northern part of the country. Sampling was done by selecting each alternative subjects attending the OPD. Data were collected by a pre-tested, interviewer-administered questionnaire. Diagnostic criteria for CVD risk factors are adopted from American Diabetic Association (ADA) and World Health Organization (WHO).

Results: The proportion of hypertension, overweight & obesity, waist circumference, dyslipidemia, physical inactivity, betel quid consumption and current smoking was 26%, 74.7%, 77.2%, 52.9%, 18.2%, 28.1% and 10.3% respectively. Among

the 402 participants for whom all measurements were available, 1% had at least one of the six risk factors (hypertension, overweight & obesity, waist circumference, dyslipidemia, smoking and physical inactivity). Only 5% had two risk factors while 20% had 3 and 25% had 4 risk factors. On logistic regression no predictors were found to be associated with hypertension. Semi urban diabetics were less likely to be obese (OR =2.1, 17.7 and 0.3 respectively). Male gender was predictors of dyslipidemia (OR=6.7) and high waist circumference (OR=14.55).

Conclusions: Overweight & obesity, waist circumference and dyslipidemia are common while current smoking is comparatively uncommon among diabetic subjects. Habitat and male gender are predictors of obesity and males are more likely to develop central obesity and dyslipidemia.

Key words: CVD risk factors, overweight & obesity, waist circumference, type 2 diabetics, Bangladesh

PO435

HYDRATION AND NON-HYDRATION DURING EXERCISE: EFFECTS ON HOMOCYSTEINE CONCENTRATIONS AND RELATED PARAMETERS

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Background and objectives: The effect of exercise on total homocysteine (tHcy) levels, a risk factor for cardiovascular disease (1,2), is not clearly stated. To the best of our knowledge, there is no study which analyses the effect of hydration during and after exercise on tHcy levels. Aim: To assess the recovery of serum tHcy and related parameters with controlled hydration during and after exercise (2 h) with two different drinks (water and a sport drink).

Methods: 20 physically active male subjects (20 – 45 years) performed four stable submaximal tests of 40 minutes at 65% VO2máx on a treadmill under controlled conditions: temperature (30ºC) and humidity (60%). In two of the tests the subjects drank during exercise (250ml) and in the other two tests they didn´t. After all four tests the subjects were rehydrated with one of the drinks. The amount of fluid intake was the same as weight loss for each subject during each test. Blood samples were taken before, immediately after, and two hours after completing each test. We analyzed serum tHcy, folate, cobalamin, creatine and creatinine concentrations.

Results: THcy concentrations increased significantly during both non-hydration tests (P<0.01); however, tHcy increased only slightly without significant differences when drinking during exercise. After exercise, tHcy concentrations decreased at 2h in all four tests, but only significantly with the sports drink (p<0.01). Although an inverse correlation was found between folate and tHCy before the two non-hydration tests, no correlation was found between folate, cobalamin, creatine and creatinine with tHcy during the hydration process.

Conclusions: A better response of tHcy concentrations are shown with an adequate hydration than non-hydration protocol during acute aerobic exercise, independent of the type of fluid (water or sport drink). After exercise, tHcy significantly decreases only with the sports drink, independently of the hydration protocol during exercise.

Key words: homocysteine, exercise

PO436

EFFECT OF 'BEAN SPOT INFECTIONS' ON THE NUTRITIVE VALUE OF PHASEOLUS VULGARIS (COMMON BEAN) SEEDS

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Background and objectives: "Bean spot diseases" are causing too much loss, due to absence of resistant cultivars, the pathogens variation. It affects Yield, marketability and edibility of infected seeds in bean producing areas of the world. Valorizing P. vulgaris spot infected seeds in nutrition appear to be necessary. This study investigated the nutritive value of P. vulgaris seeds infected bean spot diseases.

Methods: 36 rats separated into six groups were used, and fed for 14 days with 10% experimental protein diets, prepare with non infected white common bean (MEX142a); infected white common bean (MEX142b); non infected brown common bean (MAC55a); infected brown common bean (MAC55b), separately cooked for 2 hours, dehydrated at 60°C and ground. Egg-white was used as standard protein. Feed intake, weight, faeces collection were recorded. Transaminases and serum creatinine were measured. Results obtained were reported as mean ± SD and statistically analyzed using one way ANOVA and student Newman Keul tests. P value of less than 0.05 was considered significant.

Results: The infection significantly (P<0.05) affected the protein content MEX142b. MAC55b showed slight increase of crude proteins. The ash contents of the infected seeds significantly increased (P<0.05) MEX142. Infected seeds were more

consumed than the non infected seeds. Proteins of infected seeds were significantly (P<0.05) bioavailable and lead in significant weight gain (P<0.05) of rats. Serum enzymes analysis showed that infected seeds had significant (P<0.05) low activities. MAC55b significantly increased (P<0.05) the PCV (packed cell volume).

Conclusions: P. vulgaris seeds infected by spot diseases are rich source of nutrients, its protein is bioavailable, it's seem not to be toxic, and could be nutritionally useful. (MAC55) could be more recommended for it ability of increasing PCV.

Key words: P. vulgaris, Bean spot diseases, Nutritive value

PO437

NUTRITION EDUCATION TO INCREASE FLUID INTAKE AMONG LOW DRINKER FEMALE TEENAGER IN INDONESIA

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Background and objectives: Almost human body composed by water and it has vital role of functioning cell organs. Most of teenagers did not know about the functions of water for human body, and the symptoms of dehydration. Thirst study 2009 found Urinary Tract Infection (UTI) was16.5% subjects which might be related to drinking habit. The objective of this study was to measure compliance of water intake with and without water supply in low drinker. This study was part of UTI Study conducted in accordance with the ICH GCP procedure.

Methods: An interventional, open label, controlled study in female teenagers, 19-21 years old with diagnosis of UTI, year 2011 in Surabaya city Indonesia. Eligible subjects were 39 with inclusion criteria selected by pre-screening interview from 2201 subjects suspected UTI. Subjects were divided into water group (drinking volume? 1.5 mL/day), were given advice to drink water/fluid > 2 L/day and water supply 3 bottles per day @ 600 ml. Non water group was only given an advice. Subject was evaluated every 2 weeks until Day 62 and after intervention phase finished Day 90. The evaluation was using 7 days diary to measure daily fluid/water intake and followed by urine specific gravity assessment.

Results: Drinking habit improved in both group, but average volume intake higher in water group than non-water group. The total fluid intake among water group subjects were sharply decreased in the follow up visit after 1 month, however compared to prior of intervention the fluid intake was higher. The average fluid intake was 1661.56 L/day.

Conclusions: It was hard to change behave of low drinker. The implementation of dietary guideline should be introduced at the early age in life cycle when people is already aware to drink before thirsty.

Key words: Low drinker, nutrition education, teenagers Acknowledges Aqua-Danone

PO438

HIGH MEAT AND HETEROCYCLIC AMINES INTAKE BETWEEN INDIVIDUALS WITH DELETIONS INVOLVING GSTT1 OR GSTM1 GENES POLYMORPHISMS: SITUATION IN SAO PAULO-BRAZIL

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Background and objectives: The high red and processed meat and heterocyclic amines (HCA) consumption has been associated with higher risk of colorectal cancer. However, the risk can vary by individual genetic factors, as deletion variants of detoxifying enzymes. The objective was to investigate the red and processed meat and HCA consumption, and deletion variants of glutathione-S-transferase enzymes (GSTT1 and GSTM1).

Methods: A cross-sectional population-based survey among a representative sample (n=748) of adolescents, adults and elderly people living in Sao Paulo, Brazil, was conducted in 2010. The usual meat intake was assessed by Multiple Source Method, using two 24-hour dietary recalls. The cooking methods and doneness level of meat were obtained by a structured questionnaire. The HCA consumption was calculated using the HCA database developed by Sinha et al, (2005). The recommendation of 500g/week of red and processed meat consumption was considered excessive consumption. It was used PCR-based assays to detection GSTM1 and GSTT1 deletions.

Results: The mean of red and processed meat consumption was 102g/day, 43% more than the recommendation. The mean of HCA consumption was 378ng/day. These consumptions did not vary between groups with or without genes deletion (GSTT1 and/or GSTM1). The group that had the deletion variants of GSTT1 and/or GSTM1 and also consumed excessive red and processed meat and high HCA, was estimated in about 25%.

Conclusions: One in each four individuals in this population has a susceptible genotype that can increase the risk of colorectal cancer at this level of red and processed meat and HCA intake. In the later years, the new discipline of nutrigenomics and nutrigenetic raised the debate about the opportunity of disease prevention through individualized medicine. Our findings might add evidence to this debate, reinforcing the concept that "one size does not fit all".

Key words: Meat, heterocyclic amines, cancer, glutathione-S-transferase

PO439

GROWTH FACTORS FROM MILK AND DAIRY PRODUCTS: IS THERE AN IMPACT ON THE INCIDENCE OF CANCERS?

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Background and objectives: Growth factors (GF) are found in all tissues and fluids and are involved in several physiological mechanisms, including cell proliferation. The presence of GF in milk and dairies raised the issue of their potential role in carcinogenesis.

Methods: We summarized the epidemiological evidence relating GF, dairies consumption and cancer risk, focusing on prospective and intervention studies in humans.

Results: Meta-analyses and recent prospective studies led to conclude to a positive association between blood concentrations of Insulin-like growth factor 1 (IGF-1) and the incidence of three common cancers – prostate, breast (ER+ tumors) and colorectal cancers. Evidence from technological treatment of milk and dairies, from the maturation of the large bowel and from intervention studies is in favor of a low if any contribution of exogenous IGF1 from dairies to the IGF1 blood concentration. However, there is much evidence that nutritional factors, including, but not exclusively so, milk (rather than other dairies), influence the endogenous synthesis of IGF1, through mechanisms that are not fully understood, but can involve energy or some specific types of proteins. Finally, meta-analyses conclude in three opposite directions regarding the association between dairy intake and the three cancer types associated with IGF1 concentrations. Dairies seem to be positively associated with prostate cancer risk, inversely with colorectal cancer risk, and neutrally with breast cancer risk.

Conclusions: Thus, the involvement of exogenous IGF-1 from dairy sources in cancer risk, if any, is likely to be low. While dairy but also other nutritional factors can be associated with increased IGF1 concentrations, mostly through stimulation of endogenous IGF1 synthesis, the direct relationship between these aspects and cancer risk is spurious, and if any, would depend on the cancer site. Further studies are requested to better understand the overall effect of diet on IGF1 concentrations and whether this affects cancer risk.

Key words: IGF-1, milk, cancer, dairies

PO440

A COMPARATIVE STUDY OF WEB-BASED SELF-ADMINISTERED DIETARY RECORDS AND CLASSICAL 24-HOUR TELEPHONE-BASED DIETARY RECALLS IN A BRAZILIAN POPULATION

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Background and objectives: Automated web-based systems for the self-assessment of dietary intake are becoming increasingly more popular since they are cost-effective and less time consuming than the more traditional methods. The objective of the present study was to compare the results obtained using the NutriQuanti® internet-based dietary record system with those derived from 24-hour recalls carried out by a dietitian.

Methods: A total of 268 volunteers satisfied the selection criteria and were invited to complete on-line self-assessment dietary records on three non-consecutive days within a 15-day time frame. On the day of receipt of each dietary record, a 24-hour recall covering the same period was conducted by telephone interview with a dietitian. Values of the dietary variables were adjusted for within-subject variance and energy intake. Pearson and Spearman correlation coefficients were employed in the analysis of the results obtained using the two Methods of assessment.

Results: Only 60 participants (mean age 31 years) completed all stages of the study, and of these 78.3% were female and 45% were overweight. The mean intake values of lipids, calcium, iron, sodium, vitamin B6 and vitamin C were statistically equivalent for both

Methods of assessment. Adjusted correlation coefficients ranged from 0.61 (for lipids) to 0.87 (for energy) ($p<0.05$).

Conclusions: The NutriQuanti® internet-based dietary record system showed satisfactory agreement with the classical 24-hour recall method for use in classifying individuals and groups according to their energy and nutrient intakes.

Key words: Food intake, Nutritional status, Public health, Dietary assessment, Relative validity

PO441

NUTRITIONAL EFFICIENCY AND THE QUALITY MENU OF THE NATIONAL SCHOOL NUTRITION PROGRAM (PNAE) IN BRAZIL

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Background and objectives: The adequacy of nutrition during childhood is essential, ensuring the growth and development of children. First eating habits are incorporated in childhood, so the school environment is a key to this determination. This study aim to evaluate the correlation between nutritional efficiency and the quality of the menu provided on units receiving the National School Nutrition Program (PNAE), according to the methodology Award Efficient Public Manager of School Meals 2012.

Methods: This was a descriptive study, performed by database manager of the Award Efficient Public Manager of School Meals 2012.

Results: The South region had higher amounts of actions for the nutritional efficiency, with 16.5%. Already the North had only 7.7%. Comparing these data with the quality of the menus offered to children, it was noted that there is no relationship between them, because the Southeast region showed better grades of the menus, due to serving another meal (usually milk or dairy products) and by this 'type lunch meal' is near 12pm. The South was the region with the highest prevalence of low grades (5.5%), which may be explained by a study which indicated that between regions of Brazil, the South stands out 86.5% of presenting menus with regional preparations and despite having greater availability of fruit, the consumption is low.

Conclusions: The practice of nutrition education in schools was not related to the quality of the menu offered. Although the South has better nutritional efficiency, the quality of the menu was lower. It is necessary, therefore, that education and nutritional efficiency are applied not only in theory but mainly in practice by encouraging and changing eating habits of children.

Key words: Nutrition Education. School Food. Menu Planning.

PO442

STRENGTHEN NUTRITION EDUCATION IN PRIMARY SCHOOLS, USING SCHOOL GARDENS BASED LEARNING IMPROVE FRUIT AND VEGETABLE CONSUMPTION AMONG STUDENTS AND TEACHERS.

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Background and objectives: One of FAO priorities is assist member state to implement practical nutrition education intervention in the school. Objectives: To test the potential and effectiveness of nutrition education, school garden based learning and cooking classes in increasing the consumption of fruit and vegetables among children, teachers and parents. Theory, prior, rationale: strengthening the curriculum with topics of nutrition, food security and food safety, use school garden as a teaching tool and incorporate garden produce in school meals, increase preferences and consumption of fruit and vegetables amount school children.

Methods: 80 primary schools in rural areas of El Salvador , with a total of 3200 students and 240 elementary school teachers participate in one year program. Topics strengthened in the curriculum were; food for a healthy life, healthy and safe food, nutrition and health, family and community food security. School garden was used as a practical tool to teach practical nutrition issues, science ,language arts, mathematics, social studies , food security and farming principle. Teaching material were develop, tested and validate. Outcome measures and analysis: The evaluation included a pre, post- assessment , Food frequency, food preferences and knowledge, attitude and practices questionnaire were administrate to students, teachers and parents. The use of the School garden as a teaching tool was evaluated also acceptance of the school meal menu.

Results: From baseline to final parents and teachers were more confident that they could encourage children to eat fruit and vegetables for lunch and supper.

Conclusions: The interventions development a positive environments within the education community, increasing preferences for fruit and vegetables as well as knowledge of nutrition , besides being more conscious about what they eat. Ministry of Education is implemented the program at national level.

Key words: nutrition education, school garden, beliefs

PO443

ESTIMATION OF INSULIN RESISTANCE IN MEXICAN ADULTS BY THE [13C]GLUCOSE BREATH TEST CORRECTED FOR ENDOGENOUS TOTAL CO2 PRODUCTION

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Background and objectives: Type 2 diabetes is commonly preceded by a preclinical state known as prediabetes, which involves subclinical β-cell dysfunction known as insulin resistance (IR). Insulin resistance has been recognized as the key factor in the development of type 2 diabetes. Moreover, data from clinical trials have shown that IR can be reduced by weight loss and changes in lifestyle behaviors and that early interventions to reduce IR can delay or prevent the onset of type 2 diabetes. Thus, there is a need to identify individuals with IR before they develop glucose intolerance and type 2 diabetes; various methods are available, but the practical diagnosis of IR remains a challenge. A novel noninvasive method has also been proposed, involving estimation of IR based on carbohydrate metabolism of 13C-labeled glucose. The aim of this study was to evaluate the efficacy of the [13C]glucose breath test to measure IR, considering total CO2 production in an adult Mexican population.

Methods: Fifty-eight adults underwent a [13C]glucose breath test with simultaneous measurement of total CO2 production by indirect calorimetry, at baseline and 90 minutes after the ingestion of 15 g of dextrose and 25mg of [13C]glucose. HOMA was used as a marker of insulin resistance.

Results: We found an inverse correlation between HOMA and the breath test δ13CO2 (‰), r = −0.41 (P = 0.001). After adjusting for total CO2 production, correlations between HOMA and fasting glucose were less strong but remained significant. An ROC curve was constructed using δ13CO2 (‰) and HOMA values; the cut-off point was 9.99‰ δ13CO2, corresponding to a sensitivity of 80.0 (95% CI: 51.9, 95.7) and a specificity of 67.4 (95% CI: 51.5, 80.9).

Conclusions: The [13C]glucose breath test is a simple noninvasive procedure but was not sufficiently robust for an accurate diagnosis of insulin resistance. Our findings suggest that the test might be helpful in identifying individuals who are not IR, which in turn may contribute to improved diabetes prevention.

Key words: Diabetes, Breath Test, Stable Isotopes, Insulin Resistance

PO445

MULTIPLE MICRONUTRIENT DEFICIENCIES: THE TANZANIA DEMOGRAPHIC AND HEALTH SURVEY 2010

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Background and objectives: Vitamin and mineral deficiencies are significant public health problems in developing countries. Deficiencies of vitamin A (VA), iron and iodine are common in women of reproductive age and are linked to detrimental health outcomes. The Tanzania Demographic and Health Survey 2010 assessed the prevalence of vitamin A deficiency (VAD), iron deficiency (ID) and iodine deficiency (IDD) in a nationally-representative sample of women 15-49 years.

Methods: Dried blood spot (DBS) samples were prepared from blood obtained by finger stick from 9000 women for measurement of retinol-binding protein (RBP), a proxy for VA and transferrin receptor (sTfR) a marker of ID. VA and ID data were adjusted for the influence of infection or inflammation by testing a sub-sample of women for C-reactive protein (CRP). CRP, RBP and sTfR were determined by enzyme immunoassay (EIA). Urine samples were collected from 10000 women to estimate the urinary iodine concentration (UIC) by titration.

Results: The unadjusted prevalence of any VAD in women (RBP < 1.24 μmol/L) was 42.0%; the adjusted prevalence was 36.7%. ID (sTfR >8.3 μg/mL) was 30.0%. The percentage of women with both ID and anaemia (Hb <11.0 g/dL and <12.0 g/dL for pregnant and non-pregnant women, respectively) was 14%. The median UIC in women was 160 μg/L. Thirty six percent of women were iodine deficient (UIC <100 μg/L) whereas 22% had an optimal UIC (150-300 μg/L). The determinants of these micronutrient deficiencies will be assessed in further analysis of the data.

Conclusions: Vitamin and mineral deficiencies are prevalent among women 15-49 years old in Tanzania, with 30% of women being deficient in VA, iron or iodine. A comprehensive nutrition intervention is needed to combat vitamin and mineral deficiencies among women in Tanzania.

Key words: VAD; iron deficiency; iodine deficiency; Tanzania; Demographic Health Surveys (DHS)

PO446

DIETARY PATTERNS AND MORTALITY RISK IN THE MULTIETHNIC COHORT STUDY

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Background and objectives: Overall dietary patterns may provide insights into the associations between diet and diseases that the assessment of individual foods/nutrients may not uncover. We prospectively investigated the association between three distinct dietary patterns, 'Fat and Meat' (characterized by high intake of discretionary fat, meat, eggs, and cheese), 'Vegetables' (vegetables groups), and 'Fruit and Milk' (milk/yogurt and fruit groups) and risk of all-cause, cancer, and cardiovascular mortality in the Multiethnic Cohort with more than 215,000 African Americans, Native Hawaiians, Japanese Americans, Latinos, and whites.

Methods: For this analysis, we only included 148,693 participants who reported no history of heart disease, cancer, or stroke. During 13 years of follow-up, 22,735 deaths occurred, including 7703 cancer deaths and 7926 cardiovascular deaths. Risk was estimated using Cox proportional hazard models.

Results: After multivariable adjustment using a comprehensive smoking model, Fat and Meat pattern was associated with a higher risk of all-cause (highest vs. lowest quintile: hazard ratio (HR) = 1.36, 95% confidence interval (CI): 1.27, 1.46), cancer (HR = 1.17, 95% CI: 1.04, 1.32), and cardiovascular (HR = 1.42, 95% CI: 1.27, 1.60) mortality. In contrast, Vegetables pattern was related to a lower risk of all-cause (HR = 0.85, 95% CI: 0.81, 0.89), cancer (HR = 0.88, 95% CI: 0.81, 0.96) and cardiovascular (HR = 0.85, 95% CI: 0.79, 0.93) mortality. The associations were similar in never smokers only, which suggested no evidence of residual confounding by smoking. However, Fruit and Milk pattern showed a slight increase in risk of all-cause mortality overall but no significant association in never smokers.

Conclusions: A dietary pattern high in fat and meat may increase the risk of all-cause, cancer, and cardiovascular mortality, whereas a dietary pattern high in vegetables may reduce the risk.

Key words: dietary patterns, mortality, cancer, cardiovascular disease, multiethnic cohort

PO447

OVERWEIGHT AND OBESE AMONG VERY YOUNG CHILDREN IN CHILE AND ASSOCIATION WITH EARLY DEVELOPMENT

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Background and objectives: To document the prevalence of overweight and obesity among very young children in Chile and to explore the association of overweight/obesity with early childhood development. Child obesity/overweight may act through health and self-image to influence later social and economic success. This study strengthens our understanding of causal pathways by exploring whether developmental comorbidities are present at a very young age.

Methods: This study uses cross-sectional data from the first wave of the Chilean Encuesta Longitudinal de la Primera Infancia (ELPI), which is a nationally representative sample of about 15,000 children and their families. We used validated scales to measure socio-emotional, behavioral, motor, language and overall development. This study uses multivariate linear regression to estimate the association between overweight/obesity and early childhood development while controlling for confounding factors.

Results: In Chile, 35% of very young children are obese or overweight (defined as >2SD) and 21% are obese (>3SD). A higher prevalence of obese children live in urban areas (OR, 1.18; P=0.02, 95% CI, 1.025, 1.347). Controlling for opportunities for physical activity and indicators of socioeconomic position (e.g. wealth and maternal education), a higher prevalence of obesity, but not overweight, was associated with three measures of development: the Test of Psychomotor Development (Coordination: RR, -0.152; P< 0.005; 95% CI, -0.213, -0.091. Gross Motor: RR, -0.177; P<0.005; 95% CI, -0.238, -0.115) the Evaluation Scale of Psychomotor Development (RR, -0.170; P<0.005; 95% CI, -0.250, -0.090) and the Spanish adapted version of the Peabody Picture Vocabulary Test (RR, 0.077; P=0.026; 95% CI, 0.009, 0.145).

Conclusions: Early childhood obesity in Chile is associated with arrested language and motor skill development. Understanding the type of comorbidities present at a very young age can help clarify causal pathways linking obesity, development, and later social and economic success.

Key words: early childhood development, obesity, overweight

PO448

THE PROBLEM OF STUNTED CHILDREN IN INDONESIA AND ITS IMPLICATION FOR THE COUNTRY DEVELOPMENT

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Background and objectives: Chronic malnutrition problems in Indonesia are illustrated by the high prevalence of short children aged 0-59 months which close to 40 percent. This paper attempts to provide concrete recommendations based on identified risk factors for chronic malnutrition and stunting.

Methods: The descriptive assessment was apply using data collected from Basic Health Research (Riskesdas) 2010 by National Institute of Health Research and Development (NIHRD), Ministry of Health

Results: Children in Indonesia are still far behind in nutritional attainment as shown by the achievement of average height of children when they are 19 years old. Among males attained a mean height of 162.9 cm, which is 13.6 cm shorter than international WHO reference mean height for this age and 19 year old girls had a mean height of 152.8 cm or 10.4 cm shorter than the WHO height reference.

Conclusions: Impaired growth during childhood indicates less efficient development especially in the improvement of human resources. Comprehensive and integrated efforts should be urgently needed and started from the root causes of poverty affecting nutritional intake through various forms of community empowerment, including behavior changes which stimulates intervention program acceleration to combat stunting risk.

Key words: stunted children, poverty, country development

PO449

HYDROGEN GENERATED BY FERMENTATION OF DIETARY FIBER AND RESISTANT STARCH RELIEVES OXIDATIVE STRESS IN RATS.

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Background and objectives: Excessive oxidative stress can trigger the onset and progression of various lifestyle diseases. Recently, the effects of hydrogen (H2) on reducing oxidative stress have been clarified and its reduction activity in vivo has been confirmed in rodents administered H2 through inhalation of H2 gas and drinking H2 water. The aim of this study was to determine the effect of H2 generated by fermentation of dietary fiber and resistant starch in the large intestine in rats with hepatic ischemia-reperfusion (IR) injury, an oxidative stress model.

Methods: Rats were fed diets containing non-fermentable cellulose (negative control), pectin and high amylose cornstarch (HAS; resistant starch source) for 7-14 d. On the last day of the experimental period, rats were subjected to IR treatment (ischemia 30 min, reperfusion 45 min). Portal H2 concentrations were measured using a gas chromatography technique. The extent of oxidative stress was determined by the hepatic ratio of reduced:oxidized glutathione and plasma ALT and AST activities.

Results: The ability to produce H2 in the large intestine was enhanced by feeding pectin and resistant starch (5-10 umol portal H2/L) but not cellulose (0.5-1 umol portal H2/L). A high ratio of reduced:oxidized glutathione was induced in IR rats fed pectin and HAS diets compared to control IR rats. Furthermore, plasma ALT and AST activities in IR rats fed pectin and HAS were lower than in the control IR rats.

Conclusions: H2 generated by large intestinal fermentation could relieve oxidative stress. Large intestinal generation of H2 potentially plays a significant role in the control of various lifestyle diseases that can be achieved through long-term dietary fiber and resistant starch intake.

Key words: hydrogen, dietary fiber, resistant starch, fermentation, oxidative stress

PO450

CORRELATIONS BETWEEN DIFFERENT ANTHROPOMETRIC MEASUREMENTS AND INDICES IN A SELECTED SRI LANKAN POPULATION- A PRELIMINARY STUDY

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Background and objectives: Prevalence of obesity is increasing rapidly in the world. In Sri Lanka the percentage of adults in overweight, obese and centrally obese categories are 25.2%, 9.2%, 26.2% respectively according to World Health Organization (WHO) cut-off values for Sri Lankans. Obesity leads to further health concerns such as diabetes, cardiovascular disease etc. There are several anthropometric measurements & indices used in assessing body fat levels such as Waist Circumference (WC), Hip Circumference (HC), Mid Arm Cir-

cumference (MAC), Body Mass Index (BMI) & Waist to Hip Ratio (WHR). Thus, the aim of this study was to investigate the correlations between these parameters with each other and age.

Methods: This descriptive cross sectional study was carried out with 46 non diabetic individuals (age: 22-60 years). Ethical approval was obtained from the Ethics committee, Faculty of Medical Sciences, University of Sri Jayewardenepura. Anthropometric measurements (weight, height, WC, HC, MAC) and indices (BMI, WHR) were obtained according to WHO and NHANES III standards and data were analyzed using SPSS version 16.

Results: BMI range of the population was 17.9 kg/m2 - 36 kg/m2 with 41% of the population having a BMI of >25 kg/m2. BMI values showed significant correlations with HC, WC, and MAC ($p<0.05$). WHR indicated significant correlation with only WC ($p<0.05$). MAC did not yield significant correlation ($p>0.05$) with WHR but had significant correlations with other parameters measured ($p<0.05$). Participants >35 years had a WHR >0.85 and participants >35 years had a WHR <0.85. A significant correlation with age and WHR ($p<0.05$) was observed, however, no significant correlations were observed between age and other parameters.

Conclusions: BMI and MAC might be better parameters compared to WHR to estimate body fat levels in this population.

Key words: Anthropometric measurements, anthropometric indices, BMI, WHR, MAC

PO451

HOME BASED COMPLEMENTARY FEEDING IN COMMUNITIES OF BANGLADESH: TRIALS OF IMPROVED PRACTICES (TIPS)

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Background and objectives: In Bangladesh child malnutrition is reflected with high level of stunting and micronutrient deficiency. Appropriate complementary feeding practices are only 21% in Bangladesh (BDHS 2011). Age appropriate complementary feeding with sufficient energy& nutrient dense food can combat challenges of food insecurity and lack of access to diverse nutritious foods. The study aimed at developing complementary feeding manual with guidance for improving complementary feeding practices in Bangladesh.

Methods: A base line study was conducted all over Bangladesh on current practices of complementary feeding Based on the results from the literature review and baseline survey(FGDs,in-depth interviews and observational data) recipes have been formulated considering availability, seasonality, energy density, protein content, micronutrient ,minimum dietary diversity, cost, feasibility, acceptability following standard guidelines for the children of 6 to 23 months of age. Improved recipes were then tried in child in seven divisions of Bangladesh. Acceptance were evaluated using standard score card. Laboratory analyses of improved recipes for 10 ingredients were also assessed for adequacy of nutrients.

Results: All 35 recipes were well accepted by children and their care takers. A guideline and manual for appropriate CF practice considering the complementary foods, recipe options, key nutrition education messages and recommendations based on Trials of Improved practices (TIPS) carried out in Bangladesh has been developed.

Conclusions: The tested and improved recipes will be used for the children of Bangladesh to prevent malnutrition and the guidelines and the pictorial manual will help nutrition practitioners of developing countries of the world.

Key words: Home-based, Complementary Feeding, TIPS, children

PO452

WHICH MOTHERS IN RURAL COMMUNITIES DON'T INITIATE TIMELY BREASTFEEDING OR EXCLUSIVELY BREASTFEED ? A STUDY IN 6 LOW INCOME COUNTRIES

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Background and objectives: Sub-optimal breastfeeding has been recognized as a leading risk factor for global burden of disease in 2010. Timely initiation of breast feeding (TIBF) or breastfeeding (BF) in the first hour is included in the essential newborn care (ENC) guidelines of the WHO and exclusively

breast feeding (EBF) is recommended for first 6 months of life but have been a challenge to achieve globally. This study determined prospectively the prevalence of TIBF and EBF at 6 weeks postnatal and factors associated with lack of TIBF and EBF in rural communities of 6 low-middle income countries trained in ENC. DESIGN/

Methods: A Maternal and Newborn Health Registry prospectively enrolled 31,608 pregnant women followed to 6 weeks postnatal in rural communities in 6 countries (Kenya, Zambia, Guatemala, Argentina, Pakistan and India) between January 2010 and December 2012.

Results: TIBF rates ranged from 28% to 91% and that of EBF at 6 weeks ranged from 85% to 99%. The significant adjusted relative risks for lack of TIBF were older maternal age (1.01), lower parity (1.02 for none, 1.03 for 1), caesarian section (1.9), LBW <1500g (1.72), 1500-2499 (1.16), multiple births (1.18), female (0.98), resuscitation (1.37), baby not placed on mother`s abdomen after delivery and for non EBF were older maternal age (1.02) parity > 2 (1.34), some schooling (1.62), LBW <1500g (2.56), 1500-2499g (1.24), lack of TIBF (1.42), clean fuels for household cooking (1.32).

Conclusions: Despite standardized ENC training, rates of TIBF vary widely across countries. Reinforcement of training and alternate methods to administer breast milk to LBW or resuscitated neonates may be needed to improve TIBF, and, EBF in those that do not receive TIBF. Stakeholders to promote EBF post-partum may consider targeting older women with some education and higher parity.

Key words: Exclusively Breastfeed, Initiate Timely Breastfeeding

PO453

DESIGN AND PROCESS EVALUATION OF A PAIRED-MATCHED RANDOMIZED CONTROLLED HEALTH PROMOTION TRIAL IN ECUADOR

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Background and objectives: Childhood obesity is increasingly prevalent in low- and middle-income countries, and effective health promotion interventions are required to tackle it. A theory- and evidence-based project 'ACTIVITAL!' aimed to design, implement and evaluate a school-based intervention to improve physical activity (PA) and dietary behaviour among Ecuadorian adolescents. The systematic development of the intervention and the process evaluation for the first year are described.

Methods: Both the intervention mapping protocol and the Comprehensive Participatory planning and Evaluation approach were used when developing the intervention. A cross-sectional study and a formative evaluation including focus groups, literature review and participatory stakeholder workshops were undertaken to inform its development. A process evaluation was conducted including the 'reach' and 'dose' of the intervention components for parents and adolescents.

Results: An intervention framework with different strategies targeting adolescents, parents and school tuck shops was developed. These strategies included individual (i.e. an interactive programme on healthy nutrition and PA) and environmental (i.e. workshops with parents and tuck shop staff and a walking trail) components. The effectiveness of the intervention on BMI, dietary and PA behaviour was evaluated through a paired-matched cluster RCT in 20 secondary schools (NCT01004367). Of the 73.3% teachers who initially agreed to participate, only 58.6% provided the classes and 23% of parents attended the workshops. In contrast, reach was high among adolescents (95%). Importantly, the intervention 'dose' was high, with 84% of classes and 100% of workshops provided.

Conclusions: The ACTIVITAL! project developed a school-based intervention tailored to the cultural needs of Ecuadorian adolescents and their environment. Intervention components were successfully implemented and reached a high dose. It's important to have clear and transparent reporting of intervention development and process evaluation, to be able to apply such interventions in similar settings.

Key words: Ecuador, process evaluation, adolescents, health promotion intervention

PO454

ANTI INFLAMMATORY EFFECT OF CINNAMALDEHYDE ON A MICROGLIA, MG6

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Background and objectives: It has been known that cinnamaldehyde, isolated from leaves of Cinnamomumosmophloeum, exhibited an anti-inflammatory effect on monocytes/macrophages. It has been reported that an active monocyte/macrophage secreted proinflammatory cytokines, such as IL-1 , TNF- , IL-6, and free radical molecules, reactive oxygen species and nitric oxide (NO). These molecules have been recognized to become signal transduction molecules in management of innate and adaptive immunity. However, it is concerned that inflammatory damage would be induced, if they are secreted

excessively in monocyte/macrophage. In this study, we investigated whether cinnamaldehyde could inhibit hyper-inflammatory action in monocyte/macrophage.

Methods: MG6 is classified into microglia as murine brain macrophage. It is considered that various proinflammatory molecules were excessively produced from this microglia during activation of it. However, such chronic hyper-inflammation of microglia is recognized to induce neural disorders. We examined whether cinnamaldehyde could down-regulate expressions of proinflammatory cytokines, IL-1 , TNF-α, and IL-6, and free radical such as NO in inflammatory microglia, MG6, stimulated with LPS.

Results: In this work, it was shown that cinnamaldehyde could inhibit to induce active proinflammatory cytokines. Although IL-1 mRNA expression did not change in stimulated MG6 by qRT-PCR analysis, production of active IL-1 protein might be inhibited by cinnamaldehyde. It was also suggested that an inhibition of caspase-1 production, which could converse the preform of IL-1 into active form, might contributed to this down-regulation by cinnamaldehyde. Moreover, it was suggested that this compound could down-regulate expression of other proinflammatory cytokines mRNAs and production of NO in the microglia stimulated with LPS.

Conclusions: These results suggested that cinnamaldehyde could inhibit hyper inflammatory of microglia. And, we consider that anti-inflammatory action of it could contribute to prevention from nervous disorders, and thus, cinnamon leaves could be used as effective materials for our health care.

Key words: cinnnamaldehyde, microglia, MG6, anti-inflammatory

PO455

WORKFLOW OF ISOLATION AND FUNCTIONAL CHARACTERIZATION OF ORDESA'S PROBIOTIC STRAIN COLLECTION

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Background and objectives: The intestinal microbiota is an important factor for health and the evolution of diseases in humans and animals. For this reason efforts have focused in the use of different techniques to isolate and characterize bacteria with probiotic properties that could be used as preventive agents. The objective of this study was stablish an effective workflow to isolate probiotic strains from human samples, including human milk, and feces of breastfeeding mothers and their babies.

Methods: Several samples of human origin including breast milk (aseptically obtained), infant feces and breast milk mother's feces have been used. Several dilutions of these homogenized samples were plate in different culture media under anaerobic conditions at 37ºC. For each colony, cellular morphology and Gram stain was determinated. Gram-positive rod-shaped bacteria were selected to test catalase, oxidase, aminopeptidase and F6PPK activities. Putative Lactobacillus and Bifidobacterium species were genetically identified sequencing and comparing 16S rRNA sequences obtained with the Ribosomal Database Project (http://rdp.cme.msu.edu/). Strains identified as a member of Lactobacillus or Bifidobacterium genus were selected to test their biochemical activities (carbohydrates profile and specific enzyme activities) using API 50CH and API ZYM, and also to establish their Random Amplification of Polymorphic DNA (RAPD) profile.

Results: More than 400 potential probiotic strains have been isolated and identified using this workflow. The genetic data obtained has been used to elaborate phylogenetic trees to evaluate biodiversity, and the biochemical data has been used to improve phylogenetic trees by elaborating biodiversity dendograms in order to classify all Ordesa's probiotics in groups of biodiversity. A clear representative probiotic strain has been identified for each biodiversity group.

Conclusions: The workflow used to isolate and characterize strains was effective, high amount of potential probiotic bacteria have been recovered from human feces and breast milk.

Key words: gastrointestinal microbiota, infants, Lactobacillus, Bifidobacterium, probiotics.

PO456

EVOLUTION OF PHYSICAL FITNESS IN A 4 YEAR-PERIOD IN NON-INSTITUTIONALIZED ELDERLY: MADRID- EXERNET LONGITUDINAL STUDY

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Background and objectives: To maintain adequate physical fitness levels (PFL) in elderly is important to keep independence and life quality. The aim of this study was to assess the evolution of PFL in a 4-year period in non-institutionalized Spanish elderly.

Methods: 187 subjects (≥65 y) from the Madrid cohort of the Longitudinal EXERNET study were analysed twice: in 2008 and 2012 for static balance (SB), leg strength (LSt), arm strength (ASt), flexibility, agility (A), walking speed (WS) and aerobic capacity (AC) using eight test (Rikli & Jones). Parametric and non-parametric analyses were executed with SPSS. Right-arm flexibility (RAFx), Left-arm flexibility (LAFx) and AC where

analysed with a T test. SB, leg flexibility (LFx), A and WS were analysed with a Wilcoxon Test. Data were analysed according to sex and initial age: 65-69y: GA1; 70-74: GA2; and ≥75: GA3).

Results: Mean SB (29.0-21.7s), A (5.2-5.8s), WS (16.1-17.7s), and AC (536.6-487.2 m) scores decreased significantly after the 4 year-period (first and second measurement) in the whole sample, independent of age and sex (all ≤0.05). Arm (-16.2/-12.6 cm) and leg (-5.0/ -3.1 cm) scores improved in the 4 year-period. Decreases were more pronounced in men than in women in all tests. Significant differences were observed within GA1 for SB (38.6 – 26.6 s), arm (-14.6/ -8.1 cm) and leg (-6.4/-1.6 cm) flexibility, A (5.1-5.8 s), WS (14.9-16.6 s) and AC (597.8-531.2 m). Within GA2 and GA3 significant differences were found for A and WS.

Conclusions: Physical capacity tends to decrease in the 4 y period except for flexibility and ASt. AG1 is much more affected than the other two groups. Results show that fitness tends to worsen strongly in AG1and in men, while the tendency in the other groups and women is not so marked.

Key words: Fitness, elderly, quality of life

PO457

FOOD AVAILABILITY AND QUALITY OF THE DIET IN HOUSEHOLD`FROM SPAIN (1964-2011)

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Background and objectives: The aim was to describe the food availability, the dietary patterns and some markers of dietary quality in Spanish household.

Methods: This study is based on the household consumption assessed by the National Institute of Statistics (INE) and the Spanish Ministry of Agriculture, Food and Environment (MAGRAMA) in collaboration with the Spanish Nutrition Foundation (FEN).

Results: Many differences are observed regarding the consumption of foods in Spain between the 60`s and nowdays. The most important changes are observed between 1964 and 1981 in almost all food groups, especially in dairy (1964:228 g/person/day; 1981:381 g/person/day; 2011:308 g/person/day), fruits (1964:162g/person/day; 1981:283 g/person/day; 2011:291 g/person/day) and meat (1964:77g/person/day; 1981:179 g/person/day; 2011:141 g/person/day), except in oil and fats where the most important changes are observed between 1991 (54,9 g/person/day) and 2001 (35,3 g/persona/day). The consumption was much higher in 1964 than in 2011 for cereals (143 g/person/day in 1964 vs. 160 g/person/day at present), oils and fats (468 g/person/day vs. 31,9 g/person/day), legumes (1964:41 g/person/day-2011:10,7 g/person/day), and lower for fruits (162 g/person/day and 291 g/person/day in 2011) and meat (77 g/person/day (1964) and 141). Energy intake in household declined about 1000 kcal/person/day, when compared the mean consumption in 2011 (2075 kcal/person/day) with 1964 (3008 kcal/person/day). The contribution (%) of macronutrients and alcohol to energy consumption in Spain from 1964 to 2011 shows also important differences (protein 12% in 1964 vs. 15% nowdays; lipids, from 32% to 41% in 2011; carbohydrates: 53% in 1964 and 42% in 2011). The data from 1960´s were much more close to the recommendations. In order to evaluate the dietary fat quality, the percentage contribution of the three fatty acid families to the total energy was calculated (1964vs.2011): SFA (8.6%vs.11.9%), PUFA (3.7%vs7.5%), whereas for the MUFA there were almost no modifications (17%vs.17,9%).

Conclusions: Social and economic changes have led to important modifications in food and dietary patterns in the last few decades, some changes have had a potential positive impact whereas others have moved the Spanish diet somewhat away from the traditional Mediterranean one.

Key words: Food-availability, household, quality-diet, food-patterns, Spain

PO458

PRODUCT FORMULATION FROM DEHYDRATED SPINACH AND CARROT: IMPACT STUDY OF THE DEVELOPED VIDEO FILM INVOLVING LOCAL LEADERS

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Background and objectives: Awareness about the nutrient content of vegetables is very less especially in the rural areas where they are grown abundantly. In view of this, the present study was undertaken with the objective to produce a video film on products developed from dehydrated vegetables i.e. spinach and carrot. Its impact on rural women was then studied.

Methods: Rural women between the age of 18-35 years were selected from two villages of Allahabad district namely Malakharhar (n=40) as experimental group and Champatpur (n=40) as control group. The film entitled ¡°Nirjalikrit palak avam gajar se bane paushtik alpahar¡¯ was produced for nutrition education showing the importance of vegetables, their dehydration and product formulation to combat micronutrient deficiencies. Video film was shown only to the experimental group first; without discussion and then with discussion.

Results: Before nutrition education, majority of the respondents (γ90%) were in low knowledge category in both the groups. When the experimental group was exposed to video film, their knowledge level rose and majority of the respondents obtained medium score (67.5%) and when the same group was exposed to video film followed by discussion, their mean knowledge score further increased to 83.10 percent. Whereas there was no improvement in the knowledge scores of control group. The difference in the pre and post exposure knowledge scores (70.68 %) of experimental group was found to be highly significant (P<0.01). Percent retention in knowledge was found to be 74.52, 30 days after exposure to video film.

Conclusions: Education level of respondents was positively and significantly correlated with knowledge scores of the experimental group. Therefore it can be concluded that this film can be used in teaching and popularizing of recipes developed by incorporating dehydrated vegetables.

Key words: Product formulation, Dehydration,Education

PO459

PROMESA II STUDY: EFFICACY FOR LOSING WEIGHT OF A MULTIDISCIPLINARY WEIGHT-LOSS PROGRAMME (PRONOKAL® METHOD)

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Background and objectives: The Pronokal® Method is a multidisciplinary weight-loss programme involving diet, physical exercise and coaching under medical supervision. It consists of an active stage, divided into 3 phases with a very low calorie ketogenic diet (protein diet) followed by dietary re-education stage and maintenance stage. This study evaluates the efficacy of method for losing weight during the active and dietary re-education stages.

Methods: Prospective, multicentre, epidemiological study on the efficacy for losing weight of the multidisciplinary programme (Pronokal® Method). The patients began with the active stage, with protein diet based on products made with high biological value proteins, until they had lost 80% of their excess weight. They then began dietary re-education stage with gradual reintroduction of different foods. The physical exercise and coaching were maintained throughout. Weight-loss results and differences between genders were analysed using comparison tests Student's t-test and ANOVA.

Results: Date were recorded from 3435 patients (83% female), with mean BMI of 32.68±5.83. Mean weight loss was -17.42 kg. During the active stage, weight loss was -14.43 kg (82.8% of weight loss) (p<0.0001) and during the dietary re-education stage, the weight loss was -2.99 kg (17.2% of weight loss) (p<0.0001). The men lost comparatively more weight than the women, both in absolute terms and percentage-wise, during both the active stage (-13.44 kg vs. -9.90 kg; p<0.05 and 11.90% vs. 11.10%; p=0.05) and the dietary re-education stage (-21.06 kg vs. -15.01 kg; p<0.05 and 19.22% vs. 17.72%; p<0.05).

Conclusions: The multidisciplinary programme (Pronokal Method) has been shown to be effective for losing weight in men and women, although men lose more than women. The bulk of the weight is lost during the active stage with the very low calorie ketogenic diet (protein diet).

Key words: obesity, multidisciplinary, very low calorie diet, protein diet, Pronokal Method.

PO460

ORGANOLEPTIC AND NUTRITIONAL EVALUATION OF VALUE ADDED PRODUCTS PREPARED FROM GERMINATED SORGHUM (SORGHUM BICOLOR) FLOUR

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Background and objectives: Germination is a traditional method of processing which is known to have positive effects on the nutritional quality of grains. Objective: An attempt was made to develop and assess the nutritional qualities of value added products prepared from germinated sorghum flour.

Methods: For the development of products grains were germinated for 48h and milled to obtain flour. Three products namely mathri, ladoo and sweet biscuits were prepared by incorporating germinated sorghum flour (GSF) at 20, 40 and 60% level along with one control. Sensory evaluation of products was done on 9 point hedonic rating scale by a panel of ten judges.

Results: Mathri containing 20%GSF, ladoo and sweet biscuits having 40% GSF were judged as the most acceptable by the panel members. These products were chosen for analyzing proximate composition, anti-nutrients and in-vitro protein digestibility. Moisture content of products ranged from 3.82g to 4.43g/ 100g. Crude protein content varied from 8.71 to 14.13g per100g on dry weight basis. Ladoos were found to be having highest crude fibre and ash content. Biscuits were highest in fat and energy content i.e.23.5g and 486.9kcal, respectively. In terms of minerals, iron content was ranging from 2.68-3.38mg, calcium 32.0-57.2mg, zinc 1.78-3.64mg, copper 0.78- 0.99mg

and manganese content was 2.22 to 2.67mg/ 100g on dry weight basis. Tannin was observed lowest in mathri (1.26mg/100g) followed by biscuits (1.63mg/100g) and ladoo (2.98mg/100g) on dry matter basis. However, ladoo had highest phytic acid content and also the highest percentage of in vitro protein digestibility than other products.

Conclusions: Germination is a beneficial technique for enhancing the nutritive value of sorghum. Products developed from germinated sorghum flour were very well accepted and this can create a pathway for enhancing the nutrition security of the masses.

Key words: Germinated sorghum flour, product development, sensory evaluation, nutrient composition, anti-nutrients

PO461

COULD BREAD BE A GOOD VECTOR IN FIGHTING HYPERTENSION IN MOROCCO?

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Background and objectives: The Moroccan Health Department estimates the national HTA prevalence to 33.6% (from which 78% aren't diagnosed). Since bread is the staple food in each Moroccan household, our objective was to evaluate the average amount of salt used in making bread in order to assess the impact of its overconsumption in causing high blood pressure.

Methods: We collected 160 bread samples (80 with salt and 80 without salt as control), between March and April 2011, from 80 bakeries in Casablanca. The quantification of salt was done using the MOHR method: based on the titration of chloride ions by colorimetric assay.

Results: The average amount of salt used in the preparation of the regular bread is 17.42±1.28g of salt per Kg of flour. Taking in consideration that the average consumption of bread by Moroccans is about 500g per day, which means that the intake of salt from bread consumption only is about 8-9 g per day.

Conclusions: These results represent about two-fold the recommendations established by the Institute of Medicine (US) in their report of 2004, which are a daily intake according to age between 1500 and 2300 mg per day of sodium (3.75 and 5.75 g per day of salt), and also the therapeutic target of 2000 mg per day of sodium (5g of salt) established by 2003 by the WHO. Since bread is a staple food in Morocco and represents the source of half the sodium intake, we can only recommend using it as a vector for a national programme to reduce salt intake in order to fight hypertension.

Key words: hypertension, salt intake, bread, Morocco

PO462

EFFECT OF MAIZE PORRIDGE WITH AMARANTH-GRAIN OR MICRONUTRIENT POWDER CONTAINING NAFEEDTA ON IRON STATUS OF KENYAN CHILDREN: TRIAL VS. SIMULATION

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Background and objectives: In case of policy decisions when resources are limited for intervention studies, theoretical simulations may provide a guide into choice of appropriate intervention. Efficacy trials still a gold-standard for evaluating the impact of fortification with iron-rich foods such as amaranth-grain and multi-micronutrients powder (MNP) containing NaFeEDTA to control iron deficiency (ID). We compared the effects of simulating and efficacy trial of maize porridge enriched with amaranth-grain or MNP to reduce ID in Kenyan pre-school children.

Methods: A simulation using data from two surveys from Mwingi Kenya was done. In the 1st survey (2008), dietary intake data were collected by 2-day 24hr recalls (n=197). Biochemical data (n=70) was collected in 2nd survey (2010). For an 80-day simulation and 96-day intervention (n=279; 12-59 months), porridges provided: unrefined maize porridge (control; 3.7 and 4.1 mg of iron/meal); unrefined maize (30%) and amaranth-grain (70%) porridge (amaranth group; 12.7 mg and 23mg of iron/meal); or unrefined maize porridge with MNP (MNP group; 6.2 mg and 6.6mg iron/meal; 2.5mg iron as NaFeEDTA) respectively. Treatment effects were estimated relative to control.

Results: In simulation study, ferritin concentration increased significantly in both amaranth (1.82µg\l 95% CI 1.42, 2.34) and MNP (1.80µg\l 95% CI 1.40, 2.31, p<0.005) group. Prevalence of ID was reduced by 54% in both groups. Consumption of amaranth and MNP in the trial increased ferritin concentration by [4% (95% CI=-28, 49) and 40% (95% CI=10, 95)] while prevalence of ID reduced by 17% and 70% respectively. Change was not significant in the amaranth group.

Conclusions: Both the simulation and efficacy trial show that consumption of maize porridge fortified with MNP containing NaFeEDTA reduce prevalence of ID in pre-school children. Simulations based on incomplete scientific evidence are not sufficient to replace scientific studies as there could be over estimation of effects.

Key words: Amaranth-grain, MNP, Iron

PO463

HERITABILITY OF CHRONOBIOLOGICAL PATTERN IN HEALTHY WOMEN

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Background and objectives: Chronobiology is the science which studies the biological changes in the individual along time, those which run around 24 hours, are defined as "Circadian Rhythms". Previous studies have shown the influence of genetics and environmental factors in many aspects of life but the relative influence on the chronotype of the subject is still unknown. Thus, the aim of our study was to determine the heritability of circadian rhythmicity patterns in monozygotic (MZ) and dizygotic (DZ) twin.

Methods: The pilot study was performed in 21 pairs of female twins (12 monozygotic [MZ] and 9 dizygotic [DZ]), with a BMI 24.3±2.8 and mean age 48±2. The sample was selected from the participants in the Murcia Twin Register. Zygosity was ascertained by DNA. Circadian patterns were studied by analyzing Wrist temperature that was measured during 1 week every 10 min. Rhythmic parameters were obtained using an integrated package for temporal series analysis "Circadianware®".

Results: MZ twins showed consistently higher intrapair correlations than DZ twins. Particularly interesting were the correlations in amplitude [MZ:r=0.830; P=0.001; DZ:r=0.258; P=0.502]; mean temperature [MZ:r=0.803; P=0.002; DZ:r=0.229; P=0.554]; M5 [MZ:r=0.555; P=0.061; DZ:r=0.063; P=0.872] and inter-daily stability [MZ:r=0.611; P=0.036; DZ:r=0.418; P=0.262]. One exceptions of this pattern was intra-daily variability.

Conclusions: The pattern of correlations found point to moderate to high heritability for most of the variables analyzed, suggesting a relevant genetic influence in the chronobiology of the studied women. Variables with a known important effect of environment appear to be less influenced by genetic factors.

Key words: chronobiology, twins, heritability

PO464

THE EFFECTS OF DIETARY GLUTAMINE ON HEPATIC INFLAMMATORY RESPONSE AND MITOCHONDRIAL IN DIABETIC SEPTIC MICE

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Background and objectives: Diabetes or sepsis may decrease mitochondrial oxidative phosphorylation and damage mitochondrial function to lead tissue hypoxia and organ dysfunction. Glutamine has immunomodulatory and mitochondria- protective property. Thus, this study investigated the effects of dietary glutamine on hepatic inflammatory response and mitochondrial function in diabetic septic mice.

Methods: Male ICR mice were randomly assigned to diabetes mellitus control (DMC) and DM with glutamine (DMG) groups. Diabetes was induced by a single dose intraperitoneal injection of 150 mg/kg body weight streptozotocin and those mice fasting blood glucose higher than 200 mg/dL were considered diabetic. DMG group were received with a diet in which part of casein was replacing by glutamine, which provided of 25 % of total amino acids for 3 weeks. Septic mice were induced by cecal ligation and puncture (CLP) and were sacrificed at 0, 6, and 24 hours after CLP, respectively. The blood and liver were collected for further analysis.

Results: The DMG group had lower alanine aminotransferase and aspartate amniotransferase activities at 6 hours after CLP than those in the DMC group. Compare with DMC group, the hepatic cytochrome c oxidase subunit I mRNA levels in the DMG group were significantly higher at 6 hours after CLP. DMG group had a lower p65 mRNA level at 24 hours after CLP. Aspects of morphology were observed by transmission electron microscopy, the enlargement of hepatic mitochondrial damage induced by CLP. However, the structure damage in the DMG group was lower in the DMC groups. The results of hepatic mitochondrial permeability transition change were decreased less in the DMG group than those in the DMC group.

Conclusions: These results suggest that dietary glutamine may attenuate the hepatic injury by modulating hepatic inflammatory response and mitochondrial function in diabetic mice with sepsis.

Key words: glutamine, diabetes, sepsis, mitochondria

PO465

DIETARY BIOMARKERS IDENTIFIED THROUGH METABOLOMICS AND THEIR RELATION TO COLORECTAL CANCER IN THE DIET, CANCER AND HEALTH COHORT

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Background and objectives: It is envisioned that advanced exploratory metabolite screening tools will provide useful insights into biomarkers for recent as well as habitual intakes of foods and their possible relation to cancer development. A unique opportunity for such investigations exists in the biobanks of cohort studies. The aim of the present study was to relate metabolite profiling patterns to incidence of colorectal cancer with focus on whole grains, fruits and vegetables.

Methods: The present study was conducted among 322 women in the prospective Diet, Cancer and Health cohort study, consisting of 163 colorectal cancer cases diagnosed during a median follow-up period of 5.9 years and 159 referents. Non-fasting blood samples and data on lifestyle and dietary factors were collected at recruitment. Plasma samples were profiled by untargeted metabolomics using liquid chromatography-time-of-flight-mass spectrometry (LC-QTOF). Observed features were represented by retention time (RT) vs. m/z pairs. The feature list was analyzed using multiple linear regression or modified Cox proportional hazards models. Features with $p<0.05$ and $q<0.2$ were considered potential markers and were further analyzed by MS/MS for identification. Markers were identified by standards having the same RT vs. m/z and a similar mass spectrum.

Results: A total of 641 features were observed in the negative mode and 1071 in the positive after removal of erratic features. Glucose levels were found to be related to an increased risk of colorectal cancer. An inverse association with fruit and vegetable intake was seen for the lipophilic compound identified as 1-palmitoyl-2-(5-oxovaleroyl)-sn-glycero-3-phosphocholine (POV-PC), which has been found to promote atherosclerosis. Several other features, e.g. various amino acids as well as compounds known as polyethylene glycols (PEG's) were identified and associated to either CRC or dietary intake.

Conclusions: Metabolite profiling patterns appear to be relevant biomarkers for use in cohort studies.

Key words: Metabolomics, Colorectal cancer, Cohort study

PO466

FOOD STRATEGIES GENERATED BY HOUSEHOLDS IN POVERTY AND ITS RELATIONSHIP TO CHILD NUTRITION IN NORTHWEST MEXICO

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Background and objectives: Obesity is considered by WHO as the epidemic of the twenty-first century, both in children and adults, as well as in all social strata. Mexico is a country that has the highest rates especially among children. At present, the obesity has been increase in poor communities therefore requires to be studied. Thus the aim of this study was to identify and compare different food strategies generated by households in poverty with different child nutritional status.

Methods: A descriptive – comparative, quanti-qualitative and anthropological approach was carried out. Anthropometric evaluation was performed on 182 children, aged 6 to 12 years at northwest of Mexico. Later were selected 40 poor households according to nutritional status of children and, we conducted a semi-structured interview with mothers in order to know food practices and social representations. Subsequently we could be identified food strategies.

Results: The prevalence of overweight and obesity was 31%, greater than the national average, especially in girls. The overweight was higher in girls and obesity in boys. We found also risk of stunting and stunting, the first was present mainly in boys and second one, only in girls. Practices in relation to food consumption in these households were carried out to reduce costs looking for different sources of food supply compromising the variety and quality of food. In addition, they prioritized foods that make the most of and satiate; besides flavor. They preferred thinness and beauty in women and thinness and strength in men. Differences in food strategies generated by households according to nutritional status and risk factors in early childhood were mainly in the food practices.

Conclusions: Differences were take place in access to employment, government assistance, family networks, public ser-

vices and domestic labor, diversification of supply, and food preparations.

Key words: poverty, nutritional status, food strategies, households

PO467

PORTUGUESE FOOD AND NUTRITION ACTION PLAN

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Background and objectives: In Portugal there is a coexistence of high prevalence of obesity with high levels of food insecurity. Food insecurity may lead to the increasing of health inequalities, namely by an unequal distribution of obesity and other diet-related chronic diseases through the most vulnerable groups. This situation prompted the Portuguese Health Ministry to define the National Program of Healthy Eating as a priority program, which aims to improve the population´s nutritional status by promoting availability and physical/economic access to healthy foods thus creating conditions for all citizens to valorize, consume and integrate them into their daily routines.

Methods: Launched on March 2012, after consultation with partners and civil society, this is the first formal food and nutrition action plan in Portugal. Until that date, Portugal did not have a formal and integrated strategy.

Results: The strategy determined five objectives: (1) increase knowledge about food consumption and nutritional status of the population, its determinants and consequences (2) improve the consumer's knowledge to make them able to do more informed decisions (3) improve the availability of certain types of foods, particularly in schools, workplaces and other public institutions (4) identify and promote integrated and crossed-actions with other society sectors that encourage the consumption of healthy foods and (5) improve the qualification of professionals who can influence knowledge, attitudes and behaviours in the food field. This strategy aims to combine economic growth with improving the nutrition situation and intends to integrate the local health regions and municipalities in a solid and structured nationally program, paying special attention to health inequalities.

Conclusions: This program follows the recent recommendations of the WHO and EC, and pretends to be a multisectorial program, involving stakeholders on healthy eating promotion, addressing the current challenges of the double burden of malnutrition and the health inequalities.

Key words: food and nutrition policy, health promotion, Portugal.

PO468

EFFECT OF WATER INTAKE ON RESTING ENERGY EXPENDITURE IN HUMANS

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Background and objectives: Drinking water is commonly espoused in weight loss regimens and is regarded as healthy. Recently, drinking water has been associated with a temporary increase in resting energy expenditure. However, the concept of a thermogenic effect of water is controversial because other studies have found that water drinking does not increase energy expenditure. The objective of the study was to test whether drinking water affects resting energy expenditure (REE) in humans.

Methods: In 33 healthy male volunteers (age: 23,8+/-2,5 years), normal-weight (body mass index (BMI): 23,7+/-1,9 kg/m2), we measured the effect of drinking 500 ml at room temperature (22°C) water on REE by indirect calorimetry before and 45 min after the drinks. All data are given as means +/-SD. REE after drinking of water was compared with the corresponding baseline value by a paired t test. The statistics were performed using statistical software (Statistica version 10). The level of statistical significance was set at $P < 0,05$.

Results: Drinking 500 ml water increase REE by 8,5+/-6,7% after 45 minutes (5,76+/-0,81 kJ/min vs 6,23+/-0,90 kJ/min; $P < 0,0001$). It was reported that drinking half a liter of water at room temperature increased resting energy expenditure by 30% in normal-weight healthy subjects and by 24% in overweight and obese healthy subjects on no medications after an hour. However previously and later published studies did not confirm this finding.

Conclusions: Drinking water at room temperature increase resting energy expenditure. It is necessary to confirm whether the temporary thermogenic effect of drinking water exists over a longer period throughout the day. If confirmed in other studies may be a useful adjunctive treatment in overweight and obese individuals to attain an increase in energy expenditure.

Key words: water, resting metabolic rate, thermogenesis.

PO469

ANTIHYPERTENSIVE AND TRIGLYCERIDES-LOWERING EFFECTS OF SALVIA HISPANICA SEED EXTRACT IN HYPERTENSIVE RATS INDUCED BY L-NAME

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Background and objectives: Cardiovascular diseases are the first cause of death in Mexico being hypertension one of the main risks factor. Chia seed is rich in nutrients such as essential fatty acids, including omega-3, fiber and antioxidants. The chia has been known since pre Hispanic culture and has been used as a medicinal therapy because of the hypotensive effect and reduction of cardiovascular risk properties. In vitro studies have been performed on certain salvia seeds that possess bioactive compounds with potential ACE I-inhibitory effects

Methods: 38 Rats with hypertension induced by L-NAME were divided into 4 groups (n=8): nega- tive control (Sham); hypertensive control (CH); hypertensive + captopril (HCA); and hypertensive + extract (HE). The group HE received P.O. 400 mg/kg/day of methanolic extract of Chia (EM) during the experiment. For 5 weeks the systolic blood pressure (SBP) was monitored; blood was collected to quantify the serum levels of C-reactive protein (CRP), total cholesterol (ColT), (Col-LDL) cholesterol-LDL, triglycerides (TG), and liver enzymes (AST, ALT, LDH), at the beginning and at the end of the test.

Results: We avoided the increase in SBP with the administration of the methanolic extract in the HE group. There were no significant differences in ColT, LDL-Col nor PCR serum levels. The TG levels of the HE group at the end were lower than in the CH group. No substantial changes in the levels of AST, ALT, LDH were found.

Conclusions: The methanolic extract of Salvia hispanica L., when administered orally, lowers the SBP and the serum triglyceride levels. These results and the ancient use of the Chia as food; suggest it's safe to use chia in the treatment of high blood pressure, however, more studies are needed to find the dose with the desired effect and to be recommended.

Key words: Salvia hispanica, methanolic extract, anti-hypertensive

PO470

ANTIMICROBIAL EFFECT OF MUNKOYO ROOTS (RHYNCHOSIA SPECIES), USED IN PREPARATION OF NON-ALCOHOLIC INDIGENOUS FERMENTED ZAMBIAN BEVERAGES-CHIBWANTU AND MUNKOYO

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Background and objectives: The Munkoyo roots are used in the preparation of the beverages munkoyo and chibwantu-Zambian non-alcoholic beverages. There is inadequate information on the effects of the munkoyo roots (Rhynchosia) on the microbiology of these fermented beverages. There is a potential that Munkoyo roots may have antimicrobial properties, thereby contributing to the microbiological quality and safety of the beverages. Objectives: To evaluate the antimicrobial effects of the munkoyo root extracts on pathogenic microorganisms- E.coli and Staphylococcus aureus.

Methods: Samples of the Munkoyo root were purchased from different markets in Zambia and transported to South Africa. Munkoyo root extracts were prepared (hot water, cold water and methanolic (60%) extracts) and microorganisms (E. coli and Staphylococcus aureus) were prepared for the experiment. The screening for antimicrobial potential of the munkoyo root extracts was done by means of two assays; 1) the agar diffusion method and 2) growth of microorganisms in nutrient broth supplemented with root extract (hot water and methanolic (60%).

Results: For assay 1, much activity was shown against staph aureus compared to E. coli and the methanolic extract had more activity. For assay 2, inhibitory activity was observed against staph aureus and for E. coli inhibitory activity was observed within the first three hours and thereafter there was growth stimulatory activity.

Conclusions: The study gives an indication that the root types possess different active compounds both antimicrobial and microbial growth stimulatory. The results form a strong basis for further studies on the active components of the roots for possible use in preservation, as well as stimulation of growth of essential microorganism such as lactic acid bacteria, for improved food quality and safety.

Key words: Antimicrobial Effect, Munkoyo Root.

PO471

NUTRITIONAL STATUS AND HEPATITIS B INFECTION IN THE UNITED STATES (2003-2006)

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Background and objectives: Nutritional status modulates immune response to infections and can alter the risk and course of infectious diseases, including hepatitis B. We assessed the association between nutritional status and hepatitis B virus (HBV) infection among participants (n=13,665) of the National Health and Nutrition Examination Survey (2003-2006) in the United States.

Methods: Based on available serological data (HBV surface antigen [HBsAg], core antibody [anti-HBc], and surface antibody [anti-HBs]), we categorized individuals as having: current HBV infection ([anti-HBc+, anti-HBs-]; or [HBsAg+, anti-HBc+, anti-HBs+]); previous infection or immunization (HBsAg-, anti-HBs+); or no infection or immunization (HBsAg-, anti-HBc-, anti-HBs-). We examined associations between micronutrient biomarkers, anthropometry, and HBV infection status using polytomous logistic regression, accounting for sampling weights.

Results: 1.1% of participants were currently infected with HBV; 28.4% had previous infections or immunizations. Among individuals with HBV, 50.7% were overweight or obese (body mass index [BMI]≥25 kg/m2), and 3.6% were vitamin A deficient (<70 μmol/L serum retinol). Among previously infected or immunized participants, 1.2% had vitamin B12 deficiency (<200 pmol/L), and a mean mid-upper arm circumference (MUAC) of 29.6 cm. Participants with vitamin A deficiency had 16 times higher odds of having current HBV infection (p<0.01), adjusting for sex, ethnicity, age, foreign birth, and education, compared to those with adequate vitamin A status. Those with BMI≥25 kg/m2 had lower odds of having a current HBV infection (p<0.01), accounting for the same covariates, compared to participants with BMI between 18.5 and 25 kg/m2.

Conclusions: Vitamin A deficiency and overweight or obesity are associated with current HBV infection in U.S. participants in NHANES. Future studies are needed to increase our understanding of etiological relationships between nutritional status and HBV infection and implications for clinical management.

Key words: Hepatitis B, micronutrients, anthropometry, surveys

PO472

VITAMIN STATUS ASSESSMENT IN YOUNG ADULTS WITH INTENSE TRAINING

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Background and objectives: Long and short unbalanced intake could lead on vitamin deficiencies that alter performance and the optimization of results in high intensity training. Bad eating habits in this collective could cause adverse effects. The aim of this study was to evaluate the nutritional status focused on vitamins in a young male adult collective traded with high intensity tests.

Methods: This is a cross-sectional study. Twelve men, aged 25.8 ±4.2 years, participated in this observational study voluntarily. Real nutritional intake was measured with Nutriber software, the anthropometry with bioimpedance TANITA team and specific methodology, and the physical condition was tested with practical exercises (2000m run, high jump, a circuit and pull-ups). SPSS 17.0 program was used to determine the correlation between vitamins and other parameters.

Results: The Recommended Dietary Allowance (RDA) of Energy, Protein, Lipids, Carbohydrates, Vitamin B2, Vitamin B6 and Vitamin C were 76.1%, 219.9%, 80.8%, 63.1%, 116.4%, 140.4% and 194.2%, respectively. Vitamins B2 (r=0.77; p=0.005) and B6 (r=0.72; p=0.011) were directly correlated with pull-ups. Significant associations (r=0.62; p=0.033) were found between lipids and carbohydrates intake, caused by high frequency in the intake of chocolates and biscuits food group. The intake of protein was correlated with Vitamin C (r=0.66; p= 0.021). There was also a high correlation between the intake of Protein and Vitamin B2 (r=0.90; p<0.001) and Vitamin B6 (r=0.92; p<0,001). Protein intake was also directly correlated with the intake of Vitamin E (r=0.76; p=0.004) and pull ups (r=0.78; p=0.004).

Conclusions: Our results show, the group studied evinces imbalances in nutrient intake that given the association can alter the availability of other macro and micronutrients, affecting the expected results on training. For that reason assessment and optimization of nutritional intake are necessary, as well as monitoring these collectives.

Key words: Vitamin, Nutrition Assessment, Intense Training

PO473

POTENTIAL USE OF A SCORE OF GENERAL HEALTH AND QUALITY OF LIFE IN ELDERLY ABSTAINERS AND MODERATE DRINKERS

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Background and objectives: Regular and moderate alcohol consumption may exert favourable effects on health compared to abstinence. Our aim was to calculate and compare a score of general health and quality of life (QoL) between elderly abstainers (A) and moderate drinkers (MD).

Methods: Forty subjects (aged 55-75 years) (32 women) divided into two groups: A (n=20) and MD (n=20) (< 30g alcohol/day for women and <60g/day for men) were recruited. All subjects fulfilled a series of validated questionnaires on health and QoL and underwent fasting blood tests. Variables adding equally to the score were: 1) cholesterol >200 mg/dL or FPG > 112 mg/dL; 2) BMI > 25; 3) daily physical activity less than 30 min. walk (calculated as METs); 4) sleeping difficulties; 5) "not so good" or "bad" perception of own-health; 6) hypertension, DMII, previous episode of heart attack or stroke, or suffering two other chronic diseases (rheumatoid arthritis /asthma / bronchitis /gastric or duodenal ulcer /constipation /depression /migraine /hemorrhoids /osteoporosis /anemia) or having lowering cholesterol medication. Differences for each variable and in the total score were assessed through chi-square tests.

Results: No differences between both groups were found, however, a trend was observed for higher CVD risk biomarkers in A (14 out of 20) compared to MD (8 out of 20) (P=0.057) and also a trend for insufficient physical activity in A (5 out of 20) compared to MD (1 out of 20) (P= 0.077). Total score was, however, 38 and 37 in A and MD, respectively.

Conclusions: The score did not point out differences in general health of these elderly depending on their alcohol consumption. However, bigger samples might be necessary since some trends were observed for poorer general condition of abstainers.

Key words: moderate drinkers, general health score, quality of life

PO474

UNBALANCED NUTRIENT INTAKE IN ADULT MEN WITH INTENSE TRAINING: MINERAL STUDY

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Background and objectives: Nutritional assessment is important to control high intensity athletes because their increment of caloric expenditure causes increased requirements, and their eating habits are not suitable. All that results in the intake of imbalanced diets that cause adverse effects as mineral deficiencies and/or nutritional excess that alter performance and the optimization of the expected results. The aim of this study was to evaluate the nutritional status focused on minerals in a young male adult collective traded with high intensity tests. We made a nutritional evaluation, with intake habits, anthropometric measures and physical tests.

Methods: Twelve high-training men, aged 25.8 ± 4.2 years, participated in this cross-sectional study voluntarily. Real nutrient intake was measured with software Nutriber, anthropometry with bioimpedance TANITA team and specific methodology, and physical condition was tested with practical exercises (2000m run, high jump, a circuit and pull-ups). SPSS 17.0 program was used to determine the correlation between minerals and other parameters.

Results: Regarding macronutrient and micronutrient intake, the RDA's of Energy, Protein, Lipids, Carbohydrates, Calcium and Selenium were 76.1%, 219.9%, 80.8%, 63.1%, 127.2% and 155.7%, respectively. The intake of Calcium was directly correlated with pull-ups (r=0.78; p=0.005). Significant associations (r=0.62; p=0.033) were found between lipids and carbohydrates intake, caused by chocolate, cookies, biscuits, cakes, pastries consumption. Also, significant correlations were found between the intake of Calcium, Proteins and Carbohydrates, and the latter with Selenium (r=0.61; p=0.036). Energy intake was directly correlated with the intake of macronutrients and the intake of Selenium (r=0.59; p=0.043).

Conclusions: According to our results, the subjects presented an unbalanced diet that can alter the availability of other macro and micro nutrients, affecting the results on training. For that reason, nutritional assessment and the nutritional optimization are necessary as well as monitoring this type of population.

Key words: Mineral, Nutrition Assessment, High-Training.

PO475

FISH OIL DECREASE HEPATIC TRIACYLGLYCEROL AND EXPRESSION OF FATTY ACID SYNTHASE IN FRUCTOSE-FED RATS

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Background and objectives: high consumption of fructose is associated to Metabolic Syndrome. Fish oil (FO) is beneficial for the treatment of this syndrome. The objective of the present study was to evaluate the effects of different amounts of FO in hepatic triacylglycerol (TG) and cholesterol and expression of lipid metabolism genes.

Methods: initially, male Wistar rats were divided in two groups: Control (C, n=6) and Fructose (Fr, n=32) receiving 60% fructose for 60 days. After this period, animals from Fr group were divided in: FrFO7 (n=8) receiving 60% fructose and 7% FO; FrFO5 (n=8) receiving 60% fructose and 5% FO plus 2% soybean oil, and FrFO2 (n=8) receiving 60% fructose and 2% FO plus 5% soybean oil for 30 days. Afterward, the animals were sacrificed. Liver TG and cholesterol were analysed by commercial kits after lipid extraction. Gene expression was acquired by real time qPCR from liver using SYBR Green. Relative RNA expression was standardized to the endogenous gene 18S and calculated using the ÄÄCT method.

Results: the amount of TG was higher in the Fr group compared to the other (FrxC and FrxOP2, P<0.05; FrxOP7, P<0.01; FrxOP5, P<0.001). The hepatic cholesterol was increased in the OP7 group compared to Fr and OP2 (P<0.05 for both). The Fr and OP2 had increased expression of fatty acid synthases compared with C group (P<0.01). The HMG-CoA reductase expression was decreased in the Fr, OP7 and OP5 groups compared to C and OP2 groups (CxFr, P<0.01; CxOP7, CxOP5, FrXOP2, OP7xOP2, OP5xOP2, P<0.001). The expression of long-chain-acyl-coenzyme A dehydrogenase was increased in the OP7 group compared to Fr (P<0.001), OP5 (P<0.01) and OP2 (P<0.001).

Conclusions: the amount of FO influence gene expression of rats fed with fructose. Also the major quantity decreases the hepatic TG.

Key words: fish oil, Metabolic Syndrome, fructose.

PO476

EFFECTS OF SOLUBILIZED OKARA (TOFU REFUSE) ON INTESTINE MICROFLORA AND GASTRIC STRESS ULCER IN MICES

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Background and objectives: Okara (Tofu refuse) is a by-product during process of soybean. It is rich in dietary fiber, which has functional effects to prevent from lifestyle-related diseases. As the surface of the by-product is occupied by the insoluble dietary fiber, its processing into physiologically functional foods is difficult.

Methods: We have processed Okara into water-soluble material, and there investigated the solubilized Okara to use as a food with various physiological functions on mouse, especially to check effects on maintenance of intestine microflora and protection of gastric stress ulcer. Okara was autoclaved at 121°C for 1h, and digested with cellulase and pectinase (solubilized Okara). [Ex 1] Balb/c mice, eight weeks of age, were fed standard diet (control), high-fat diet and their 3% solubilized Okara-fortified diets (4 group) for 14 days. The serum and intestinal cecum were collected and analyzed their flora by real-time PCR. [Ex 2] After fasted for 16 hours, the mice were exposed to the water-immersion restraint stress according to the method of Yoneda et al., and thereafter, their serum and stomach were collected.

Results: [Ex 1] The count of the Lactobacillus in intestine cecum contents increased 10-fold in solubilized Okara diet groups, compared with control. On the contrary, that of high fat diet groups increased of 60-fold. Conversely, that of Bifidobacterium was significantly reduced in solubilized Okara diet groups. In solubilized Okara diet groups the triglyceride concentration in the plasma was less than that of control diet groups. [Ex 2] Protective rate to gastric ulcer of mice fed with solubilized Okara diet were significantly higher than that fed with control diet.

Conclusions: These results suggest that the *f*À-1,3-glucan of Okara is an important part of the active principle for anti-ulcerogenesis.

Key words: *f*À-1,3-glucan, tofu-refuse, intestine-microflora, gastric-stress-ulcer, mouse

PO477

MIR-21 EXPRESSION IN PATIENTS WITH CELIAC DISEASE

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Background and objectives: Celiac disease (CD), a chronic enteropathy of the small intestine, is triggered by gluten proteins found in wheat, rye and barley. CD is characterized by an altered immune response in genetically susceptible individuals. MicroRNAs (miRNAs) are RNA molecules, small and not codable, which bind to complementary sequences of specific messenger RNAs. The expression of miR-21 (microRNA related to inflammation) has not been described in CD yet. Our aim was to evaluate the expression of miR-21 in peripheral blood mononuclear cells (PBMCs) of CD patients and healthy controls.

Methods: We studied a sample of 10 patients with CD (on gluten-free diet) and 10 healthy controls. Mean age of subjects was 35.2±9.4 years, 25% male, without age- or gender- differences between groups. A blood sample was obtained and PBMCs were isolated by Ficoll-Hypaque. Total RNA was extracted using TRIzol. The concentration and purity of the RNA samples were measured spectrophotometrically. Relative expression of miR-21 was performed using real-time PCR specific for miR21. RNUB6B expression was used as internal control. Expression levels were determined using TaqMan probes.

Results: The average expression of miR21 (CtdRmiR21) was significantly higher in CD group (27.9±.5 vs. 27.1±.8, p=0.028). After standarization, expression profile (RQ value) of the CD group showed just a trend (1.77±.93 vs. 1.08±.72, p=0.09) for higher levels of miR21.

Conclusions: These preliminary data show that the expression of Mir21, a microRNA involved in inflammatory processes, is slightly elevated in PBMCs of CD subjects. The results are interesting for a better understanding of microRNA regulation in CD disease.

Key words: Celiac disease, microRNAs, miR21

PO478

SCHOOL FOOD FORTIFICATION IMPROVES NUTRITION STATUS OF STUDENTS FROM POOR MIGRANT FAMILIES

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Background and objectives: To observe the effect of food fortification including multinutrient fortified rice, iron fortified soy sauce and VA fortified cooking oil on school children of rural-urban migratory families.

Methods: The school children in a boarding school for children of migrated families in suburb Beijing city were selected as volunteer subjects and the school caffiteria were supplied with iron fortified soy sauce, multinutrient fortified rice and VA fortified cooking oil for 10 month. Dietary survey and nutrition measurement were conducted before and after 10-month intervention with fortified foods. Hb, SF, SI, sTfR, serum Zinc and serum VA were measured with blood samples. VB1 and VB2 were measured with urine samples.

Results: Supply of fortified foods showed a significant increase on micronutrient intakes of the school children and the daily intakes of the fortified micronutrients met the requirements of Chinese AI or RNI of those micronutrients. Hemoglobin, Serum zinc, VA, urine VB1 and urine VB2 levels were significantly increased compared with baseline. sTfR level was significantly lower than that of the baseline, the rates of micronutrient deficiencies or inadequacies were significantly reduced.

Conclusions: Food fortification could be an effective and feasible approach for lowering the micronutrient deficiencies on school children of migrated people who are considered one of the most vulnerable population.

Key words: migrant school students, iron fortified soy sauce; fortified rice; vitamin A fortified cooking oil; nutrition intervention

PO479

DEVELOPMENT OF A CULTURALLY APPROPRIATE ASSESSMENT TOOL - KNOWLEDGE, ATTITUDE AND PRACTICE QUESTIONNAIRE ON CARDIOVASCULAR DISEASES AND THEIR RISK FACTORS

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Background and objectives: Cardiovascular diseases (CVDs) and cardiovascular risk factors (CVRF) are exponentially rising. Many developing countries including Sri Lanka (SL) face double burden of malnutrition and increase in non-communicable diseases (NCDs).The study objective was to develop a culturally appropriate questionnaire to assess the knowledge, attitudes and practices (KAP) regarding CVDs and CVRF in a patient population from medical clinics, by obtaining in-depth information.

Methods: A qualitative study was conducted with seven focus group discussions among the following 3 groups; doctors, health education nurses, and multi-ethnic group of patients attending health clinics. The discussions were carried out until saturation point was reached and data was independently documented by two investigators. Using this data, a structured, self administered questionnaire on KAP was developed targeting 4 main domains of general perception on health and KAP, sub domains of CVDs - diet, physical activity and lifestyle.

Results: Though CVDs and CVRF are common, there is cultural variability in the drivers and barriers towards achieving a healthy lifestyle. Qualitative data indicated the following; poor knowledge on CVDs, CVRF and their etiology, lack of suitable educational materials in the appropriate language for patients. Cultural barriers to control diseases/ risk factors were, the stigma of having a chronic disease, lack of family support, fasting and feasting for religious or cultural reasons, rejection of certain foods due to mythical beliefs regarding the foods. Other cultural problems identified included eating of large portions and leftovers due to reluctance to waste foods, preferences for certain types of unhealthy foods, living in an extended family and inadequate support from peers and employers. The KAP was developed using the above information and pre-tested.

Conclusions: This tool will contribute to build an assessment methodology for future use in epidemiology and research locally.

Key words: Cardiovascular Diseases, KAP questionnaire, Knowledge, Attitudes, Practices

PO480

EFFECT OF CARBOHYDRATE RESTRICTION DURING PREGNANCY ON THE GLUCOSE AND LIPID METABOLISM IN OFFSPRING

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Background and objectives: Increasing evidence suggests that the origin of some metabolic disorders, which manifest in adult life, may have their roots during development. In fact, several epidemiological and experimental studies have shown that maternal undernutrition (energy or protein restriction) leading to low birth weight predisposes offspring to the development of metabolic phenotypes such as obesity. However, separate effects of the dietary energy sources during pregnancy remain unclear. In the present study, focusing on the primary source of dietary energy, carbohydrate, we investigated the effect of carbohydrate malnutrition during pregnancy on the metabolic phenotype in mice offspring.

Methods: At 10.5 days gestation, pregnant mice were divided into three groups: the control (C), the energy restriction (R), or the carbohydrate restriction (CHR). The amount of food provided for the R group was restricted to 60% of that for the C group (control diet). The CHR group was fed with 60% energy restricted diet by reducing only carbohydrate from the control diet. After parturition, all the dams were fed with control diet. At 8wks of age, offspring were fed with either normal fat diet or high fat diet (HFD) for 5 months.

Results: The R and CHR offspring were born small but caught up in body weight to C offspring within 4 days after birth. When fed a HFD, the R offspring developed pronounced weight gain and adiposity compared with the C offspring; however, these parameters in the CHR offspring were similar to that in the C offspring. Impaired glucose metabolism was also observed in the R offspring but not in the CHR offspring.

Conclusions: Carbohydrate restriction during pregnancy does not affect catch-up growth, obese phenotype, and impaired glucose and lipid metabolism induced by high fat diet in mice offspring.

Key words: Carbohydrate restriction, pregnancy, obesity

PO481

RESVERATROL ATTENUATES VASCULAR ENDOTHELIAL INFLAMMATION BY INDUCING AUTOPHAGE THROUGH CAMP SIGNALING PATHWAY

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Background and objectives: Resveratrol is a naturally occurring polyphenol which shows dominant effects on endothelial dysfunction with its anti-inflammatory benefits. However, the exact mechanism was not elucidated. We intended to investigate the role of autophagy in the anti-inflammatory effects of resveratrol in endothelial cells.

Methods: Human umbilical vein endothelial cells (HUVECs) were cultured. Cells were pre-incubated with different doses (0.1, 1, 10 and 20 μM) of resveratrol and then exposed to TNFα. The effects of resveratrol on cell autophage was detected by transmission electron microscopy, confocal microscopy, RNAi and western blot assays. The protein expression of cAMP, PKA, AMPK, SIRT1 were measured.

Results: We found that resveratrol pretreatment reduced the ICAM-1 expression in endothelial cells induced by TNF-α and increased the ratio of MAP1LC3B2 and SQSTM1 degradation in a time and concentration dependent manner. And 3-MA and Beclin-1 siRNA attenuated resveratrol-induced autophagy and further attenuated resveratrol-induced inhibition of ICAM-1 mRNA expression. Furthermore, resveratrol increased intracellular cAMP level, the expression of protein kinase A (PKA) and silent information regulator 2 (SIRT1) as well as the activity of AMP-activated protein kinase (AMPK). Finally, resveratrol-induced autohpage in TNF-α stimulated HUVECs was abolished in the presence of inhibitors of adenylyl cyclase (KH7), PKA (H-89), AMPK (compound C) and SIRT1 (nicotinamide), as well as, the siRNAs of PKA, AMPK and SIRT1 transfection, indicating resveratrol effects on autophagy were dependent on cAMP-mediated signaling pathway.

Conclusions: Resveratrol attenuated endothelial inflammation by inducing autophagy in HUVECs, which was mediated through the activation of cAMP-PKA-AMPK-SIRT1 signaling pathway.

Key words: Resveratrol; autophagy; endothelial cells; cAMP; inflammation

PO482

SURVEY FOR DIET AND NUTRITION INTAKE OF BEIJING PEOPLE IN OUT-HOME TABLE SERVICE RESTAURANTS

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Background and objectives: Now, more and more Chinese people, especially in big cities, like to choose eating away from home. It has been showed that restaurant dinner may be related to extra body weight gain, however, little is known regarding how much about dietary intake for Chinese people away from home comparing with in home. This study aims to assess dietary intake of customers in table-service restaurants, and evaluate their energy, protein, fat and sodium consumption in one dinner.

Methods: On dinner time (lunch or supper), 2204 customers randomly selected in six middle-level restaurants in Beijing, was investigated their food consumption by single blind recording their ordered dishes weight before and after eating. According to the dish recipes, cooking way, and food composition database or measured data, food consumption and energy, protein, fat and sodium intake were evaluated.

Results: In one restaurant dinner, the mean intake of foods for a standardized man included 76 g cereals, 162 g vegetables, 11 g fruits, 128 g meat, 50 g fishery products, 10 g eggs, 12 g legumes, 15 g pure energy food, 28 g oil, 7 g salt , 5.2 g dairy, 68.1 g juice, and 7.3 g alcohol, with 1112 kilo-calories, 54.6g protein, 62.3g fat, 88.0g carbohydrate, 10.7g cholesterol and 2920 mg sodium. Fat was the major energy supplier (52.7%), nearly meet one-day need.

Conclusions: There may be a need for interventions to promote healthier food choices among people eat out home.

Key words: food consumption, nutrition intake, table service restaurant

PO483

FOOD INTAKE DURING THE REST PERIOD AFFECTS THE RHYTHMS OF CARBOHYDRATE AND LIPID METABOLISMS IN RATS

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Background and objectives: Recent studies in animals have linked energy regulation and the circadian clock that raise the possibility that the timing of food intake itself may play a significant role in healthy metabolism. In this study, we examined the effect of food intake during the rest period on the rhythm of carbohydrate and lipid metabolisms in rats.

Methods: Eight-week-old male Wister rats were housed under a 12h light-dark cycle (lights on from 21:00 to 09:00). Rats were divided into two groups. The control group consumed three meals per day during active period (9:00, 13:00 and 17:00), and the late dinner group consumed two meals during the active period (9:00 and 13:00) and one meal at the beginning of the rest period (21:00). Rats were fed a normal diet and each group were provided equivalent amount of calories per day. After 3 weeks, blood samples were collected from the portal vein and the hepatic vein at 8:00, 12:00, 16:00, 20:00 and 24:00.

Results: There were no difference in body weight and abdominal fat, but the levels of plasma triglyceride and cholesterol increased in the late dinner group. Plasma glucose in the portal vein reflected feeding directly while that in the hepatic vein was maintained at a constant level. The hepatic glycogen had a circadian rhythm that increased by feedings during the active period, but did not increase after feeding during the rest period. Furthermore, the red muscle glycogen also did not increase after feeding during the rest period.

Conclusions: The findings of this study suggest that food intake during the rest period changes the rhythm of glycogen and lipid metabolisms.

Key words: meal timing, late dinner, carbohydrate metabolism, lipid metabolism

PO484

OMEGA-3 FATTY ACIDS IMPROVES OXIDATIVE STRESS IN WOMEN WITH POLYCYSTIC OVARY SYNDROME

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Background and objectives: Fish oil has beneficial effects in a number of disease states. It was reported that levels of long chain polyunsaturated fatty acids [n-3 LC PUFA including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)] were decreased in infertile women. Objectives of this study were to determine the effects of omega-3 fatty acids supplementation on some oxidative stress markers such as serum total antioxidant capacity (TAC), malondialdehyde (MDA) and paraoxonase 1 (PON1) activity in women with polycystic ovary syndrome (PCOS).

Methods: This double-blind randomized controlled clinical trial was conducted on 61 overweight or obese PCOS patients; aged 20-35 yr. Thirty of the subjects had taken 4 g/day omega -3 fatty acids and 31 were given placebo over 8 weeks. Fasting blood samples, anthropometric measurements and 3-day, 24-hour dietary recalls were collected at the baseline and at the end of the trial.

Results: Dietary intake of n-3 LC PUFA from usual diet was low in studied subjects (0.23 mg/day) and the ratio of dietary omega-6 fatty acids to omega-3 fatty acids intake was high as 63 to 1. Omega-3 fatty acids supplementation significantly decreased serum levels of MDA (P=0.01) and increased serum PON1 activity (P=0.038) compared with placebo. Changes in serum TAC levels and anthropometric measurements were not statistically significant in any groups at the end of the study (P>0.05).

Conclusions: Low dietary intake of n-3 LC PUFA is prevalent in women with PCOS. Supplementation with omega-3 fatty acids improved some indices of oxidative stress in PCOS patients and might contribute to the improvement of metabolic complications in these patients. Educational programs to encourage subjects to consume fish and marine foods also is suggested.

Key words: Omega-3 fatty acids, polycystic ovary syndrome

PO485

EFFECT OF FLAVONOIDS ISOLATED FROM GARDEN EGG VEGETABLES (SOLANUM MACROCARPUM) IN DIET INDUCED OBESED WISTAR RATS

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Background and objectives: There is increased consumption of fatty foods and refined carbohydrates, which leads to increased incidence of obesity, diabetes, cardiovascular diseases, high blood pressure and cancer. There is low consumption of vegetables, which contain phytochemicals with antioxidant properties. This study was designed to determine the effect of flavonoids isolated from (Solanum macrocarpum) in diet induced obesed Wistar Rats.

Methods: Four groups of twenty male Wistar rats were fed a highly palatable diet for 8 weeks to induce obesity resembling mild obesity condition in human population. diet induced obesed rats received rat chow and flavonoids extract daily for 21 days. Group 1 received rat chow alone; Group 2 received 0.05% of flavonoids extract and rat chow; Group 3 received 0.15% of flavonoid extract and rat chow; and Group 4 received 0.25% of flavonoid extract and rat chow. Body mass index (BMI), Total cholesterol, High density lipoprotein (HDL), Low density lipoprorein (LDL) and Triglyceride were evaluated using standard assay technique. The data were statistically analyzed using ANOVA and mean separated using LSD.

Results: Feeding the rats with obesity induced diet showed increase in BMI, total cholesterol, LDL and triglyceride levels along with decrease in HDL ($p<0.05$). Consumption of flavonoids resulted in significant reduction in BMI, LDL, total cholesterol and triglyceride level with significant elevation in HDL cholesterol compared to the rats fed only rat chow ($p<0.05$). It was observed that the decrease in BMI, Triglyceride, total cholesterol and LDL cholesterol level of rats fed 0.25% of flavonoids were significantly different ($p<0.05$) from those fed 0.15% and 0.05% flavonoids.

Conclusions: The results suggest that flavonoids extract from Solanum macranthum has atherogenic effect which can help to reduce obesity.

Key words: Flavonoids, Solanum Macrocarpum, lipid profile, Obesity and Rats

PO486

PROJECT YEAH: DEVELOPMENT OF A WEB-DELIVERED THEORY-BASED INTERVENTION FOR PREVENTING EXCESS WEIGHT GAIN IN YOUNG ADULTS

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Background and objectives: The purpose of this poster is to describe the development and testing of a theory-based, tailored web-delivered intervention for prevention of excessive weight gain in young adults using a community-based participatory research (CBPR) model. Investigators from 14 universities in different states of the USA employed the PRECEDE-PROCEED process of CBPR process to identify and prioritize quality-of-life behavioral and environmental factors

that influence weight gain in young adults (YA).These factors were assessed for the YEAH (Young adults Eating and Active for Health) intervention via focus groups, key informant interviews, quantitative surveys, and environmental audits, and results were used to guide the development of the intervention.

Methods: YEAH was developed as a 10-week, web-based intervention with 19 interactive modules and nudges (stage-tailored messages) addressing issues highest-rated by YA: managing stress (time and sleep management, balancing relationships, and control of alcohol), improving eating behaviors (eating enjoyment, skills for choosing and assembling meals), incorporating physical activity, and managing weight with a non-diet approach. Nudges were developed to reinforce module content, cognitively tested, and sent 3 times/week via email. Participants were encouraged to set goals and track progress via YEAH's website. Anthropometric measurements, fruit and vegetable intake, physical activity, stress management, and sleep duration assessments occurred at baseline, post-intervention (10-weeks), and 15 months. Data were analyzed using PROC MIX, SAS. YA (n=1639, age=19.3±0.03 years, BMI=24.1±0.1, 66% female), who were non-nutrition/non-exercise science majors, were recruited and randomized, stratified by institution and gender into intervention (n=824) and control (n=815) with 58% retention through 15 months.

Results: Intervention participants had significant increases in vegetable intake, intentions for meal behaviors and decreases in percentage of energy from fat at 10-weeks.

Conclusions: Community involvement in the development and implementation of YEAH enhanced the intervention and increased the likelihood of a sustainable weight management program.

Key words: young adult, obesity prevention

PO487

EVALUATION OF THE QUANTITY OF MILK CONSUMED AND BODY COMPOSITION OF HIV-POSITIVE BREASTFEEDING MOTHER

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Background and objectives: Exclusive breastfeeding for 6 months, followed by the introduction of appropriate complementary foods while continuing breastfeeding, as recommended by the World Health Organization (WHO), are the cornerstone of child nutrition. Measuring the amount of milk consumed with conventional techniques known as 'weighing' was long and disrupted the normal diet of the child. The objective of this study is to use the deuterium oxide isotopic dilution technique to assess breastfeeding practices and the determination of body composition of lactating mothers who are HIV positive in Bangui.

Methods: 45 couples mothers/infant were recruited at 3 months after delivery. Mothers who agreed to practice exclusive breastfeeding and who gave their informed consent are retained in the study. They were either under or triple antiretroviral prophylaxis according to national protocol. Statistical analyzes were performed using Epi Info version 3.5.1.

Results: The average age of mothers was 28.7 years and the average fat-free mass of mothers was 41.2 kg. About 20% among them have a body mass index (BMI) less than 18.5 kg/m2.The average age of the infants was 9 weeks and their length was 58.1 cm, 60% of infants were male. Two children infected with HIV died. The amount of milk consumed at 3 months was about 739.5+/-186.2 g / day, the rate exclusive breastfeeding was only 22.2%.The quantity of maternal milk consumed was highly correlated respectively to maternal BMI and maternal fat-free mass(r2BMI=0.80 IC= [0,80 ; 0,93] ; p<0,001) and (r2FFM= 0,97 ; IC= [0,76 ; 0,86] ; p<0,001).

Conclusions: Although the recruited HIV women were encouraged the exclusively breastfeed and they have reported that they were exclusively breastfeeding, the stable isotope study have shown that the practice of exclusive breastfeeding in the context of HIV remains very low. The ART in HIV-infected mothers reduces the transmission of HIV from mother to child.

Key words: breastfeeding, HIV, deuterium oxide

PO489

ANALYSIS OF THE MECHANISM OF ACTION OF TRYPTOPHAN INDUCED PROTEIN SYNTHESIS IN THE RAT LIVER

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Background and objectives: Tryptophan, an essential amino acid, has been identified to be able to promote protein synthesis in the rat liver. However, the details of the mechanism of action have not been clarified. To investigate the mechanism of action of tryptophan induced protein synthesis in the liver, we performed proteomic and metabolomic analysis of the liver.

Methods: Eighteen hours fasted Wistar rats were divided into 3 groups. One group of animals was sacrificed without any treatment as a control. Remaining two groups of animals were administered 135mg/100g body weight L-tryptophan by oral gavage and then sacrificed after 1h or 3h after administration.

Results: The proteomic analysis revealed that ornithine aminotransferase (OAT) expression was decreased at 1h and 3h after administration. OAT is a key enzyme of ornithine (Orn) catabolism. Liver and serum Orn level was significantly increased at 3h after administration. Moreover, the levels of spermine (Spe), which are involved in cell growth, in the liver increased at 3h after administration. It was reported that Trp administration enhanced the enzymatic activity of ornithine decarboxylase (ODC). ODC catalyzes the decarboxylation of Orn to form putrescine and is the late-limiting enzyme of Spe synthesis.

Conclusions: Based on these results, we speculate that the increases in Orn levels through suppression of OAT expression and the stimulation of ODC activity by Trp administration may lead to accelerate Spe synthesis and thereby promote protein synthesis in the liver.

Key words: amino acids, liver, protein synthesis

PO490

GLYCEMIC INDEX, GLYCEMIC LOAD AND SATIETY SENSATION IN INDUSTRIALIZED FOOD

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Background and objectives: The Glycemic Index (GI) is a ranking of carbohydrate-containing foods based on the blood glucose response they elicit. Low glycemic index foods show beneficial effects in controlling insulin production. The glycemic load (GL) is a measure of the effect of food on the release of insulin. Satiety is the subjective feeling of fullness after consumption of a food. The purpose was to determine the GI, GL and the satiety sensation with the consume of industrialized foods.

Methods: 26 healthy subjects with normal biochemical markers and BMI, consumed 50 grams of glucose and the equivalent of 50 grams of available carbohydrates in 2 different foods (cereal bar and chocolate drink) on alternate days. Serum glucose was measured at the 0, 15, 30, 45, 60, 90 and 120 minutes, and also the satiety sensation with a Visual Analogue Scale.

Results: The cereal bar obtained a GI of 62.3% and a GL of 31.1 U, and the chocolate milk show a GI of 45.6% and a GL of 22.8 U. At 120 minutes of consuming the cereal bar, 38.5% felt a little hunger, and with the chocolate drink 42.3% felt without hungry.

Conclusions: The cereal bar showed intermediate GI and the chocolate drink showed low GI, and both foods had high GL. The cereal bar showed a less fullness at 120 minutes although not statistically significant. Is important to know the parameters of GI and GL and include it in the nutriological interventions in healthy and diseased persons.

Key words: Glycemic Index, Glycemic Load, Satiety

PO491

CONTROLLING THE INCREASE IN POSTPRANDIAL CIRCULATING STEARIC ACID CONCENTRATION IS CRUCIAL FOR PATIENTS WITH HYPERLIPIDEMIA TO PREVENT TYPE 2 DIABETES

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Background and objectives: Hyperlipidemia is strikingly common in patients with type 2 diabetes and disturbance of lipid metabolism appears to be an early event in the development of diabetes. FFAs seem to play an important role in the development of diabetes. Few studies have investigated changes in serum FFA profile in hyperlipidemia and its relation with diabetes, and all of those studies were done in the fasting state. Therefore, we investigated the dynamic changes and underlying regulatory mechanism of postprandial FFA profile in hyperlipidemia and their relation with diabetes.

Methods: Glucose tolerance was tested in hyperlipidemic patients, and serum glucose, insulin and FFA profile were determined. Male C57BL/6 mice were randomly assigned to either a low-fat diet or a high-fat diet for 16 weeks. Glucose tolerance was tested and blood glucose, insulin and FFA profile were analyzed. The expression of key enzymes involved in lipid metabolism in liver and muscle were detected. SiRNA was also applied to mice and HepG2 cells to specify certain regulators.

Results: Serum stearic acid (SA) was the only fatty acid increased dramatically in the postprandial state. The elevation of SA was due to increased insulin-stimulated de novo synthesis mediated by sterol regulatory element¨Cbinding protein-1c (SREBP-1c)/acetyl-CoA carboxylase/fatty acid synthase/elongation of long-chain fatty acid family member 6 (ELOVL6) and the elongation of palmitic acid (PA) catalyzed by ELOVL6. Downregulation of SREBP-1c or ELOVL6 by siRNA reduced SA synthesis in liver and serum SA level, followed by amelioration of IR in mice. However, inhibition of SREBP-1c was more effective in improving IR than suppression of ELOVL6, which resulted in accumulation of PA.

Conclusions: Reduction of postprandial SA is crucial for preventing type 2 diabetes, and SREBP-1c is potentially a better target to prevent diabetes by decreasing postprandial SA.

Key words: hyperlipidemia, type 2 diabetes, SA, SREBP-1c

PO492

EFFECTS OF OMGEGA-3 FATTY ACID SUPPLEMENTS ON GLUTATHIONE REDUCTASE AND PEROXIDASE ACTIVITY IN TYPE2 DIABETIC PATIENTS

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Background and objectives: Industrialization and development leads to low ratios of omega-3 to omega-6 fatty acids in diets, increasing risk of chronic diseases, e.g., diabetes. Omega-3 fatty acid supplementation may help glycemic control in diabetic patients, but there is some concern on antioxidant status. This study was conducted to determine the effect of omega-3 fatty acid supplements on antioxidant enzymes (glutathione reductase (GR) and glutathione peroxidase(GPX)) in type2 diabetic patients.

Methods: In a randomized, double-blind, placebo-controlled clinical trial, 81 adults with NIDDM were treated with omega-3 fatty acid supplements (2.7g/day) or sunflower oil for 8 weeks. Data on height, weight, and food consumption (based on 24h food recall), and drug consumption were collected. Also fasting blood samples were taken at the beginning and at the end of the study.

Results: Mean age, weight and BMI, as well as energy and carbohydrate, protein, fat, fiber, polyunsaturated fatty acids, vitamin E,C,A,B9, B12, zinc and selenium intakes and drug consumption were not significantly different between the two groups at baseline. Nor were there any significant differences with regard to these variables before and after supplementation in either group. Moreover, biochemical variables were not significantly different between the two groups before the interventions. HbA1c % at the end of week eight was significantly lower than the baseline value in the intervention group (p=0.00) and significantly higher in the control group (p=0.02). In addition, changes in both groups were significantly different (p=0.00). GPx (20.85± 1.67 vs. 19.23±61.18 U/gHb) and GR (28.51±2.05 vs. 27.87±1.5 U/gHb) decreased, although no significantly.

Conclusions: This study suggests that supplementation by 2.7 g/day omega-3 fatty acids in patients with NIDDM decreases HbA1c but has no effects on antioxidant enzymes.

Key words: NIDDM, HbA1c, GR, GPX

PO493

HAND WASHING KNOWLEDGE AND PRACTICES AMONG SCHOOL CHILDREN IN BANGLADESH

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Background and objectives: The high incidence of diarrheal diseases and other communicable diseases among children due to poor personal hygiene remains a concern on the public health agenda in most countries. To address the problem efficiently, the study was undertaken to determine hand washing knowledge and practices among school children of Dhaka city in Bangladesh.

Methods: It was a cross sectional study amongst 273 school children studied in class VI and VII in two selected schools of Dhaka. Data were collected by pretested structured questionnaire and analyzed by appropriate univariate as well as multivariate analysis.

Results: The Mean±SD of the total score of knowledge was 36±11 and practice was 36±9 of the study subjects. Knowledge score on necessity of hand washing determined low (37%). Knowledge score (42%) on appropriate timing of hand washing found more than practice score (37%). Although most of the children (94%) found complete knowledge on appropriate hand washing materials but they did not practice hand washing properly due to unavailability of soap in school. On the other hand, in their home, they practiced hand washing properly due to presence of hand washing facilities. No children had complete knowledge on hand washing techniques which also reflected in their practice. The Mean±SD of age of children was 12±1 and most of them (81%) were from single family. These variables were found to be significantly (p<0.001) associated with total knowledge and practice score. There was also found significant positive correlation between knowledge and practice (r/p=0.177/0.001).

Conclusions: There is still lacks of knowledge and practices on hand washing among school children. Implementation of multifaceted interventional behavioral hand washing program with continuous monitoring and performance feedback and make available of hand washing facilities in school is important for improving effective hand washing practices.

Key words: Hand Washing, Knowledge, Practices

PO494

IDENTIFICATION OF NOVEL NONINVASIVE BIOMARKERS FOR DIAGNOSIS OF CALCIUM DEFICIENCY

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Background and objectives: Calcium deficiency is a global public health problem. Although the initial stage of calcium deficiency can lead to metabolic alterations or potential pathological changes, calcium deficiency is difficult to accurately diagnose. To accurately assess and provide appropriate nutritional intervention, a global analysis of metabolic alterations in response to calcium deficiency was investigated in our study.

Methods: The metabolic alterations associated with calcium deficiency in a rat model were first investigated by urinary metabonomics based on ultra performance liquid chromatography coupled with quadrupole time-of-flight tandem mass spectrometry and multivariate statistical analysis. Secondly, the correlations between the dietary calcium intakes and the identified biomarkers from rat models were further analyzed to confirm the potential application of these biomarkers in humans.

Results: Urinary metabolic profiling analysis could preliminarily distinguish between calcium deficient and non-deficient rats after a 2-week low calcium diet. The reliable biomarkers of calcium deficiency were identified by a time-course analysis of discriminating metabolites in a low calcium diet experiment, repeating the low calcium diet experiment and performing the calcium supplement experiment. Twenty-seven biomarkers were identified, such as pseudouridine, citrate, oxoglutaric acid, pyrophosphoric acid, sebacic acid and indoxyl sulfate. The reliable biomarkers with regular trends of change could unravel the dynamic pathophysiological changes and accurately assess calcium-deficient rat at different stages. Significant correlations between calcium intake and the biomarkers (pseudouridine: Pearson correlation, r=0.527, p=0.0001 and citrate: Pearson correlation, r=-0.426, p=0.001) were further confirmed in urine of human.

Conclusions: We identified for the first time the reliable biomarkers of calcium deficiency in rat model. Based on further verification of the biomarkers in large population, we anticipate that these biomarkers may be used alone or in combination as a noninvasive screening method in a large-scale population study or for the diagnosis of calcium deficiency.

Key words: biomarkers, calcium deficiency, metabonomics, urine

PO495

BARRIER IN EXCLUSIVE BREAST FEEDING PRACTICE AMONG RURAL MOTHERS IN BANGLADESH: A QUALITATIVE STUDY

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Background and objectives: Malnutrition in children under two years is a major public health concern in Bangladesh. Mother's knowledge and practice related to IYCF is a contributory factor in child nutrition in Bangladesh. The study was designed to examine the knowledge, perception, practice and motivation of the mothers, their family members and the implementers on breast feeding in a rural area.

Methods: The study was conducted in a nutrition intervention area in an Upazila of Sylhet district in June-July 2011. Data was collected using qualitative

Methods including in-depth interviews and focus group discussions with mothers and family members of 0-24 month children, GO & NGO health service providers.

Results: The study showed that most of the mothers, family members and service providers had adequate knowledge on exclusive breasting and colostrums feeding. However, in spite of knowing on exclusive breast feeding many of the mothers could not completely adopt this practice in their life. One of the major causes of this was lack of knowledge on how to deal with insufficient breast milk supply. Additionally, absence of family support and inspiration, limited access to information and media were other hindering factors. Most of the mothers and family members could not mention how to increase sufficient milk production and flow. Some of them only reported that mother should eat plenty of nutritious food for sufficient breast milk production. Most of the male family members did not know about it. Most of the service providers were knowledgeable on how to increase breast feeding flow however, they were not aware to counsel the community.

Conclusions: Knowledge on exclusive breast feeding was satisfactory however overall practice was found poor. Appropriate community based strategies and interventions need to be designed to improve mothers' exclusive breast feeding practice.

Key words: Knowledge, practice, exclusive breast feeding.

PO496

EGYPT NUTRITION LANDSCAPE ANALYSIS: GAPS, OBSTACLES AND OPPORTUNITIES

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Background and objectives: Stunting among under-five Egyptian children has reached an alarming 29%. To have a better understanding the problem and possible solutions, the Landscape Analysis (LA) study was commissioned by the National Nutrition Institute (NNI) and Ministry of Health and Population (MoHP), with support from UNICEF Egypt Office, as the first study of its kind to be carried out among Arab countries.

Methods: The Landscape Analysis is a snapshot of the current nutrition situation not based on representative sampling methodology. Four densely populated governorates were selected out of 27. Seven districts with the highest number of new births and facilities were chosen. Service delivery units included were public hospitals, family health centers and units. Four tools were used; facility checklist, structured questionnaire for health workers, Semi-structured interview tool for national level stakeholders and managers of Non-governmental organizations (NGO's). Data collection was completed between the 3rd to the 14th of July 2011.

Results: 43 facilities were visited, 134 health workers and stakeholders were interviewed, 13 FGD's were held, Protocols for vitamin A and zinc use were present in 15% of facilities. Nutritional educational materials were available in nearly (20%) of facilities. Availability of supplements: Vitamin A (2%), iron and folic for pregnant women and infants were (19%) and (47%) respectively, zinc (58%).Only 31% of health workers received training on child growth charts, 59% received training on exclusive breast feeding. Qualitative analysis showed insufficient funds for nutritional activities (10-25%), no clear Leadership, the roles of different partners are not defined with Lack of effective coordination.

Conclusions: Better use of available resources and strategic engagements with international partners to fund and provide technical expertise in various aspects of nutrition. The health system needs to be strengthened at all levels.

Key words: Landscape analysis, Egypt, stunting, scaling action in nutrition

PO497

ASSOCIATION OF TELEVISION VIEWING AND DIETARY BEHAVIOR WITH OVERWEIGHT AND OBESITY IN PRIMARY SCHOOL CHILDREN OF DHAKA CITY

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Background and objectives: Childhood obesity is a major risk factor for cardiovascular disease and also increases risk for future diabetes. In a developing country like Bangladesh, televisions have become a important household item, particularly; TV advertisements may have a great impact on dietary behavior on children. The aim of the present study was to assess the possible association between dietary behavior and television viewing with overweight or obesity in Bangladeshi urban primary school children.

Methods: A cross-sectional study was conducted 1200 primary school children. Data were collected from Dhaka City. Participants (age 6-13 years) were randomly collected on the basis of predefined scoring. Subjects were classified as underweight (<90.99%), normal, (91-110%), overweight (111-120%) and obese (> 120%), if their weight-for-height values were within the ranges of the recommended median values. Duration of television viewing was categorized as <60min/day and >60min/day. Dietary history was taken by specific food frequency questionnaire. Univariate and Multivaiate regression models were used as appropriate.

Results: The substantial number of overweight and obesity was found to be 31% in the study subjects. Mean fat intake was significantly higher in overweight and underweight groups (p=0.008) compared to the normal group. About 13.6% overweight and 18% obese children watched television more than 60 minutes. A significant positive correlation (r= 0.106, p= <0.04) of junk food intake with overweight and obesity and significant correlation (r= 0.292, p= <0.001) was found between TV viewing with weight for height. In logistic regression analysis, overweight and obesity were associated with TV viewing (p<0.001) and junk food taking (p=0.02) when the effects of other confounders (sex, age, parent's education, parent's income) were adjusted.

Conclusions: A substantial number of children are already overweight and obese and TV viewing and unhealthy food intakes are important contributors of weight gain.

Key words: Child obesity, Television viewing, Diet

PO498

THE ROLE OF SMALL INTESTINE AND LIVER ON THE METABOLIC RHYTHM OF AMINO ACID IN RATS FED VARIOUS PROTEIN DIETS

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Background and objectives: The profile and concentration of plasma amino acid were maintained constant on the healthy condition. The aim of this study was to investigate the role of small intestine and liver on the regulation of plasma amino acid.

Methods: We examined the postprandial concentration of plasma free amino acid in rats fed various energy % of protein; 5%, 20% and 35%. Rats kept on a 12h light-dark cycle (lights on 2100 to 0900) and fed during a restricted time of day (1000-1600). After 3 weeks, blood samples were taken from the portal vein and the hepatic vein at 0800, 1300, 1800 and 2300.

Results: In most amino acid, postprandial plasma concentration in portal vein was elevated by response of protein intakes. However, the profile of plasma amino acid in portal vein kept on that of fasting time, such as plasma lysine concentration was the highest in the essential amino acid. Plasma concentrations of glutamate, aspartate and arginine in portal vein were maintained low levels regardless of the amount of ingestion. Postprandial plasma concentration of most amino acid in hepatic vein was lower than that in portal vein. The difference of plasma amino acid concentration between portal vein and hepatic vein, it showed the metabolic amount in the liver. Thus, postprandial liver increased the amino acid uptake with kept the profile of amino acid in portal vein.

Conclusions: These results suggest a crucial role of small intestine as regulatory on the profile of plasma amino acid. On the other hand, liver is a contributor to maintain the concentration of plasma amino acid.

Key words: amino acid, portal vein, hepatic vein, liver, small intestine

PO499

DELAYED INITIATION OF AND NON-EXCLUSIVE BREASTFEEDING AMONG CHILDREN AGED 0-23 MONTHS IN SOUTH ASIA: A POOLED ANALYSIS

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Background and objectives: Early initiation of breastfeeding within the first hour and exclusive breastfeeding (EBF) improves the health and nutrition status of newborns and are the two most important determinants of infants and young child survival. This study identifies factors linked to delayed initiation of breastfeeding among children aged 0-23 months and non-EBF among children aged 0-5 months.

Methods: We pooled the most recent data from Demographic and Health Surveys in five South Asian countries (Bangladesh 2011; India 2005-2006; Nepal 2011, Sri Lanka 2006-2007 and Pakistan 2006-2007). Our analysis was restricted to the last-born child who was living with the respondent (ever-married women age 15-49 years) and the total sample was 31082.

Results: The pooled rate of early initiation of breastfeeding and EBF were 33% and 51%, respectively. Multivariate analyses revealed that non- EBF was significantly higher among mothers who delivered their babies at the health facilities (adjusted odds ratio (AOR) = 1.47) and mothers who perceived their babies to be smaller than average (AOR) = 1.28). Compared with mothers who had 7 or more antenatal visits, the odds for mothers who had 3-6 visits, 1-2 visits and no visit were significantly higher for delayed initiation of breastfeeding and non-EBF. Mothers who had secondary or more level of education and had no education were significantly more likely to delay the initiation of breastfeeding and not to give EBF compared with mother's who had primary level education. Mothers who delivered their babies by caesarean section (AOR) = 2.15) were more likely to delay initiation of breastfeeding.

Conclusions: Interventions to promote early initiation of and exclusive breastfeeding should be further strengthened in the South Asia region, with more emphasis to target mothers who are at risk for sub-optimal practices.

Key words: early initiation of breastfeeding, exclusive breastfeeding, survival, South Asia

PO500

MONITORING THE COMPLIANCE TO THE INTERNATIONAL CODE OF MARKETING OF BREASTMILK SUBSTITUTES: LABELLING VIOLATIONS IN INDONESIA

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Background and objectives: Exclusive breastfeeding rate in Indonesia is still lower than targeted by the Government. The government has adopted several legal measures to protect and promote breastfeeding. Several provisions of the International Code of Marketing of Breast Milk Substitutes (BMS) have been adopted but additional efforts are required to have it fully in force, particularly on labelling aspects. The purpose of the study was to assess the violations related to the set of articles 9 on labelling part of the Code in Jakarta, Indonesia.

Methods: The standardized protocol developed by the Interagency Group on Breastfeeding Monitoring (IGBM) to estimate the prevalence of violations of the Code was used. It combines qualitative and quantitative methods. A total of 27 labels from different types of BMS (infant formula 0-6 months, follow-on formula 6-12 months, follow-on formula 6-18 months, and growing up formula 12-36 months) was collected in different selling points of the city. Each label of each product was analysed based on 32 parameters to identify violations related to labelling.

Results: On all labels (100%) under assessment, violations of the Code were found in one or more parameters. All labels have brand name or show promotion of brand`s awareness and recognition, bear company name or logo, and have pictures that idealise the use of BMS. None of the labels have information on the negative effects of bottle feeding or the difficulty of reversing decision not to breastfeed.

Conclusions: Formula labeling violations in Indonesia is of concern and it may jeopardize breastfeeding practices. Labels needs to provide appropriate information about the risks of using the products and superiority of breastfeeding. Results will be used to advocate for further regulations to strengthen labeling regulations to comply with International Code of Marketing of BMS.

Key words: Formula, labels, Breastfeeding, Code, Marketing

PO501

A SHIFT IN OCCUPATIONAL PHYSICAL ACTIVITY AND ANIMAL PROTEIN CONSUMPTION LEAD TO OVERWEIGHT AMONG RURAL INDONESIAN ADULT MEN

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Background and objectives: Previous studies have shown that increasing overweight evidence not only in urban but also rural population. This study explored multi-layers of individual and community factors explaining overweight among rural Indonesian men.

Methods: Longitudinal data of the 2000-2007 Indonesian Family Life Survey (IFLS) was used. In the analysis, 1877 men 18-60 years in 1993 with complete follow-up were included. Overweight was defined as BMI>=25 kg/m2. Individual factors included age, smoking habit, occupational physical activity (PA) and animal protein consumption frequency. Heavy PA job was defined as occupations in agricultural, mining and dealing with lifting heavy things. Animal protein consumption included consumption of meat, egg and dairy products. At the next level, factors associated with the shifting of occupational PA and animal protein consumption were explored. Data was analyzed by generalized estimating equation modelling.

Results: After adjusting for age, smoking habit and animal protein consumption, men who have shifted from heavy to lower PA occupations have 2.52 (CI:1.96-3.24) higher risk of overweight over the observation period. The shift in occupational PA was partially explained by involvement in non-farming business (OR:2.40,CI:2.11-2.72) and development of factories (OR:1.24,CI:1.08-1.42). On the other hand, men who consumed more frequent animal protein has 2.04 (CI:1.38-3.03) higher risk of overweight than those who did not consume (adjusted for age, smoking habits and occupational PA). Further analysis showed that changes in animal protein consumption were associated with affluence and accessibility to market (OR:1.54,CI:1,09-2.17).

Conclusions: The study showed that increasing overweight prevalence in rural areas was associated with both the changes in PA and food consumption pattern, which in turn associated with individual factors and changes in community environment. The study suggested that changes in community environment could serve as early warning for obesity prevention effort.

Key words: Overweight, Physical activity, Animal protein consumption, Longitudinal

PO502

HIGH FRUCTOSE DIET ALTERS INTESTINAL PERMEABILITY AND ELECTROPHYSIOLOGY IN ADULT MINIPGS

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Background and objectives: Increased gut permeability and resulting endotoxin leakage following high-fructose chronic intake have been advocated as etiopathological factors in nonalcoholic fatty liver disease and steatohepatitis (NAFLD, NASH). However, gut permeability data are scarce and conflicting regarding the site of barrier alteration. The only study in man suggests aspirin-induced altered colonic, but not intestinal permeability in 10 NASH patients. Therefore, we hypothesized that a high fructose diet increases permeability along the gastrointestinal tract and alters intestinal glucose absorption and gut ion exchange.

Methods: For testing the hypothesis, adult minipigs were fed similar amounts of wheat-soyabean-corn starch based diet containing 20% pure glucose or fructose for 8 weeks (n=6/treatment). Gut tissues were collected post-mortem and segmental permeability and electrophysiology were investigated in Ussing chambers (UC) under basal condition or after addition of cytochalasin B (mycotoxin blocking sugar transport and cell microfilaments).

Results: Pigs grew similarly with either diet. Basal jejunal macromolecule transcellular permeability was twice higher with fructose (P<0.01) with no difference at other sites. Basal paracellular permeability was unaffected. Under cytochalasin, ileal and colonic transcellular permeability tended to be higher with fructose (P=0.15). Basal gut electrophysiology was unaffected by diets. However, under cytochalasin net ion movement was lower in jejunum and higher in ileum (both P=0.02) and potential difference was lower (P=0.04) with fructose. Intestinal sodium-dependent glucose absorption capacity was higher (P=0.05, global effect) and carbachol-induced jejunal chloride secretory capacity was lower (P=0.055) with fructose (no differences under cytochalasin).

Conclusions: High-fructose diet increased jejunal transcellular permeability and glucose absorption capacity while decreasing jejunal secretory capacity. Cytochalasin treatment disclosed additional differences between diets for transcellular permeability and ion exchange. Work is in progress to investigate the impact of chronic fructose consumption on intestinal glucose and fructose transporters.

Key words: high-fructose diet, gut, permeability, electrophysiology, minipig

PO503

THE NUTRITIONAL VALUE, WATER USE AND NUTRIENT CONTRIBUTION OF TRADITIONAL AFRICAN LEAFY VEGETABLES

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Background and objectives: For centuries traditional crops sustained rural populations in developing countries. Several of these crops are native to the countries where they grow and are well adapted to climatic conditions. The objectives of the study was to determine the nutrient content, agronomic practices, consumption and contribution to nutritional status of eight selected African crops.

Methods: Eight traditional crops were selected from those most commonly consumed. Nutrient content was determined using accpeted standardised techniques including proximate analyses, Ion Cromatography and HPLC. Drought and heat stress analyses were done using Relative Water Content (RWC), leaf area, Cell membrane stability and reduction essays (TTC). Water use was determined using Crop evapotranspiration. Consumption of these plant foods and its contribution to nutritional status were assessed by focus groups discussion, food recall methodology and dietary calculations. The data from these plant foods were compared to that of Swiss chard.

Results: The nutrient intake data was based on children aged 4-8 years old. These traditional vegetables provided substantial amounts of vitamin A and iron. Amaranth and cowpea provided more that 75% of the RDA, while pumpkin leaves were the best source of iron and provided between 50 – 75% of the RDA for the age group. All the traditional crops had a higher degree of drought tolerance compared to Swiss chard. However, all eight crops were sensitive to water stress. Although the production was best at full irrigation, these plants could still produce edible leaves at much lower levles of irrigation.

Conclusions: The findings of this study support the promotion and use of these vegetables as food crops from both the agronomic and human nutrition perspective, especially in food insecure communities. They make a significant contribution to nutrient intake in the arid regions of the continent.

Key words: nutrition, indigenous foods, African vegetables, amaranth

PO504

METHOD NON-INVASIVE IN BLOOD OF MICRORNAS BIOMARKER FOR PREVENTIVE DIAGNOSIS OF CELIAC´S, CROHN´S, WILSON´S DISEASES WITH UNKNOWN ETHIOLOGY

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Background and objectives: In the last decade, Nutrigenomics has developed into very important sector in the clinical research. Especially in identifying the association of lifestyle or eating habits particular to the development not only of complex diseases, such as cardiovascular disease and oncologic, but also rare autosomic disease difficult to diagnose and unknown etiology, such as celiac disease, Crohn's disease and Wilson's disease. Our main aim in this study is to characterize new biomarkers in blood and validate their application in disease prognosis. Among them, the identification of novel microRNAs(miRNA), which play a crucial role in the silencing of certain key genes in the development of these pathologies discussed above.

Methods: The study will include 150 patients with different pathologies described above and 150 healthy persons. Blood samples were collected after a 12-hour fast recruited by the Andalusia Cooperative Society (SCA). All participants gave their informed consent. The serum miRMA isolation is being obtained using a novel and fully automated system epMotion 5075 VAC workstation in a 96 well format (Eppendorf Iberica). For quantification end, we use real time quantitative PCR by an Eppendorf realplex (Eppendorf Iberica).

Results: Preliminary results confirm that our isolation and quantification

Methods will be useful to identify new biomarkers, which have a high sensitivity and specificity, applied to preventive diagnosis.

Conclusions: The expected results of this study will result in enough data for a statically significant relationship between the levels of miRNAs and genetic predisposition to the development of these diseases.

Key words: Celiac-Crohn-Wilson´s, diseases, miRNA, biomarkers, diagnostic

PO505

A NOVEL APPROACH TO THE DESIGN OF COMPLEMENTARY FEEDING BEHAVIOUR CHANGE INTERVENTIONS

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Background and objectives: It is widely recognized that infant child feeding practices need to be improved to reduce the burden of chronic child malnutrition worldwide. However, infant and child feeding practices are deeply ingrained in culture, habit and context, and are a complex target for behavior change intervention. Many nutrition programs develop messages that derive from scientific recommendations rather than from principles of effective behavior change (BC). Project Baduta in Indonesia aims to bring the best scientific knowledge about behavior change combined with the creative practices of industrial marketing to nutrition BC intervention design.

Methods: An innovative approach developed by LSHTM was used to design a program to promote appropriate feeding amongst children 6-24 months of age in peri-urban Surabaya. The BC approach – called 'Evo-Eco' because it originates in evolutionary biology and ecological psychology – focuses on behavior in its social, physical and biological settings, and on the motivated and habitual aspects of routines, rather than on cognitive aspects.

Results: The framing workshop generated insights on the role of prior advertising histories of complementary foods, the cultural place of milk, the tedious nature of infant feeding, the fear of wasting food, and mother's desire to reduce effort by involving infants in family feeding events. Findings led to a reorientation of project goals. Formative Research employed novel tools including video ethnography, behavioural settings analysis, motive projections, the elicitation of everyday routines, and behaviour trials. The results provided the design principles for a behaviour change intervention, set out in a creative brief.

Conclusions: This presentation outlines the approach, the methods and the results of the first stage of Project Baduta. We conclude that nutrition promotion needs to incorporate the lessons of modern BC approaches and to tap the creative skills that are normally proprietary to industry.

Key words: complementary foods, stunting, children, indonesia

PO506

EFFECTS OF VITAMIN C ON CELL CYCLE AND APOPTOSIS

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Background and objectives: Vitamin C (VC) a water soluble antioxidant and antimutagene has dual effects on biologic systems. VC has both free-radical scavenging and autooxidizing properties as well as in cell proliferation and cell death. The aim of this article is mechanistic surveying of VC roles in cell cycle and apoptosis.

Methods: This review compromised on published articles in PubMed, GoogleScholar, sciencedirect and ovid according to key words since 1998.

Results: Regarding in vitro studies, VC supplementation with X-ray irradiation results in apoptosis in human leukemia, LH-60 cells, due to activation of pro-apoptotic factors such as Bax and caspase-8. Also high dose of VC combination with H2O2 by increasing oxidative stress decreases Bcl-2 expression and induces apoptosis in HL-60 cells. Moreover, treating ovarian cells with VC in presence oxidative stress enhanced cell cycle arrest at the G2/M phase by delaying activation of cyclin B-cdc2. While, in the absence of oxidative stress, it had no effect on cell cycle. In contrast, VC in human colon carcinoma HT-29 by blocking drug-mediated apoptosis induced by oxidative stress, allow cancer cells to become insensitive to chemotherapy. Incubation of T cells with VC induces them to enter S phase. Recently, studies demonstrated VC has an antiproliferative activity via inhibition of tRNA synthesize gene expression in HT-29 cells, and administration of high-dose VC significantly induces mitochondrial apoptosis in mesothelioma tumor cells in dose-dependent manner.

Conclusions: Although a high alimentary intake of VC contributes to cancer prevention, high level of VC may have quite different effects at various stages of cell growth, proliferation and apoptosis that may promote cancer progression. Thereby safe-dose of administration of VC and implications for a clinical use in anticancer therapies has to be discussed.

Key words: vitamin C, apoptosis, cell cycle

PO508

LUTEIN AND ZEAXANTHIN STATUS. DIETARY INTAKE, SERUM CONCENTRATIONS AND MACULAR PIGMENT DENSITY IN SPANISH SUJECTS

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Background and objectives: Lutein and zeaxanthin are dietary carotenoids. Both are concentrated in retina and constitute the macular pigment. A higher concentration of lutein and zeaxanthin in blood or intake has been associated with lower risk of age related macular diseases. Objective: to assess the status of lutein and zeaxanthin by means of dietary intake, blood levels and macular pigment density (MPD) and correlations among them.

Methods: Subjects: 108 subjects (54 women). Inclusion criteria: 20-35y (young) or 45-60y (old), normolipemic, no vitamin or dietary supplements.Exlusion criteria: obesity, cataract or any ocular disease. Study approved by the Ethical Committee Clinical Research (Hosp. Univ. Puerta de Hierro, Madrid). HPLC validated method was used to analyze lutein in serum (Olmedilla et al., Clin. Chem., 43;1997). MPOD measured by the M:pod device. Statistical analysis: lutein and MPOD data expressed as mean +-SD. SPSS vs 21.0 statistical software. Lutein /zeaxanthin intake was assessed by a 3-day food record using the carotenoid database published by our group (Nutr. Hosp., 27; 2012) .

Results: Concentrations in blood (µg/dl): 13,1±7 lutein; 3,4±2,7 zeaxanthin. Concentrations in diet (µg/day): 1073±1572 lutein; 95±140 zeaxanthin. Central MPD: 0,29±0,14. Old group showed higher levels of lutein and zeaxanthin in blood and intake but when those concentrations standardized by lipids (cholesterol+triglycerides) those differences disappeared. MPD was similar in both groups. Correlations between blood and diet concentrations: r=0,223 (p=0,02) for lutein; r=0,322 (p=0,01) for zeaxanthin; r=0,255 (p=0,008) lutein plus zeaxanthin. Lutein and MPD r=0,201 (p=0,037).

Conclusions: Lutein and zeaxanthin concentrations in diet and blood are correlated. Blood concentrations of lutein, but not dietary intake, shows correlation with MPD.

Key words: lutein, zeaxanthin, diet, blood, macular pigment density.

PO509

CHEMOPREVENTIVE AND ANTI-CANCER PROPERTIES OF POMEGRANATE SEED OIL (PSO)

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Background and objectives: In recent years, there is much interest about anticancer properties of PSO. Due to its weakly estrogenic activity, interference with cell proliferation, cell cycle, metastasis and anti-inflammatory effects. This article has tried to reveal chemopreventive and anti-cancer potential of PSO in various cancers.

Methods: This article is a review on articles published in googlescolar, pubmed, sciencedirect and ovid according to key words since 1998.

Results: Chemopreventive effects of PSO refers to its strong inhibiting ability of inflammatory enzymes gene expressions such as lipoxygenase and cyclooxygenase-2 (COX-2) as well as decreasing stimulation of cytokines such as IL-4, IL-6, IL-8 and TNF- by inhibiting ERK/MAPK transduction pathways and NF-kB activation. Also PSO has anti-proliferative and pro-apoptotic properties in cancer cells. It can promote apoptosis via p53/p21 up-regulation and caspase-3 pathway and also attenuate G0/G1 to S phase and cell cycle arrest in G1 in prostate, bladder, breast and human leukemia cancer cells. Punicic acid, a major bioactive substance of PSO via overexpression of PPAR- and increase lipid peroxidation can inhibit proliferation and induce mitochondrial apoptosis in breast and colon cancer cells. Moreover, PSO has an especial anti-proliferative activity in breast cancer cells via aromatase and 17 -hydroxysteroid dehydrogenase enzymes inhibition and antiestrogenic activities. Similarly, in skin cancer models, PSO significantly decrease tumor incidence and multiplicity. Recent in vitro and in vivo studies demonstrated PSO anti-angiogenic action in breast cancer by decreasing angiogenic factors such as IL-4, migration inhibitory factor (MIF) and vascular endothelial growth factor (VEGF).

Conclusions: In sum, PSO can potentially be used in both prevention and treatment of various cancers, but further studies needed to warranting chemopreventive and therapeutic application of PSO in humans.

Key words: pomegranate seed oil, cancer, proliferation, apoptosis, angiogenesis

PO510

THE PERFORMANCE OF THE HOUSEHOLD FOOD IN-SECURITY (ACCESS) SCALE (HFIAS) IN COMMUNITIES WITH VARYING EXPOSURE TO ECONOMIC MEANS TESTING

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Background and objectives: Experiences of food insecurity are similar across cultures. Instruments used to assess the prevalence of household food insecurity and those that evaluate households' qualification for social benefits (means testing) are similar. Whether prior exposure to means testing influences households' responses during the assessment of the prevalence of household food insecurity requires further study. The objective is compare the performance of Household Food Insecurity –Access (HFIA) instrument in two communities with varying uptakes of social benefit programmes, and thus exposure to means testing.

Methods: The HFIA instrument was administered to 742 randomly sampled households in two communities. The HFIA-scores were computed for each community and compared. Next, the null hypotheses of independence between the HFIA-scores and households wealth (per-capita income, and ownership of assets), and the prevalence of stunting were evaluated.

Results: The HFIA-scores ranges from 0-27. Higher scores indicate higher food insecurity. The mean HFIA-score for both communities was 11.0 ± 7.5. The mean HFIA-score was lower (T-test -3.588; $p < .001$) in the low-exposure community (9.8 ± 7.7) than in the high-exposure community (11.7 ± 7.1). Higher proportions of food insecure households were observed in the lower quintiles of per-capita household income and household asset holding. Notably, 92% of households in 1st and 2nd quintile of per-capita income were food insecure. This proportion did not differ significantly between the low-exposure and the high-exposure community. Similarly, households with stunted children had significantly ($p<.05$) higher mean HFIA-scores (stunting 12.2 ± 7.5 vs 10.2 ± 7.5). Again the mean HFIA-scores for households with stunted children did not differ significantly between the low-exposure and the high-exposure community.

Conclusions: The findings suggest that HFIA tool performs similarly well in assessing household food insecurity in communities with low and high exposure to means testing.

Key words: food insecurity, means testing, stunting

PO511

ANTHOCYANIN DAILY INTAKE AND ITS ASSOCIATION WITH HEALTH INDICATORS IN COMMUNITY POPULATION

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Background and objectives: the present study is to optimize a method for quantifying the contents of anthocyanins in phyto-foods, to quantify anthocyanins in common plant foods in China, providing information for the establishment of Chinese database of anthocyanins, to estimate the daily intake of anthocyanins of Guangzhou population on the basis of the quantitative data and results from the food intake survey, and then to analyze health effects of anthocyanins intake.

Methods: Phyto-foods were sampled from Guangzhou, Chongqing, Tianjin and Wuhan around China in two different seasons. The anthcyanins extracted from foods were assayed by HPLC-MS. A total of 1404 adult residents from Guangzhou community were recruited. Dietary survey was performed by using semi-quantitative food frequency questionnaire, and health parameters of the subjects were examined.

Results: A total of 200, 160, 180, and 100 items were collected from Guangzhou, Chongqing, Tianjin and Wuhan, respectively. The anthocyanin contents were analyzed by HPLC-MS, the anthocyanin food content database is established. The daily anthocyanin intake was estimated as 27 mg/D of anthocyanin aglycon, equivalent 43 mg/D of anthocyuanin. The results demonstrated that anthocyanin daily intake is positively associated with HDL-C concentration ($P<0.05$), and negatively with uric acid. Higher anthocyanins intake also decreased the risk of right-and-left carotid plaque ($P<0.01$). However, there were no differences in BMI, TG, LDL-C, IMT and SBP in higher vs low anthocyanin daily intake.

Conclusions: The study set up the database of anthocyanin contents of plant foods, estimated the anthocyanin consumption as 43 mg/D in community population, and revealed that high dose of anthocyanins intake had higher blood HDL-C concentration and lower blood uric acid concentration, and the anthocyanin might reduce risk of right-and-left carotid plaque¡¯s incidence rate.

Key words: anthocyanin, daily intake, lipid and HDL

PO512

THE DISTRIBUTION OF THE SNPS WHICH HAVE THE ASSOCIATION WITH IRON DEFICIENCY ANEMIA IN CHINESE

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Background and objectives: Iron deficiency anemia (IDA) is directed by many risk factors, and the genotype is the one of them. Single-nucleotide polymorphisms (SNPs) which associate with IDA had been discovered, and some valuable results had also been concluded. No study to our knowledge, however, has estimated the distribution of these SNPs in Chinese. We conducted a descriptive study to examine the distribution of these SNPs in Chinese.

Methods: 202 samples were selected randomly from the native children, whose age were from 8 to 12. DNA samples were obtained from the leucocytes in peripheral blood and genotyped by sequenom MassArray. 5 SNPs which had been shown that have the association with IDA in the previous study were chosen to be examined, rs877908, rs4820268, rs2543607, rs2543633 and rs2235321. The proportions of these SNPs on each allele were calculated, and the distributions of them were described.

Results: The proportions of the alleles on rs877908 were 22.4%(CC), 47.9%(CT) and 29.7%(TT) respectively. The proportions of the alleles on rs4820268 were 21.6%(AA), 48.2%(AG) and 30.2%(GG) respectively. The proportions of the alleles on rs2543607 were 2.5%(AA), 31.8%(AG) and 65.7%(GG) respectively. The proportions of the alleles on rs2543633 were 22.2%(AA), 46.5%(AC) and 31.3%(CC) respectively. The proportions of the alleles on rs2235321 were 23.1%(AA), 45.6%(AG) and 31.3%(GG) respectively.

Conclusions: The SNPs on the 5 alleles are confirmed.According to result, the potential risk of IDA in Chinese can be estimated, and the high risk genotype groups should be taken more attention on the developing of IDA.

Key words: IDA, SNPs, genotype, distribution

PO513

IS ADHERENCE TO THE GREEK MEDITERRANEAN DIET BY ELDERLY GREEK AUSTRALIANS ASSOCIATED WITH THE GREEK HOME GARDEN?

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Background and objectives: The Australian arm of the MEDIS (MEDiterranean ISlands) study is a cross sectional survey of socio-demographic, medical history, lifestyle factors and dietary characteristics of elderly Greek Australians over 65 years of age originally from the islands of Crete and the Republic ofCyprus who migrated to Australia up to almost 60 years ago from their homeland. It aims to explore the relationships between cardiovascular disease risk factors and adherence to the Mediterranean diet using the MedDiet Score to explain the persistent low coronary heart disease mortality of Greek migrants to Australia. Growing a home garden has been documented as a form of social connectedness to one's homeland and is an identifying trait of Greek culture1.It is well documented that the traditional Greek Mediterranean diet is a dietary pattern that is predominantly plant based along with a high intake of olive oil, legumes, fish, seafood and low amounts of meat2 and dairy.The purpose of this paper is to explore the association between a home garden and adherence to the Mediterranean diet which, in addition to acting as a vehicle for the maintenance of culture and tradition may explain the benefits to health and well-being observed in this cohort of elderly Greek Australians.

Methods: Data was collected via a lifestyle questionnaire (LQ) and a Food Frequency Questionnaire (FFQ) and included data as to whether participants grow their own produce such as citrus and stone fruits, tomatoes, onions and garlic, green leafy vegetables and certain herbs.

Results: Our preliminary findings indicate a high MedDiet Score is positively correlated with participants who report keeping a home garden, particularly those that grow tomatoes, onions and garlic.

Conclusions: It is highly likely that growing one's own home produce encourages this tradition and pattern of eating.

Key words: MEDIS, Greek Australians, culture, MedDiet Score, home gardens.

PO514

DISTRIBUTING COMPLEMENTARY FOOD SUPPLEMENT-YINGYANGBAO REDUCING THE ANEMIA IN YOUNG CHILDREN IN A COUNTY OF SICHUAN PROVINCE AFTER WENCHUAN EARTHQUAKE

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Background and objectives: This study aimed to evaluate the impact of highly nutrient-dense complementary food supplement-Yingyangbao, at the time of 3 months after Wenchuan earthquake, on the anemia of young children in a county in Sichuan province.

Methods: The young children aged 6-23 months in the county were fed one sachet Yingyangbao per day. Yingyangbao were distributed for 15 months for free. The children entering 6 months age would be included. The length, weight and hemoglobin of the children aged 6-29 months were assessed at baseline (n=257) and Yingyangbao intervention for 6 (n=218) and 15 months (n=253) by cluster sampling. Growth status has not been described in the paper. The analysis was conducted based on 6-11, 12-17, 18-23 and 24-29 months.

Results: It showed that the hemoglobin concentration in each group among the 4 groups increased by 4.9, 6.4, 8.0, 9.5 g/L after 6 months and 12.7, 11.4, 16.7, 15.7 g/L after 15 months compared to the baseline, respectively. The total anemia prevalence in each group was significantly lower after 6 and 15 months than the baseline ($P<0.001$), except the 6-11 months group after 6 months because of fewer Yingyangbao consumption. Total moderate anemia rate decreased from 18.3% to 5.5% after 6 months, and kept decreasing to 0.8% after another 9 months. The hemoglobin concentration was significantly correlated with the amount of yingyangbao consumption($P<0.001$) The anemia rate was significantly different based on the yingyangbao compliance ($P<0.001$).

Conclusions: It was concluded that Yingyangbao which contains quality protein, vitamins and micronutrients intervened 15 months could be effective for the improvement of anemia of young children. The study provides the support that the application of the complementary food supplements to reduce the anemia of young children in the emergency of natural disaster.

Key words: young children, anemia, nutrition intervention, complementary food supplements, Yingyangbao

PO515

EXPOSURE TO NON-SWEET MALTODEXTRIN SOLUTION REDUCES WEIGHT GAIN AND CHANGES THE PREFERENCE FOR SWEET TO PROTEIN SOLUTIONS IN PIGS

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Background and objectives: There are concerns about the consequences of a long-term consumption of caloric drinks for kids. However, the specific role of a hedonic taste or post-ingestive rewarding properties of sugars on these consequences are still unclear. A non-sweet maltodextrin (low dextrin-equivalent) allows the dissociation of both properties, while pigs are a suitable model for humans due to the innate sweet preference, but also highly developed orosensorial perception and growth potential.

Methods: The preference of thirty six piglets for protein (animal plasma 20 g/l) or sweet (sucrose 20 g/l) solutions was assessed by using a choice test (CHT) before (day 14 post-weaning) and after an ad libitum supply of water (Control) or 160 g/l maltodextrin (MTD) solution for 12 consecutive days. A one-bottle test was also performed after the CHT by offering the same protein/sweet solutions on alternate days as a measure of their appetence. Pig performance and solution intake were monitored on d7 and d12.

Results: Piglets innately preferred sucrose (64%, P<0.001). No significant differences were observed on the water and MTD solution intake, but a numerical increase in MTD intake (947 vs. 759 ml) was observed from d7 to d12. Low feed intake and weight gain (P<0.05) were observed for MTD (395 g BWgain/d) than control piglets (484 g BWgain/g). Sweet over protein preference and appetence was maintained in control piglets (P=0.03), but those with access to MTD showed a strong preference for the protein solution (68%; P=0.11) and a dramatic reduction of the appetence for sweet solution.

Conclusions: The results show that a long-term access of a non-sweet caloric drink may depress feed intake and growth, but also increase the preference of piglets for protein, suggesting a role of the postingestive up/down regulation for sweet/protein orosensorial perception in pigs.

Key words: maltodextrin, pig, preference

PO516

MODULATION OF EPIGENETIC STATES AND INFANT IMMUNE SYSTEM BY DIETARY SUPPLEMENTATION WITH ω-3 PUFA DURING PREGNANCY IN AN INTERVENTION STUDY

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Background and objectives: Early-life exposures to tobacco smoke and some dietary factors have been identified as inducing epigenetic changes in genes involved in allergy and asthma development. Omega-3 polyunsaturated fatty acid (PUFA) intake during pregnancy could modulate, by epigenetic regulation, key cytokines and the maturation of Th cells. However, little is known about the mechanism by which ω-3 PUFA could have a beneficial effect in preventing allergy and asthma. We sought to test whether dietary supplementation with ω-3 PUFA during pregnancy might modulate epigenetic states in infant immune systems.

Methods: The study is based on a randomized intervention trial conducted among pregnant Mexican women who were supplemented daily with 400 mg docosahexaenoic acid (DHA) or placebo from 18-22 weeks of gestation to parturition. We applied quantitative profiling of DNA methylation states in Th1, Th2, Th17, and Treg-relevant genes as well as LINE1 repetitive elements of cord blood mononuclear cells (n=200).

Results: No significant difference in promoter methylation levels was found between the ω-3 PUFA and control groups for most genes analyzed; however ω-3 PUFA significantly changed methylation levels in LINE1 repetitive elements and specific genes (IFNã) in infants of mothers who smoked during pregnancy. Furthermore, an association between the promoter methylation levels of IFN and IL13 was substantially modulated by ω-3 PUFA supplementation.

Conclusions: Our results indicate that maternal supplementation with ω-3 PUFA during pregnancy may modulate global methylation levels and Th1/Th2 balance in infants. Therefore, these epigenetic mechanisms provide attractive targets for prenatal modulation and prevention of inflammatory disorders and potentially other related diseases in childhood and adulthood.

Key words: pregnancy, fatty acids, immunomodulation

PO517

MODERATE CONSUMPTION OF A NOVEL ORANGE DRINK PROMOTES AN IMPROVEMENT IN LIPID PROFILE AND ANTIOXIDANT ENDOGENOUS COMPOUNDS IN HEALTHY MICE.

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Background and objectives: The beneficial effects of fruits through its antioxidant compounds have largely been confirmed. Moreover, moderate alcohol consumption confers cardiovascular protection. A low alcoholic (1%) beverage from fermented orange juice (F-OJ) could join both actions. Therefore, our aim is to evaluate the effect of this novel beverage on antioxidant markers and lipid profile in a mice animal model.

Methods: OF1 Male mice (n=28), 8 weeks old, fed with standard diet, were divided into 4 groups (n=7) during 12 weeks: i) control (drinking water), ii) orange juice in drinking water (1:10), iii) F-OJ in drinking water (1:10), and iv) aqueous alcoholic solution (1:100). The four beverages were provided ad libitum. Blood was obtained by intracardiac puncture. Plasma antioxidant capacity was evaluated by ORAC, FRAP and ABTS assays. Lipid oxidation markers were analyzed by oxidized LDL and TBARS methods. Activities of antioxidant enzymes (CAT, SOD, GR, GPX), lipid profile (TAG, TC, LDL, HDL) and levels of endogenous antioxidants (albumin, bilirubin, uric acid, total glutathione) were determined spectrophotometrically.

Results: It was found that mice ingested F-OJ showed an increase on ORAC and FRAP compared to control group but did not exist significant differences. F-OJ group showed a significant decrease vs control group in CT, LDL and TAG concentration. Furthermore, the HDL levels were significant increased with F-OJ vs control. Concerning endogenous antioxidants, albumin, uric acid and total glutathione increased significantly in F-OJ group vs control. In addition, it was found a significant decrease in oxidized LDL and TBARS values between F-OJ group and control. Any significant differences among groups were obtained in antioxidant enzymes values.

Conclusions: Fermented orange juice exerts a significant improvement in lipid profile, lipid oxidation and levels of endogenous antioxidants in healthy mice.

Key words: orange juice / mice / antioxidant markers / lipid profile.

PO518

THE USE OF A COMBINED VITAMIN B12 INDICATOR TO DETERMINE B12 STATUS IN MEXICAN ADULT WOMEN AND CHILEAN ELDERLY

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Background and objectives: B12 status has been assessed for decades by single serum/plasma B12 measurements. The analysis of combination of all B12 biomarkers attempts to improve the diagnosis of B12 status. The objective was to compare single biomarkers versus a combined indicator of B12 status in both Mexican women and Chilean elderly.

Methods: Spearman correlations and linear regression models assessed associations between single B12 biomarkers (serum B12, total-plasma-homocysteine, methylmalonic-acid, holo-transcobalamin) and B12 status using the Fedosov formula, combining single B12 biomarkers 'w=log 10[(holoTC*B12)/(MMA*Hcy]-age factor'. Two baseline databases were used: I. RCT performed in women (20-59y,n=127) from Queretaro, Mexico, included bone-specific-alkaline-phosphatase (BAP) assessment. II. RCT conducted in 70-79y,(n=157) from Santiago, Chile included a peripheral nerve conduction study. SB12, tHcy, holo-TC and MMA were defined as >148-deficient, 149-220-marginal and >220-adequate (pmol/L); >12µmol/L-elevated; <35pmol/L-deficient, and >271nmol/L-elevated, respectively.

Results: I. sB12 was negatively correlated with BAP. No association was observed between the Fedosov formula and BAP. The combined formula significantly correlated with all biomarkers, while sB12 did not correlate with tHcy. Regression analysis showed no association between sB12 and BAP. Both sB12 and Fedosov's formula (? =0.004,p<0.001; ? =-0.416,p<0.001; ? =-0.16,p<0.001; ? =0.011,p<0.05, for sB12, tHcy, MMA and Holo-TC, respectively) were significantly associated with each B12 biomarker. II.Both sB12 and Fedosov's formula were significantly correlated with each B12 biomarker and with multiple neurophysiological parameters. However, after linear regression models were performed there were significant associations between the Fedosov's formula and each biomarker (?=0.006,p<0.001; ? =-0.04,p<0.001; ? =0.04,p<0.001; and ? =-0.0002,p<0.01, for sB12, tHcy, holo-TC and MMA, respectively), and also with sensitive nerve conduction velocity (m/sec)

of the right peroneal nerve (? =0.07,p<0.05). Instead, sB12 was not associated with tHcy, MMA or neurophysiology.

Conclusions: The Fedosov formula has stronger associations than single B12 biomarkers to determine B12 status. Cutoffs to define B12 status using this formula are being analyzed.

Key words: vitamin B12, Fedosov formula, biomarkers

Grants: Chilean-FONDECYT-1070592 and USDA-WHNRC.

PO519

UCP2 ALA55VAL POLYMORPHISM ARE NOT ASSOCIATED WITH WEIGHT LOSS AFTER THREE YEARS OF ROUX-EN Y GASTRIC BYPASS

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Background and objectives: Uncoupling proteins (UCPs) represent a family of carrier proteins located in the mitochondrial membrane, involved in the metabolism energy cells and may increase the energy expenditure and decrease the body weight. The Ala55Val polymorphism (rs660339) in the UCP2 gene (C>T) can be associated with the weight loss after surgery treatment for obesity. This study aimed to investigate the association of the Ala55Val polymorphism with weight loss three years after bariatric surgery.

Methods: The sample was composed of individuals with grade III obesity undergoing Roux-en Y gastric bypass. Anthropometric data were collected in the preoperative period and three years after surgery. Genotyping was performed by the method of allelic discrimination in real time PCR (Polymerase Chain Reaction) using the TaqMan pre-designed SNP Genotyping Assays kits (Applied Biosystems, Foster City, CA). Individuals with at least one variant allele were grouped and compared with those with the reference genotype.

Results: 143 subjects (79% females and 21% males, mean age 40±10 years) participated in the study. In the preoperative period the mean weight was 140±23.8 kg and mean excess body weight was 75.4±26.6 kg. Genotyping showed 36.4% (n = 52) of individuals homozygous for the C allele (C/C), 39.2% (n = 56) heterozygous (C/T) and 24.4% homozygous for the mutant T allele (T/T). Individuals with the C/C, C/T and T/T genotypes respectively showed a loss of 55.8±17.4, 55.3±21.2 and 52.7±14.3 kg; 37.7±9.4, 38.6±11.6 and 39±7.8% of initial weight and 66.3±17, 68.6±20.8 and 70±12.8% of excess body weight. There was no difference in weight loss between the different genotypes groups.

Conclusions: The UPC2 Ala55Val genotype seems to have no association with weight loss three years after bariatric surgery. Financial support: FAPESP and CNPq

Key words: uncoupling protein 2, Ala55Val polymorphism, bariatric surgery, weight loss

PO520

PREVALENCE OF INADEQUACY INTAKE FOR OLDER PEOPLE: THE USE OF NATIONAL CANCER INSTITUTE (NCI) METHOD

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Background and objectives: nutrition and eating habits for older people are still poor areas under investigation, being few explored and not receiving the attention due to them. In some developed countries, some studies have been done in order to identify the food intake of this age group, but in Brazil, there are few studies about this. Then, the aim of this study is to calculate the prevalence of inadequacy intake of micro and macro nutrients for older people using National Cancer Institute (NCI) method.

Methods: a representative sample of 365 older people were chosen at random and interviewed at home collecting data using three 24-hour recalls. This sample were chosen from a data set of older people from the city of Botucatu, São Paulo, Brazil, set up to investigate quality of life. Socio demographic data from these older people were also collected. The data from the 24-hour recall were transformed in consumption of macro and micronutrients using Nutrition Data System (NDS) software. The prevalence of inadequacy of micro nutrients were calculated using NCI method through the routines MIXTRAN and DISTRIB for SAS software and the EAR as cutoff. For macro nutrients, the inadequacy were calculated using Acceptable Macronutrient Distribution (AMD-IOM) categorization .

Results: 62,6% of the older people from the sample were female, 58% were married, 66,7% had primary school, 44,7% were hypertensive. Is was found that the consumption of macronutrients for the older people was adequate. For micronutrients, it was found that vitamin D and E, calcium and copper presented the most inadequate intake.

Conclusions: the NCI method was efficient to estimate the prevalence of inadequate intake and it is very important to establish policies in order to clarify the importance consumption of these nutrients for this age group.

Key words: older people, nutrients, inadequacy, prevalence, intake.

PO521

CLINICAL USEFULNESS OF HISTORICAL HEIGHT LOSS AND CURRENT HEIGHT/KNEE HEIGHT RATIO IN THE NUTRITIONAL ASSESSMENT OF THE ELDERLY

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Background and objectives: Height loss (HL), quite common in the elderly, is not merely caused by aging, and most often due to the osteoporotic vertebral fracture (VFx), which is associated with impaired ADL (activity of daily living), QOL (quality of life), and increased mortality. HL, however, has received little attention in the nutritional assessment of the elderly. Then, two indices were evaluated for their predictive usefulness and cutoff value for VFx; historical height loss (HHL) and current height (CH)/knee height (KH) ratio which we newly propose. ·

Methods: 151 postmenopausal women visiting the orthopedic outpatient clinic were studied. VFx was radiographically confirmed. HHL was defined as the difference between the patients recalled maximal height and the current height. The rationale for CH/KH ratio is that KH is little affected by aging or VFx, and would be of value when HHL is unknown.

Results: HHL was significantly larger and CH/KH ratio was significantly lower in sixty-two subjects with VFx than those without it . Receiver operator characteristics curve has revealed the good predictive values of these indices for VFx, the area under the being 0.84 for HHL and 0.73 for CH/KH ratio . The sensitivity and specificity were both 79% for HHL at the cut-off value of 4.0 cm, and 91% and 47% respectively for CH/KH ratio at 3.3. Using this cutoff value for HHL, the negative predictive value (NPV) was high across a wide range of theoretically simulated fracture rate encountered in most clinical practice, whereas the positive predictive value (PPV) was low. The results were similar with CH/KH ratio.

Conclusions: Both HHL and CH/KH ratio well predicted the presence of VFx, and are likely to be of value in the nutritional assessment of the elderly.

Key words: Historical height loss, Knee height, Vertebral fracture

PO522

EXPLORATORY ASSESSMENT OF DIETARY PRACTICES WITH EMPHASIS ON FAT INTAKE TRENDS IN A RURAL SETTING IN HARYANA, INDIA

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Background and objectives: India is witnessing a nutrition transition and there is limited data on overall consumption patterns (household and commercially prepared). Objectives of the study were to assess a) dietary intake patterns in rural population b) trends in dietary fat (including trans fat) intake and c) compare food inventory and 24-hr recall as a dietary assessment tool.

Methods: Dietary surveys were conducted in 260 households (systematic random sampling) in purposively selected villages using a 3-day inventory and 24-hour recall. Snacks from local shops were sampled for trans fat content. Serum lipid profile and anthropometry was done in a subset (130).

Results: Mean energy intake was 92% of RDA and median fat intake was 41.5 gms/day. 65% households consumed more than one type of oil with mustard oil and ghee being the most commonly used, and hydrogenated oils being consumed in 9%. 57% were consuming market prepared snacks (mostly confectionery/sweets/packaged snacks with a median daily consumption of 60, 36 and 42 gms respectively) with children being common consumers. The trans fatty acids in sampled snacks included C:16:1t, C18:1t and C:18:2tt. Oil consumption assessed through inventory had a significantly higher median than by 24-hour recall. Agreement analysis between the two tools showed an ICC coefficient of 0.348 (oil), 0.499 (cereal), 0.247 (vegetables) and 0.771 (dairy). The serum cholesterol correlated with household dietary fat intake ($p<0.01$).

Conclusions: Dietary trends indicated high consumption of commercially prepared snacks in children with potential implications for future chronic disease development. The variation observed in ICC between food groups necessitates careful choice of dietary assessment tools and understanding inherent sources of error in different methods.

Key words: oils, snacks, dietary assessment tools This work was supported by a Wellcome Trust Capacity Strengthening Strategic Award to the Public Health Foundation of India and a consortium of UK universities.

PO523

LEPTIN INDUCES THE ACTIVATION OF PROTEIN RELATED WITH ENERGY HOMEOSTASIS IN C2C12 MUSCLE CELLS

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Background and objectives: Leptin is key in energy metabolism regulation, and skeletal muscle is one its target tissues. AMP-activated protein kinase (AMPK) is a master regulator of energy fuel by sensing the intracellular AMP/ATP ratio (AMP is an allosteric regulator which promotes AMPK phosphorylation). When AMPK is activated by phosphorylation, it activates energy-producing processes such as fatty acid oxidation, while inhibiting energy-consuming processes such as lipogenesis. Among multiple targets, AMPK phosphorylates acetyl-CoA carboxylase (ACC), inhibiting it, and thus stimulating mitochondrial oxidation of fatty acids.. Additionally the serine/threoninespecific protein kinase (AKT) signaling pathway is involved in the control of glucose utilization. We aimed to study, in skeletal muscle cells C2C12, the time-course response to 50ng/ml of Leptin treatment in the expression and phosphorylation of the proteins mentioned above.

Methods: C2C12 differentiated myotubes were treated with 50ng/ml of leptin for 0, 30', 6h, 12h and 24h. Time-course changes in protein expression in non-treated cells were also monitored. Protein levels of phosphoAMPK/AMPK, phosphoACC/ACC and phosphoAKT/AKT were analyzed by Western blot.

Results: With respect to time controls, 50ng/ml leptin significantly increased the ratios phosphoAMPK/AMPK and phophoACC/ACC at the short-term (15'), significantly decreasing afterwards (6h and 12h respectively). In contrast, the ratio phophoAKT/AKT did not change.

Conclusions: Leptin treatment rapidly and transiently activates AMPK together with its downstream target ACC, suggesting that the energy/lipid consuming pathway activation by Leptin in muscle cells can be mediated, at least in part, by activation of AMPK.

Key words: Leptin, AMPK, ACC, AKT, C2C12 muscle cells

PO524

LINKS AMONG DIETARY HABITS OF FIRST-FORMERS AND FAMILY SOCIOECONOMIC STATUS IN LITHUANIA

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Background and objectives: Dietary habits are known to be influenced by a wide range of social and economic factors. The aim was to explore and analyses the key determinants of nutritional habits of 7-8 year old children within a socioeconomic family framework.

Methods: A cross-sectional survey of a national representative sample of first-formers was performed in ten districts of Lithuania participating in the 2nd round of WHO European Childhood Obesity Surveillance Initiative – COSI. The data were collected by means of Family questionnaires, which were filled by parents of first-formers in randomly selected schools. The questionnaires were completed by 5308 parents (response rate 88.4 %). Correlation among variables was evaluated by x^2, binary logistic regression was used to calculate odds ratio (OR) and its 95% confidence interval (CI).

Results: Daily fresh fruits and vegetables consumption was higher among children whose parents had high education level. It was established that odds ratio to have breakfast for children of high educated mothers was 1.3 times more in comparison with children of low educated mothers. Odds ratio of children breakfast consumption was 1.3 times higher in families with average income (adjusted by parent's age and education) in comparison with low income families. It was determined that chance to eat fresh vegetables every day was 2.5 times higher among these children's whose mothers were older (40 years and more) in comparison with children of young mothers (<29 years). Risk to consume soft drinks with sugar was 1.7 times lower among first-formers whose mothers had high education in comparison with children of low education level mothers.

Conclusions: Correlation was observed between healthy eating habits of first formers and better educated parents though important factors were income and age.

Key words: first-formers, dietary habits, socioeconomic status

PO525

DIFFERENTIAL METABOLIC EFFECTS OF HEPATIC MONOUNSATURATED FATTY ACIDS

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Background and objectives: Stearoyl-CoA desaturase (SCD) catalyzes the de novo synthesis of monounsaturated fatty acids (MUFA) from saturated fatty acids. Past work revealed that SCD1 deficiency impairs hepatic lipogenesis and protects against the development of diet-induced adiposity and obesity. Our objectives were to determine if hepatic MUFA synthesis is sufficient to restore the impaired lipogenic program in SCD1 global knockout mice (GKO) and to determine if the major MUFA products of the SCD1-catalyzed reaction exert differential metabolic effects.

Methods: To address our objectives, we produced liver-specific transgenic mice expressing either human SCD5, which preferentially synthesizes oleate (18:1n-9), or mouse SCD3, which preferentially synthesizes palmitoleate (16:1n-7), and introduced these transgenes into SCD1 GKO mice. The mice were fed a lipogenic high-sucrose very-low-fat diet for 10 days.

Results: Hepatic oleate synthesis induced hepatic lipogenic gene expression more than palmitoleate did whereas palmitoleate synthesis significantly induced hepatic mitochondrial fatty acid oxidation gene expression. Additionally, oleate synthesis restored body weight and liver triglycerides to wild-type levels while palmitoleate synthesis did not significantly change these phenotypes. Hepatic oleate synthesis also increased plasma glucose levels to a greater extent than did hepatic palmitoleate synthesis.

Conclusions: Overall, these results suggest that endogenously synthesized hepatic MUFA are involved in the regulation of de novo lipogenesis, fatty acid oxidation and gluconeogenesis and that oleate and palmitoleate exert differential effects on these pathways.

Key words: stearoyl-CoA desaturase, oleate, palmitoleate, adiposity, de novo lipogenesis. Supported by NIH

PO526

VOLUME AND PATTERNS OF PHYSICAL ACTIVITY IN RURAL CAMBODIAN CHILDREN AGED 15-MONTHS

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Objective: Physical activity amongtoddlers resided in low-income countries remains relatively unexplored. The main purpose of this study is to contribute to fill out a knowledge gap regarding the prevalence and patterns in Cambodian toddlers' physical activity.

Methods: As part of a nutrition intervention study, 416 toddles aged 13-17 months wore accelerometers GT3X+ Actigraph accelerometers for six consecutive days. Vertical activity counts for each2s epochwere utilized to generate collapsed and diurnal activity.Total activity was expressed as mean counts per minute (cpm) and validated cutpoints of <100cpm and > 1680cpm were applied to classify sedentary activity (SED) and moderate-to-vigorous physical activity (MVPA), respectively. Gender discrepancies in collapsed activity were analysed using multiple linear regression models. Differences in diurnal activity patterns between genders were tested using linear mixed models with subjectstreated as random effect.Study group, age and monitoring time were controlled for in all models (minimally adjusted). In fully adjusted models also weight-for-height z-score and acquisition of WHO gross motor milestones were fitted as covariates.

Results: Accelerometry data was retrieved from 375 children (M: n = 201) of which25% and 11% presented chronic and acute malnutrition, respectively. Children spent the majority of time sedentary (78.6%, SD: 3.5) and demonstrated low levels of total activity (318.4, SD: 88.7) and MVPA (6.7%, SD: 2.0). Over the whole monitoring period(fully adjusted), girls were1.4% (95% CI: -2.3; -0.5) more sedentary than boys. In turn, diurnal activity patterns revealed increased sedentary behaviour (2-3%, $p<0.01$) and lower levels of MVPA (-1%, $p<0.05$) among boys between 8:00-10:00PM.

Conclusion: Both genders displayed a low-active-high-sedentary profile. Longitudinal monitoring of physical activity levels and changes in activity patterns from the onset of early childhood should be prioritized. However,early prevention of

physical inactivity may be more effective during gender-specifictime points.

Keywords: Sedentary Behaviour, MVPA, Accelerometer, Food-insecure, Early Childhood

PO527

FOOD CONSUMPTION AND MACRONUTRIENT INTAKE IN RELATION TO SERUM BRANCHED-CHAIN AND AROMATIC AMINO ACIDS IN YOUNG ADULTS

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Background and objectives: Serum branched-chain (BCAA) and aromatic (AAA) amino acid levels are predictors of future risk of diabetes. The aim of this study was to identify diet-related determinants of these amino acids.

Methods: Circulating BCAA (leucine, isoleucine and valine) and AA (phenylalanine and tyrosine) were quantified by nuclear magnetic resonance spectroscopy from fasting serum samples of 1903 young men and women from the population-based Cardiovascular Risk in Young Finns Study (age 30-45 years). Food consumption and macronutrient intakes were assessed using a validated 131-item food frequency questionnaire.

Results: In linear regression models controlled for age, sex, waist circumference and total energy intake, BCAA and AAA were found to be in a significant, positive association with the consumption of meat, and in a negative association with wheat, rye and vegetables ($p<0.01$ for all). In further analyses, we constructed substitution models for amino acid associations with macronutrient intakes by source. When replacing carbohydrates, protein intake from foods of animal origin was positively associated with both BCAA and AAA ($p<0.01$), and fat intake from all sources with BCAA ($p=0.02$). In contrast, protein intake from foods of vegetable origin was in a strong, negative association with both BCAA and AAA ($p<0.001$) in a model with an additional adjustment for vegetable consumption. In more detailed calculations on dietary intake among this cohort, the main sources of vegetable protein were cereal, potatoes and rice. Animal and vegetable protein intakes have the strongest associations with the circulating amino acid levels, but to opposite directions.

Conclusions: Vegetable protein has earlier been associated with a lower risk of diabetes, possibly due to its relatively higher amount of non-essential amino acids leading to differences in insulin/glucagon activity, but the effective mechanisms still remain elusive. Diets rich in vegetable protein may also indicate generally distinctive dietary and lifestyle patterns.

Key words: amino acids, food consumption, protein

PO528

SECULAR GROWTH OF CHILDREN IN INDONESIA

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Background and objectives: Indonesia has experiencED socio-economic growth during several decades of development. In other industrialized countries, improvement of living conditions, health status, dietary consumption, there is secular trend of linear growth to its potential. This presentation aimed to provide evidence of secular growth on Indonesian children overtime.

Methods: The study reviewed scientific articles or studies in former Netherland Indies and Indonesia from 1942 to 2010, with large sample, covered most areas of Indonesia, sound scientific methodology, age 5 year old above. Three studies by Gorter in 1942 (> 30,000 children), Yayah in 1984 (10,000 children) and secondary data of anthropometry of RKD (Riset Kesehatan Dasar, Baseline Health Research) conducted nationwide in 2010 (> 90.000 children). This presentation use two older articles and analyze data of RKD 2010.

Results: Compared to WHO child growth standard, height of Indonesian children is shorter 6.0-13.8 Cm. There is 0.3-3.5 Cm increase of height over 70 years since 1942. Child height in RKD 2010 varied according to residence and socio-economic status. Children in Jakarta were taller 1.6-4.2 Cm compared to the rest of the country. Socio-economic status, is also associated with linear growth, that children of highest socio-economic status (quintile-1) is the tallest, and quintile-5 is the shortest. The difference of height is between 1.6-4.2 Cm.

Conclusions: Height of Indonesian children 5-19 year old in 2010 is lower than WHO Standard, an increase of linear growth compared to that in 1942. RKD 2010 showed that height of children differ by place and socio-economic status.

Key words: secular trend, height, Indonesian children

PO529

ASSOCIATION OF POSTNATAL CATCH-UP GROWTH WITH BODY COMPOSITION INDICES OF CHILDREN AT 2 YEARS OF AGE: A PROSPECTIVE COHORT STUDY

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Background and objectives: Small size at birth followed by postnatal catch-up growth relates with greater risk of childhood obesity and adulthood chronic diseases. Aim: To determine the factors associated with postnatal catch-up growth and the association of latter with the body composition indices of children at 2 years of age.

Methods: 128 term infants were recruited from a Public Health Unit in Sri Lanka and followed up from 4 mo to 24 mo of age. Birth characteristics were recorded. Growth and body composition were measured longitudinally. Body composition was estimated using skinfold thickness (SFT). Subjects were divided into three groups; catch-up growth, catch-down growth and no change in growth based on change in weight-for-age Z score (WAZ) between birth and 2 years.

Results: Children who showed catch-up growth (gain in WAZ >0.67) had significantly (P<0.05) lower birth-weight (lighter) and birth length (shorter) compared to catch-down growth (decrease in WAZ>0.67) group. Catch-up growth group showed significantly higher BMI-for age Z score (heavier), sum of SFT, tricep and subscapular (proxy for central fat distribution) SFT, fat mass, fat mass index (fatter) and fat free mass compared to catch-down growth group at 2 y. Infants who showed catch-up growth were more likely to have significantly higher BMI-for age Z scores (OR=7.00) and fat free mass (OR= 4.73) compared to no change in growth group at 2 years. Infants who showed catch-down growth were significantly less likely to have higher fat mass (OR= 0.32), fat mass index (OR= 0.27) and percentage body fat (OR=0.41) compared to no change in growth group at 2 years.

Conclusions: The children who showed catch-up growth were lighter and shorter at birth and they are heavier, fatter and had greater central fat distribution at the age of 2 y.

Key words: postnatal, catch-up growth, low birth-weight, body composition

PO530

COMPROMISED GUT PERMEABILITY, INFLAMMATION, AND STUNTING AMONG 24 MONTH OLD CHILDREN OF RURAL BANGLADESH

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Background and objectives: Stunting (height-for-age Z-score, HAZ, <-2) remains a public health problem among children of developing countries. Nutrition interventions alone have had modest effects on stunting, perhaps due to insufficient attention to compromised gut integrity and inflammation on growth. We examined these factors in 24 mo old children, followed since birth, in rural Bangladesh.

Methods: At 24 mo, data on gut integrity and inflammation were assessed in n=177 children, of whom growth from 12 to 24 mo was available in n=140, reported here. Gut permeability (urinary lactulose:mannitol, L:M) was determined, and serum was assessed for indicators of gut (endotoxin antibodies) and systemic infection (total immunoglobulin G, IgG), inflammation (c-reactive protein, CRP) and a growth factor (insulin-like growth factor-1, IGF-1). Biochemical indicators were log-transformed to normalize distributions for correlation analysis.

Results: Children gained 3.7-17.4 cm from the 12 to 24 mo visit, but HAZ differed by -0.15±0.73 and declined in 58.6% of children. At 12 and 24 mo 42.9% and 51.4% of children were stunted, respectively. Change in HAZ from 12 to 24 mo was inversely associated with 12 mo HAZ (r=-0.43, p<0.0001), positively associated with IGF-1 (r=0.19, p=0.03), and inversely associated with compromised gut integrity by L:M (r=-0.26, p=0.03, n=72). Elevated L:M occurred in 74.0% of children and 21.9% had elevated CRP. CRP and IGF-1 were inversely related (r=-0.30, p=0.0005), and total IgG was associated with CRP (r=0.18, p=0.04) and endotoxin antibodies (r=0.17, p=0.04).

Conclusions: Compromised growth and gut integrity were common among rural Bangladeshi children. Growth from 12 to 24 mo may be mediated by IGF-1, which declined with concurrent inflammation, itself associated with evidence of infectious episodes. Investigation of factors related to stunting in these children is ongoing.

Key words: stunting, gut permeability, infection, inflammation, Bangladesh

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PO531

FOOD SAFETY KNOWLEDGE, ATTITUDES, PRACTICES OF TRADITIONAL FISH HANDLERS AND CONSUMERS IN GHANA

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Background and objectives: Many communities in Ghana depend heavily on fish as an important protein source. Fish industry plays a vital role in livelihoods security and export diversification. However, availability of information regarding food safety awareness, attitudes and practices among traditional fishing communities and consumers. We sought to investigate microbial hazards in fish from the Ghana market including practitioner and consumer behaviour relating to safety.

Methods: We recruited 109 consumers and 115 fish handlers across different districts along the Accra coastal belt using a cluster sampling procedure and designed a survey instrument to investigate food safety practices, attitudes, and knowledge of traditional fish handlers and consumers of traditionally processed fish products.

Results: A higher percentage of consumers (78.9%) compared with food handlers (61.7%) identified microorganisms as the main risk to food safety ($p < 0.001$). However, a slightly higher percentage of food handlers (60.0%) than consumers (56.0%) identified pesticides as the main risk to food safety ($p = 0.0004$). Poor safety practices were found with 45.0% of consumers and 64.3% of food handlers only washing their cutting board with water after trimming fish and over 70% of respondents lacking knowledge of differences between cleaning and sanitising. The majority of respondents (>92%; $p<0.05$) were knowledgeable of good personal hygiene requirements but this was very often not translated into improved food safety practice. A significant minority of consumers (22.2%) and food handlers (23.5%) had the misguided perception that rotating food to use the oldest food first was bad food storage practice ($p < 0.05$). The majority of respondents displayed poor knowledge of HACCP .

Conclusions: The inability to translate basic food safety and hygiene knowledge into practice could prove a major barrier to effective food safety management in the traditional fish sector in Ghana. These findings provide an opportunity to review current training provision and practices.

Key words: survey, food safety, common practice

PO532

BREAKFAST SKIPPING AND FIRST BORN STATUS ARE ASSOCIATED WITH OBESITY AMONG ADOLESCENT SCHOOL GIRLS IN SRI LANKA

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Background and objectives: Global prevalence of adolescent obesity is rising at an alarming rate. This study aimed to identify the nutritional and behavioral risk factors associated with obesity among adolescent girls.

Methods: In this case-control study, a total number of 200 adolescent girls (age and ethnicity matched, 100 cases- BMI for age Z score ≥ +2SD and 100 controls- BMI for age Z score between-2SD to +1 SD) aged 14 to 18 were classified according to WHO growth standards. An interviewer administered questionnaire was used to assess socioeconomic status, dietary pattern, birth and pubertal characteristics (age of first menarche, menstrual pattern). A 3-day diet diary and long version of international physical activity questionnaire were used to assess total energy intake and expenditure of energy from physical activity, respectively. Independent sample-t-test and binary logistic regression analyses were used to compare the mean values and examine the significant predictors associated with obesity, respectively.

Results: There was a significant difference in the BMI (31.3, 20.2kgm-2, p value=0.0001), waist circumference (90.8, 68.2 cm, p=0.0001), mean energy intake (2235.4, 1921.7kcal, p=0.0001) and total energy expenditure from physical activity (1844.3, 894.5 MET-min/ week, p=0.0001) among cases and controls, respectively. The strongest association with obesity was observed for high income (odds ratio- 2.97, 95% CI, 1.10-7.98, p value-0.031), first born status (2.57, 1.17-5.66, 0.019), skipping breakfast (4.19, 1.87-9.36, 0.000), > 2 hours of TV viewing/day (2.67, 1.20-5.95, 0.017), irregular menstruation (3.60, 1.08-12.02, 0.037), both parental obesity (4.10, 1.55-10.85, 0.004) and high energy intake (6.03, 2.63-13.82, 0.000).

Conclusions: High income, first born status, breakfast skipping, >2 hours of TV watching, irregular menstruation, parental obesity and total energy intake are major potential determinants of obesity among adolescent girls. There is an urgent need to implement effective public health interventions to reverse this trend.

Key Words: Adolescents, obesity, risk factors

PO533

THE INFLUENCE OF GENETICS ON MATERNAL WEIGHT GAIN DURING PREGNANCY

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Background and objectives: The total amount of weight gain during pregnancy is determined by many factors such as psychological, behavioural, family, social, cultural, and environmental factors. Additionally, there is a genetic component also on body weight and propensity to gain weight. However, there is still no clear evidence of the role of maternal genetics in pregnancy weight gain. In this study we aim to analyse if maternal genetic variation in a set of genes influences mother's weight change during pregnancy.

Methods: A total of 128 women from the PREOBE Study* were included in the study taking into account: a) weight gain from pre-pregnancy time to pregnancy week 34 (mean weight gain was 9.87±5.81 kg), b) age of the woman when entering the study (mean age 31.20±4.2 years), c) maternal BMI before pregnancy (mean BMI 26.27±4.96) and d) development of gestational diabetes. The following genotypes were analysed: ADRB3 T/C rs4994, GNB3 T/C rs5443, LEP19 G/A rs2167270, LEP2548 G/A rs7799039, LEPR G/A rs1137101, MC4R134 G/A rs12970134, MC4R313 T/C rs17782313, MC4R616 G/A rs2229616, MC4R633 G/A rs17700633, PPAR C/G rs1801282, UCP2 C/T rs659366. Statistical analysis was performed using the SPSS 20.0 version. Hierarchical step-wise regression analysis was applied. In the first block the cofounders were forced to be entered into the model, and in the second block we entered all the polymorphisms studied using step-wise method, so that the model will retain only those, which would significantly predict the weight change.

Results: Out of the 11 studied polymorphisms only LEPR (Leptin receptor gene) G/A predicted the weight change (β coefficient 1.4, p=0.023) in the PREOBE Study population. This means that with one risk allele (A) the increment in the weight gain was 1.4 kg during pregnancy (from pre-pregnancy up to week 34 pregnancy), with confidence interval (C.I.) 0.2-2.7.

Conclusions: These results suggest that the LEPR G/A polymorphism influences weight change during pregnancy in our study sample, contributing to a higher maternal weight gain. Further investigations including larger populations are needed in order to fully access the influence of this and others genetic polymorphisms. Acknowledgement: *Supported by the Andalusian Goverment. Economy, Science and Innovation Ministry (PREOBE Excellence Project Ref. P06-CTS-02341).

Key words: genetics, gene polymorphisms, maternal weight, obesity,

PO534

IMPACT OF MATERNAL BODY MASS INDEX AND GESTATIONAL DIABETES ON NEONATAL OUTCOME

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Background and objectives: High pre-pregnancy BMI and gestational diabetes (GD) are important risk factors to delivery neonates large for gestational age (LGA). Our objective is to analyze whether mother´s body mass index and GD, depending on their metabolic control have an influence on the risk for LGA infants.

Methods: A total of 195 mother-baby pairs participants in the PREOBE project were studied. The pregnant women were classified depending on pre-gestational BMI: 77 were healthy normo-weight pregnant women (BMI<25 kg/m^2), 56 overweight (OW) (25≥BMI<30 kg/m^2) and 62 obese (OB) (BMI≥30 kg/m^2). 28.2% of them developed GD. Pregnant women were assessed at 24, 34 and at delivery. HbA1c % was used to follow the metabolic control in GD, and determined by HPLC. Offspring were classified into small, normal and LGA for gestational age at birth, following Lubchenko classification.

Results: Increased risk to be born LGA where demonstrated in the offspring born to OW and OB mothers (OR=2.393, P=0.033), independently if they developed GD or not. GD did not show any influence on this risk (OR=1.118, p=0.793). All GD mothers were treated and supervised by Endocrinologists; the HbA1c were within normal range, but significantly higher than in pregnant women without GD (NoGD) in all time points (week 24: GD=5.38±0.25 vs NoGD=4.43±0.04; week 34: GD=5.02±0.09 vs NoGD=4.67± 0.04; week 40: GD=5.16±0.10

vs NoGD=4.86±0.05) (all P´s < 0.05). Conclusions: Our results show that high mother´s BMI greatly influences the risk for LGA infants. The potential risk of macrosomia in babies born to mothers with GD might be narrowed by a good metabolic control during pregnancy and preventing overweight and obesity during pregnancy.

Acknowledgement: *Supported by the Andalusian Government. Economy, Science and Innovation Ministry (PREOBE Excellence Project Ref. P06-CTS-0234).

Key words: Obese pregnant women, gestational diabetes, large for gestational age, metabolic control.

PO535

WEB DATABASE OF NUTRITIONAL COMPOSITION AND ECONOMIC COST OF FISH AND SEAFOOD AS A NEW TOOL TO PROMOTE CONSUMPTION IN SPAIN

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Background and objectives: Nowdays, the importance and interest in healthy eating and its relation to fish & seafood consumption is well established. However, tendencies for some vulnerable groups of population (e.g.children and adolescents) show a marked decrease for this food group. Therefore, it seems critical to promote new tools in order to stimulate its consumption by using new communication technologies (e.g.interactive and updated web). Therefore, since 2003, the Spanish Nutrition Foundation (FEN) has been collaborating with the Spanish Ministry of Agriculture, Food and Environment (MAGRAMA), through contracts and agreements, in order to carry out promotion of fish and seafood consumption. The aim of the present study was to design, as part of the campaign of year 2012, a Web Database of nutritional composition and economic cost of fish and seafood.

Methods: The database contains 75 fish species (52-fish, 17-seafood and 6-canned fish and seafood). Data have been compiled from different food composition tables (Moreiras et al.2011, Mataix et al.1998, etc.). Food servings and Recommended Dietary Allowances (RDA) for the Spanish population have been obtained from Moreiras et al.2011.

Results: Web Database was divided into four sections: NUTRITION INFORMATION (nutritional composition of fish and seafood selected per 100g o portion), NUTRITIONAL CALCULATOR (determined by age, sex and physical activity, the contribution of selected fish to individual recommended intakes of energy and nutrients), COST (calculate the price in euros per unit of energy or nutrient provided by the selected fish) and NUTRITIONAL COMPOSITION TABLES (to compare the nutritional values of different fish species). This Web database is targeted to consumers and professionals and may be accesed at: http://www.fen.org.es/magrama/calculadornutricional/index_App.html. The number of visits in 2012 was 7,535.

Conclusions: Information and ICT technologies as tools to disseminate nutrition composition could support nutrition education to consumers and professionals.

Key words: database, web, fish, nutritional-composition.

PO536

WEIGHT LOSS MAY BE ACCELERATED THROUGH A CHRONONUTRITION-BASED PROTEIN DIET

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Background and objectives: Chrononutrition is the field of Chronobiology that establishes the principle of consuming foodstuffs at times of the day when they are more useful for health, improving, therefore, biorhythms and physical performance. Both tryptophan and tyrosine amino acids have been postulated as chrononutrition tools because of their metabolites functions in the body. Our aim was to analyze if a Chrononutrition-based diet designed to improve biological rhythms in obese rats can improve weight loss with respect to a Chrononutrition non-based diet.

Methods: Twenty-four rats participated in this assay for six weeks. Eighteen obese rats were separated in three groups: first group (diet A) was fed with a control diet for rats (N1=6); second group (diet B) was fed with a human protein diet adapted for rats (N2=6); third group (diet C) was fed with a human protein diet adapted for rats and supplemented with 125 mg tryptophan and 375 mg tyrosine once lights turned off (N3=6). A fourth non-obese control group (N4=6) was established in this assay.

Results: At the end of the sixth week the diet C was the only group who showed a significant correlation in weight loss. Diet B showed a decrease in body weight although diet C weights were more similar with respect to the non-obese control group.

Conclusions: Chrononutrition may be used to improve weight loss in rats, therefore, we propose its use for obese humans.

Key words: Chrononutrition, obesity, protein diet, weight loss

PO537

SERUM MARKERS OF INFLAMMATION AND OXIDATIVE STRESS IN HEALTHY INDIVIDUALS AND PATIENTS WITH METABOLIC SYNDROME

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Background and objectives: Metabolic syndrome (MS) is a combination of metabolic disturbances accompanied by oxidative stress and inflammation. The aim of this study was to evaluate the prevalence of metabolic syndrome in an adult population and to establish its relationship with serum markers of inflammation and oxidative stress.

Methods: A sample of 139 adults of 21-60 years of age (76 women and 63 men), was studied. Blood pressure, serum glucose, serum lipids, basal insulin, uric acid (UA), oxidized LDL, IL-6, vitamins A and E, total antioxidant capacity of plasma (FRAP) and C-reactive protein (CRP), were measured, and the insulin resistance (IR) was calculated by HOMA (homeostasis model assessment). Weight, height and waist circumference (WC), were measured and the body mass index (BMI) was calculated. MS was diagnosed according to the criteria of the National Cholesterol Education Program (NCEP-ATP III).

Results: The prevalence of MS was 35% (men 40%, women 30%), being higher in the older age groups. Subjects with MS showed higher values in anthropometric variables, clinical and biochemical, compared with healthy individuals, with the exception of HDL-C, which was lower. Low HDL-C, hypertriglyceridemia, and increasing WC, were the risk factors most prevalent. Adults with MS showed a higher prevalence of low values of the ratio Vitamin E/triglycerides, higher values of AU and oxidized LDL, as well as PCR, compared to healthy subjects.

Conclusions: A high prevalence of MS was found and this syndrome was associated with a lower antioxidant protection and an increase in markers of inflammation and oxidation, which can greatly increase the cardiovascular risk.

Key words: Metabolic syndrome, oxidative stress, inflammation, obesity, insulin resistance.

PO538

DETERMINANTS ASSOCIATED WITH REGULAR WEIGHTING OF UNDER FIVE CHILDREN IN POSYANDU IN KELAPA GADING SUBDISTRICT, JAKARTA, INDONESIA, IN 2011

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Background and objectives: A Posyandu is an integrated health post as an extension unit of Puskesmas (community health center) providing several under-five child health programs, especially regularity of weighting every month, basic immunization and vitamin A, additional food provision. Monitoring of child growth in Posyandu is a very important activity in order to know early children growth faltering. Data of National Basic Health Research (RISKESDAS) 2010 the percentage of regularity weighing was only 49.4%.

Methods: A cross-sectional study was conducted to interview 96 mothers of under-five children randomly selected from 7 neighborhood blocks in sub-district of Kelapa Gading, Jakarta. The multivariable analysis were done to analyze strength of association (using odds ratios) between several potential determinants and the regularity of mothers to weight their children in Posyandu. Weighting 4 times or more within the past 6 months, was considered to be regular.

Results: The proportion of mothers weighting their children regularly in Posyandu in sub district Kelapa Gading was 47.9%. The older the mothers the lesser the probability to weight regularly their children. Mothers who know that Posyandu can provide Vitamin A and basic immunization freely for their children were 2.7 times and 4.3 times respectively more likely to weight their children regularly, as compared to mothers who do not know. Closer distance between mother´s house and Posyandu gave the mothers higher probability to weight their children regularly, as much as 18.5 times, as compared to farther distance. The likelihood of working mothers to weight their children regularly, were 18.3 times, as compared to the likelihood of house wife mothers.

Conclusions: Mother's age, knowledge about the programs of Posyandu, distance between mother's house and Posyandu, and mother's occupation status were important determinants of likelihood to weight their children regularly in the Posyandu.

Key words: Posyandu, regularity of weighing, under-five children

PO539

ENERGY AND NUTRIENT INTAKES FROM COMPLEMENTARY FOODS AND CAREGIVER RESPONSIVE FEEDING PRACTICES AMONG 405 BANGLADESHI INFANTS AND YOUNG CHILDREN <24M

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Background and objectives: Bangladesh's under-five stunting prevalence, at 43%, is among the highest 24 country rates globally, while wasting in 2011 was 16%, and underweight 36%. Although exclusive breastfeeding is increasing, complementary feeding is more problematic, moreso for those up to 12m than those aged 12-23m. To design an intervention to improve complementary feeding and growth, detailed diets and feeding practices must be understood. However to date, little such information is available. This research aimed to explore infant and young child feeding (IYCF) among 405 (52% males; 73% rural) infants and young children up to 24m from 6 locations.

Methods: Caregivers were interviewed cross sectionally about IYCF practices and responsive feeding. Dietary intakes from 24h-recall and food frequency interviews were analyzed using Nutritionist Pro dietary analysis software version 5.0.0, while statistical analyses were performed using the PASW/SPSS package version 19.0 (SPSS Inc., Chicago, IL USA).

Results: Fully 66%, 74% and 86% of infants and young children aged 6-8.99m (n=74), 9-11.99m (n=46), and 12-23.99m (n=142), respectively, did not receive recommended energy amounts for their age group. Most, 82%, 92%, 86% and 85% of those aged 6-23.99m (n=262) also did not consume, respectively, adequate iron, zinc, calcium or vitamin A from their complementary foods. Food frequency results additionally showed that while >5% of infants <6m were fed rice, potatoes, orange/yellow fruits, other fruits, milk products, meat or poultry, fish and sugar, 32-61% of young children 12-23.99m were not fed these foods daily. Only 39-55% of caregivers of infants aged 8-23.99m responded positively to each of the four responsive feeding questions.

Conclusions: Extremely suboptimal energy and nutrient intakes and suboptimal responsive feeding practices were found. This information can be used to help inform future complementary feeding interventions for this high-risk group.

Key words: complementary feeding, infant and young child feeding (IYCF), Bangladesh

PO540

HEPCIDIN, INFLAMMATION AND IRON STATUS IN PREGNANT WOMEN IN KAMPALA, UGANDA

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Background and objectives: The production of hepcidin, a key iron-regulatory protein, is up-regulated when iron is abundant and in the presence of infections and inflammation. It is down-regulated by iron deficiency and erythropoietic activity. Its role in pregnancy has not been characterized in settings with a high burden of infection. Objective: To describe the relationship between hepcidin, iron status indicators and indicators of infection/inflammation in pregnant women in Kampala, Uganda.

Methods: We examined the relationships between serum hepcidin, hemoglobin, ferritin, serum soluble transferrin receptor (sTfR), AGP and CRP in 151 HIV-negative first trimester paucigravidae recruited during antenatal visits in Kampala, Uganda. Serum hepcidin was measured by a combination of weak cation exchange chromatography and time-of-flight mass spectrometry.

Results: Mean±standard deviation (SD) hemoglobin was 11.8±1.7 g/dL. Anemia (hemoglobin <11 g/dL) was present in 29.1% (95% CI 21.9-36.3) of the mothers. Mean ±SD ferritin was 61.8±66.8 µg/L, while the median was 38.3 µg/L (inter-quartile range (IQR) 19.5-75.5 µg/L). Mean±SD sTfR was 5.46±2.0 µg/ml; median was 5.0 µg/ml (IQR 4.2-6.4 µg/ml). Using ferritin<12 µg/L and sTfR >8.3 µg/mL respectively as cutoffs, 10% (95% CI 5.1-14.7) and 6.6% (95% CI 3.6-11.0) of the women were iron deficient. Mean±SD CRP was 22.1±25.2 mg/L; median was 15.5 mg/L (IQR 11.7-20.8 mg/L). Some 58.9% (95% CI 51.1-66.8) of the women had CRP>5mg/L. Median hepcidin was 1.95 nmol/L (IQR 1.30-4.53 nmol/L) for the women with hepcidin>0.5 nmol/L (N=62). Log hepcidin was significantly correlated with log ferritin (r= 0.578; p=0.000), but not with log hemoglobin, log sTfR, log AGP, or log CRP. Log ferritin was significantly correlated with CRP (r=0.264; p=0.000) and AGP (r=0.299; p=0.000).

Conclusions: The findings suggest a disconnect between hepcidin and inflammation in pregnancy. Further examination of this relationship in pregnancy in the context of a high burden of infection is warranted.

Key words: hepcidin; inflammation; iron; pregnancy; Uganda

PO541

A NEW MEASUREMENT OF MALNUTRITION

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Background and objectives: A. Malnutrition means "bad" for both over- and under- nutrition. It can result from a lack of macronutrients and/or micronutrients, or both. My consideration is: What is 'bad'? Which and How much is in lack? B. We need a new measurement in Malnutrition. We already have anthropometric, such as '%WL', 'BMI', 'MAMC' by taking body measures for diagnosis, when problem occurred. Can we predict malnutrition, preventively? The work of "Overall Nutrition Quality Index (ONQI)" by Dr. Katz DL et al of Yale University, encouraged the author. The ONQI article considered to cover 40,000 - 50,000 or more of food supply in US and the world, by giving each food a score. A fact is: the nutrients of food are not independent, especially when calories is included. Thus, classical statistics, such as a linear regression can not work, because the condition of "(mutually) Independent, Identical Distribution (iid)" lost. This model started in United Kingdom around 1950, later was named as "Spatial Autoregression Models (SAM)." Its calculation is huge, causing difficulty. Decades later, advanced computer became available, but still could not help resolving the problem for reason unknown. C. The author started SAM in 1994, fortunately soon found a resolution with precision, with dimension high. His work continued, till 1998, the author made the following two presentation. 1. "The Construction of Parameter Estimation in Spatial Autoregression Models," presented at the "Sunbelt XVIII and Fifth European International Social Network Conference" in Barcelona, Spain, May 1998. 2. "The Spatial Autoregression Models and Its Application in Social Sciences," presented at the "International Sociology Association XIV World Congress" in Montreal, Canada, July 1998. The author's dissertation is entitled "Spatial Autoregression Models: Its Solutions of Parameter Estimation and Application", Michigan State University, December 1998.

PO542

ARE NUTRITION LABELS ON PACKED FOODS USEFUL TOOLS IN REDUCING SODIUM INTAKE?

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Background and objectives: Nutrition labelling on food products has emerged as a prominent policy tool for promoting healthy eating. Providing information about salt or sodium content of packaged foods on their labels might help consumers to reduce their dietary sodium intake. This study aimed to scrutinize the nutrition labelling practice in terms of provided information about sodium or salt content of packaged foods sold in Turkish markets.

Methods: Data were obtained from food labels of 1620 packaged foods collected from the most branched three supermarkets in Turkey. Labels of food products included in the study were categorized into eleven groups: dairy products; meat, poultry, seafood and their products; fats and oils; pulses and pastas; instant soups; flours and bakery products; canned foods,pickles and pastes; snacks, light and diabetic products; breakfast products; salts,spices,dressings,dips and bouillons; ready-to-eat meals. A hecklist was used to record the existing information about salt and sodium content of the products, and health/nutrition claims or logos related to link between dietary salt/sodium and health.

Results: Nutrition label was obtained on the 75.1% of packed foods. The information about salt and sodium content was provided respectively on 2% and 24.4% of the labels. The salt content (in grams) was mostly provided on the labels of frozen products (meat, poultry and seafood) and spreads, whereas the sodium content (in mg) was mostly given on the labels of snacks. The nutrition or health claim related to salt or sodium content of the product was obtained only on the 2.5% of food labels. No food label with a logo related to salt/sodium content was obtained.

Conclusions: The information about salt or sodium content of products, provided on the food labels, should be improved for promoting food labels as efficient nutrition education tools in reducing sodium intake.

Key words: nutrition label, salt, sodium

PO543

ASSOCIATION OF CALCIUM INTAKE TO BONE STRUCTURE AND STRENGTH INDEXES OF ADOLESCENT SWIMMERS

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Background and objectives: It is well know that calcium (Ca) is required for normal growth and development of the skeleton and is a critical factor in the acquisition of optimal

peak bone mass. However, dual energy X-ray, which is oftenlly used for assessing bone mass, does not evaluate bone structure which is also important for bone health. This research therefore aims to study the influence of Ca intake on bone structure in adolescent swimmers.

Methods: Ca intake was evaluated in a total of 40 swimmers (19 males) (14.36±1.83 y) with a Ca frequency-questionnaire. Peripheral quantitative computed tomography (pQCT) was used to evaluate volumetric bone mineral density (vBMD), cortical-thickness, and to calculate resistance to fracture load in X and Y axes, stress strain index (SSI) in X and Y axes, and polar strength strain index (SSIPOL) at the non-dominant radius and tibia. Bivariate Pearsons' correlations were performed between Ca and pQCT values. For those pQCT values that showed a significant correlation with Ca, a linear regression was performed to evaluate the influence of Ca on the previously mentioned bone parameters including age, height, and subtotal-lean in the model.

Results: Independently of age, height and lean mass, Ca intake accounted for 10% of radius total and cortical vBMD and 11 and 21% of tibia total vBMD and tibia cortical-thickness respectively (all $p<0.05$). Ca was not associated to any of the strength indexes evaluated.

Conclusions: Although Ca may partially explain vBMD for radius and tibia, this nutrient was not associated to any bone strength indexes in our sample, suggesting that Ca could influence BMD, but by itself may not be enough to achieve stronger bones. Further studies assessing other factors such as physical activity or other nutrients are needed in order to explain more relations with vBMD or bone structure.

Key words: bone, calcium, swimmers

PO544

EFFECT OF SOYBEAN OIL QUALITY FORTIFIED ON THE RETENTION OF VITAMIN A IN MOROCCO

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Background and objectives: vitamin A is a micronutrient which is considered essential for growth and development. Food fortification, a strategy to fight against the Vitamin A deficiency . In Morocco, soybean oil is widely consumed (32g/d/p) by all population and thus represents a suitable vehicle for fortification by vitamin A. Objective: To determine, during storage, the effect of the quality of soybean oil on the retention of vitamin A.

Methods: Soybean oil is fortified by vitamin A palmitate, with two doses (33.3 and 66.6 IU/g). Fortified oil samples are distributed in replicate, in transparent PET bottles and stored for 6 months under different temperature conditions (ambient 42°C)and light (diffuse daylight, fluorescent light, dark). The content of vitamin A residual soybean oil is fortified Fixed-end of each month by HPLC. This analysis is accompanied by determination of peroxide value (meqO/kg) and acidity (% m/m as oleic acid) in order to determine respectively the degree oxidative and hydrolytic alteration.

Results: 1-During 6 months of storage, the fortified soybean oil undergoes oxidative essentially altered. 2 - Fluorescent light causes a remarkable increase in the peroxide from the very first month of storage (5.76 meqO/Kg). 3- temperature and diffuse light showed no specific effect on the peroxidation of soybean oil fortified (6meqO/kg). This value is lower than the regulatory limit of 10meq O /Kg.4 - No correlation was found between the peroxide value of soybean oil fortified and the rate of degradation of vitamin A.

Conclusions: Vitamin A was stable in soybean oil under the conditions of Moroccan cooking and stokage, it appears that: 1- Soybean oil fortified with vitamin A affects mainly by peroxidation.2- Diffuse light or temperature did not have a specific effect on the degradation of vitamin A.3- fortified oil may be traded even after 6 months of production.

Key words: oil fortification, vitamin A, soybean, degradation

PO545

DIET, NUTRITION AND ENERGY EXPENDITURE AT THE CATALAN GALLEYS S. XIV AND XV

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Background and objectives: Galleys were ships during XIV-XV century used as an everyday goods transportation and war. We aimed to evaluate the nutritional content of the diet and energy expenditure of the oarsmen, in the Mediterranean galleys of XIV and XV century.

Methods: Library documentation in relation to the customs, food, diet, navigation models of ships of the time. Dietary analysis through the Composition Tables of CESNID.

Results: The daily ration of the galley was monotonous, half cup of garbanzo bean stew, a kilo of cake (bizcuit) and about two litters of water. Good rowers received also some bacon and a litter of wine. The diet was improved and increased on the eve of battle. In high speed navigation the rower had to be provided with one litter of water per hour. Considering the oarsmen

as an adult male 19-30 years, 75kg and 1.67m, caloric ration would correspond around 3.000 Kcal energy expenditure, whereas additional work in the galley rowing would approach to 5.000 Kcal/day the needs. Prevalence of vegetable protein over animal, with a modest fat intake, a lack of calcium intake and a lack of vitamin C. During a 10-hour day and an effective working time of 7.5 hours and a regular navigation (4 knots), the galley rower would need a caloric intake of 2.663 Kcal (355 Kcal/h) developing an average oxygen uptake of 19,4 ml/k/min. During an 8-hour day and an effective working time of 6.5 hours with a simulated combat naval navigation (3-6 knots), caloric intake would be 3.338 Kcal (513 Kcal/h), oxygen uptake 23.9 ml/kg/min.

Conclusions: The work done during row doesn't require high energy expenditure except in combat situations. The nutritional content, although it may be somewhat deficient in some trace element, was well adapted to the energy requirements to all the navigation speeds.

Key words: nutrition, requirements, exercise

PO546

KNOWLEDGE AND ATTITUDES ON NUTRITION AND HEALTH: A MIXED METHODS STUDY OF IRISH ADOLESCENTS

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Background and objectives: Male and female adolescents(aged 16-18 years)wer compared on: 1. nutrition knowledge 2. attitudes on nutrition and health

Methods: Ther were two phases - quantiative by validated questionnaire (Parmenter & Wardle, 1999), followed by qualitative through group interviews. 110 secondary school students (59 boys: 51 girls) aged 16-18 years from two state schools in Dublin, Ireland participated phase one of this study and 12 students from the same schools were for phase two.

Results: Phase 1 showed the students to have a good nutritional knowledge, with a mean score of 52.58±10.19 out of a possible 110. There was no significant difference in nutrition knowledge scores between girls and boys (p=0.62). Girls displayed a slightly higher mean score (52.55±10.09 compared to 51.58±10.36). The questionnaire tested knowledge on four aspects of nutrition knowledge: 1. Dietary advice; 2. Food source; 3. Food choices; and 4. Diet-disease relationships. Students demonstrated a good level of knowledge on dietary advice (92.7% of participants answered over 55% correctly) but displayed low scores for the other three sections of the questionnaire. Qualitative research demonstrated clear differences in attitudes to health and healthy eating between girls and boys. Girls were more positive on healthy eating. Girls reported eating "healthy" options whereas boys took a more "relaxed" view and were happy with fast food choices. Girls were able to report positive influences on their healthy choices whilst boys were driven by their peers.

Conclusions: This study shows that whilst knowledge scores may be similar for girls and boys there are quite substantial differences between the sexes with respect to food perceptions, attitudes and food choices.

Key words: Adolescents, Ireland, knowledge, behaviour

PO547

INTERACTIVITY - A DECISIVE FACTOR IN A WEB PLATFORM TO PROMOTE HEALTHY EATING

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Background and objectives: Less healthy lifestyles are increasingly present in the day-to-day lives of citizens. In this sense, it is crucial to promote the ability of individuals to make informed decisions. Information on food, health and obesity is abundant, yet often suffers from the following problems: bias, poor scientific reasoning, complex language, little interaction and weak capacity to respond to citizens demands. To try to address these questions, a web site, constructed in 2008, was hosted on the Directorate General of Health and organized to permit easy access, easy understanding and providing a functional organization. What makes this innovative tool is the availability of mixed tools. Some of these tools only provide information. Others enable greater interaction and solving of daily problems. Recipes are available, mobile applications, newsletters, FAQs and other tools. The aim is to gradually make the site a space to exchange knowledge, incorporating the collaboration of many partners and health professionals and increasing their cooperation.

Methods: Using the Google Analytics® we analyzed data on demand throughout one year and which areas of the site were used most and which areas are the most sought after. With more than 10 000 views every month measurement tools had by far more views compared with information alone.

Results: It was found that pages that are most sought are those that incorporate more interactivity particularly measurement tools, like BMI calculator and areas dedicated to provide support to create menus for schools and recipes.

Conclusions: The design of web sites should encourage and empower citizens to have greater control over decisions and actions affecting their health, enabling them to take a more active and participatory role in the system and the processes of decision making.

Key words: web nutrition platform, interactivity

PO548

INTAKE OF FAT AND ANTIOXIDANT VITAMIN IN PARKINSON AND ALZHEIMER DISEASES IN A RURAL REGION IN JALISCO, MEXICO

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Background and objectives: Neurodegeneration is a complex and multifactorial disorder that affects the central nervous system (CNS), such as Alzheimer's and Parkinson's. Studies have proposed that an inappropriate intake of lipids and the vitamins and antioxidants deficiency are involved in the development of neurodegeneration. In contrast the intake of vitamins A, C and E could be protective effects. Epidemiological studies suggest that intake of saturated fatty acid (SFA) and cholesterol could be associated with dementia and cognitive impairment.

Methods: In this study we evaluated lipids and vitamins (A, E, and C) intake in patients with possible neurodegeneration (Alzheimer and Parkinson) (n=20) and control patients (n=41), of ages 50 to 89 years from rural region that attended to health center in south of Jalisco, Mexico in a period between january to december 2012. It's a descriptive and comparative study, the intake was carried out by recording and food consumed during 24 hours and groups the food. Significance of differences between means was calculated by multivariate analysis for covariate adjusting.The data was analyzed in SPSS program 19.0 to ≤0.05.

Results: Significant differences were shown a consumption of vitamin C (p=0.016) and saturated fatty acid (p=0.032) in the control group, in the evaluation by grouping food it was found a high fruit intake (p=0.000), vegetables (p=0.037), oils and fat (p=0.002). Patients showed a higher consumption of cereals (p=0.017), animal foods high in fat (p=0.024), whole milk (p=0.000). Both controls and patients with low socioeconomic status prevailed, (60 and 45%). The 40% of patients and 85% of controls reported engaging in housework.

Conclusions: The patients included in this study presents a high intake of vitamin C, this is consistent with the food groups such as fruits and vegetables, which could be related to the sociodemographic characteristics of the region.

Key words: neurodegenerative diseases, nutrition, vitamins

PO549

ARE IMPRECISE MEASUREMENTS INFLATING STUNTING PREVALENCE IN DEVELOPING COUNTRIES?

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Background and objectives: We start from three assumptions: mean and standard deviation(SD) are not statistically independent; height and weight are not biologically independent and anthropometrist performance influences more height measurement than weighing. Our aim is estimating differences among observed and expected SD in anthropometric surveys.

Methods: Data comes from 96 Demographic Health Survey(DHS) – 46 countries and 51 others calculated by Zuguo and Grummer-Strawn(2009). We calculated mean and SD of weight and height from children under five years(WHO-2006 standrad Z scores). We regressed SD over mean for height and weight. Next, we predicted expected SD for height and weight. The formula probit[(-2-mean)/SD] was used to estimate prevalence of stunting with observed and predicted SD. From differences in density functions (p) of predicted and observed SD Z scores for height and weight we estimated the overcharge in prevalence of observed data.

Results: In zero mean is expected a SD of 1.19Z (IC95% 1.07Z;1.31Z) for height and 1.12Z (IC95% 1.08Z;1.16Z) for weight. The b coefficients from regression of SD over mean are -0.23 (IC95% -0.31;-0.14) for height and -0.16 (IC95% -0.21Z;-0.10Z) for weight. Such figures make, in zero mean, SD of height 1.06 higher than SD weight while across distribution SD of height is 1.45 higher than SD weight. We inspect changes for SD b coefficients across mean distribution's third. In weight mean distribution changes are discrete and b coefficient keeps negative signal; in height, distribution changes are huge and b coefficient changes signal across third. Prevalence of nutrition deficit is higher by 3 relatively to weight in superior third of height mean and higher by 2 in inferior third.

Conclusions: Figures indicate that height measurement is less precise than weight at same survey. Prevalence of stunting is influenced according to country height mean value.

Key words: anthropometric measures, children, nutritional status.

PO550

IMPORTANCE OF THE SUPPLEMENT OF VITAMINS AND MINERALS IN BONE AND MUSCLE STRESS

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Background and objectives: The athletic performance has steadily risk of injuries and bone fractures due to high intensity training. The stimuli are varied and when subjected to mechanical stress, the bone tends to respond with bone deformities, can lead to stress fractures and muscle injuries. The vitamin and mineral supplementation appears to be effective in reducing these stresses. Objectives Assess the importance of supplementation of vitamins and minerals in bone and muscle stress

Methods: Case study of a triathlon athlete, 35 years; together for 3 years, 2011, 2012 and 2013. Analyzes were made of vitamin deficiencies and stress through bone and muscle Metabolic Profile of Dr. Cosendey, which operates by detecting early organ dysfunction, poisoning and nutritional imbalances. Following are proposed recommendations for vitamins and minerals in time to prevent the aggravation of pre-existing problems.

Results: The bone stress measured by percentage relative to the recommended range, ie up to 100%, was high in the first step, 242%. In 2012 that figure has dropped significantly, 54% in 2013 and dropped to 2%. This decrease bone stress was also accompanied the decline of muscular stress 131% in 2011, 95% in 2012 and 66% in 2013.

Conclusions: The results show that supplementation of vitamins and minerals is directly linked to decreased bone and muscle stress. These results are very important, since it reduces the chances of injury in athletes.

Key words: vitamins, minerals, bone stress, muscle stress

PO551

NEW METHOD OF DIAGNOSTIC ANALYSIS FOR NUTRITION– PERFIL METABÓLICO DR. COSENDEY®

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Background and objectives: The method is an innovative tool to help diagnose sub-clinical and treatment for rebalancing organic. Studying cellular stress excessive each organ or tissue of the body, detecting imbalances at an early stage, such as organ dysfunction, intoxication, imbalance of micro and macro nutrients, level of stress in the cells of various organs, degree of hydration of tissues, before the onset of signs / symptoms and onset of illnesses. Objective Present a new method for diagnostic analysis and its significance for nutrition.

Methods: The method is done from a simple blood draw and with the help of specific software, provides a lot of information about the person. Presents accurate reports that reveal how your body is in relation to its optimal operating at current lifestyle. And yet, reveals what behaviors to be adopted to get closer to 100% of their potential.

Results: The results are shown through charts, with a report containing a summary of several studies, performed by a highly trained team, and aided by computerized diagnostic systems and artificial neural networks back-propagation (RNAR). The RNAR numerous variables correlated in the client very short time, with error rates well below the agreed worldwide.

Conclusions: The Metabolic Profile Dr Cosendey ® presents itself as an innovation in the diagnostic method of analysis, since it intervenes in the initial stage of a disease process, recognizing the kind of suffering and why it is happening. It also allows the nutritionist to leave the subjectivity present results of all variables and physiological changes, in addition to the rates prevailing physiological states as dysbiosis, ketosis, oxidative stress, insulin peripheral resistance (highly recurrent)and aiding in the early treatment of disease.

Key words: diagnosis, nutrition, disease

PO552

ELEVATED CARDIOMETABOLIC RISK IN OVERWEIGHT AND CENTRALLY OBESE NORMAL WEIGHT SPANISH CHILDREN OF PRESCHOOL AGE

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Background and aims: Overweight has been associated with metabolic dysfunction in late childhood and adolescence, but few studies have explored these relationships at preschool

age. As most studies have focused on metabolic syndrome components such as lipids and glucose, little is known about how overweight in early life may relate to other cardiometabolic markers. It is also uncertain whether, central obesity among children of normal weight is related to metabolic dysfunction, or the types of markers known or thought to be related to metabolic syndrome.

Methods: This cross-sectional analysis included 254 children aged 4.5 years from the Spanish INMA-Sabadell birth cohort. We measured body mass index (BMI), waist circumference, blood pressure (BP) and plasma levels of total cholesterol, HDL, triglycerides, apolipoprotein B/A1, C-reactive protein, C-peptide, leptin, TNF-alpha, sICAM and sVCAM. Overweight was defined as an age-and-sex-specific BMI z-score ≥;85th percentile (WHO reference). Children with waist-to-height-ratio >0.5 were classified as centrally obese. Logistic regression was used to assess whether, compared to normal weight children with lower waist-to-height-ratio overweight or centrally-obese normal weight children had elevated cardiometabolic risk defined based on the lowest tertile of each marker, adjusting for age, gender, and race.

Results: Overall, 22% of children were overweight; 21% of children of normal weight were centrally obese. Compared to non-centrally obese normal weight children, overweight children had increased odds of low HDL, and of elevated triglycerides, leptin, TNF-alpha, sICAM, C-peptide and elevated systolic and diastolic BP. Among normal weight children, centrally obese children had increased odds of elevated leptin and sVCAM compared to non-centrally obese children. C-reactive protein was unrelated to weight status.

Conclusions: Overweight was associated with multiple markers of metabolic function at preschool age. Further, markers not typically assessed in metabolic syndrome analyses were associated with central obesity among normal weight children.

Key words: Overweight, obesity, metabolic syndrome, cardiometabolic biomarkers

PO553

INFLUENCE OF TWO FUNCTIONAL INGREDIENTS ON THE PLASMA CONCENTRATIONS OF LEPTIN, GHRELIN AND GLUCAGON LIKE PEPTIDE1 IN LEAN AND OBESE RATS

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Background and objectives: "Globesity" is the term that the WHO uses to define the increase in obesity in the world from 80's onwards. Public organizations in collaboration with food industry are working to develop different functional ingredients as one of the strategies planned. The aim of this work was to investigate in lean and obese rats the effect of two functional ingredients in circulating levels of GLP1, ghrelin and leptin, hormones involved in the control of weight and food intake.

Methods: Sixty male Wistar rats were given free access to food and water. We set three "lean" groups fed during 10 weeks with AIN-93M diet (Control) and two modified AIN-93M (E1 and E2) added each one with one functional ingredient and three "obese" groups fed for 10 weeks with the obesogenic diet (Research Diets®) and then another 10 weeks with experimental diets. Experiments were conducted to determine the plasma concentrations of the above hormones in fasting conditions. Hormone assay was performed by Luminex X-MAPTM.

Results: The fasting plasma concentration of ghrelin was similar in lean and obese rats. However, concentration of leptin and GLP-1 were significantly higher in obese animals. The intake of the two functional ingredients modified, in lean, but no in obese rats, the fasting concentrations of ghrelin and GLP-1 for E1 and ghrelin, leptin and GLP-1 for E2. When comparing fasting concentrations of different hormones in lean and obese rats given the two functional ingredients there were no differences.

Conclusions: Diet-induced obesity modifies fasting concentrations of ghrelin, leptin and GLP-1. The presence in the diet of two functional ingredients (E1 and E2) modifies their fasting concentration, which may affect body weight.

Key words: Functional ingredients, hormones, rats

PO554

BRAZILIAN NUT: A WAY TO IMPROVE GLUTATHIONE PEROXIDASE ACTIVITY IN ELDERLY WITH MILD COGNITIVE IMPAIRMENT

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Background and objectives: Mild cognitive impairment (MCI) is a nosological entity proposed as an intermediate state between normal aging and dementia, and it is frequently associated with decline to Alzheimer's disease (AD). Studies support the hypothesis that oxidative stress plays an important role in the pathogenesis of AD. This oxidative stress may be initiated by a decline of glutathione peroxidase (GPx) activity. This selenoenzyme is an essential line of defense against free radicals acting against hydrogen peroxide and lipid peroxidation, protecting brain against oxidative stress. These observations have prompted studies of antioxidants to decrease oxidative damage and improve cognition. Thus, we examined the hypothesis that the daily consumption of Brazilian nut would have benefits on GPx activity in elderly with MCI. This nut is recognized not only for its selenium content but also for its high selenium bioavailability.

Methods: Twenty elderly with MCI (76.6±4.2 y old) were studied. They were randomly divided in two groups: Brazilian Nut group (BN, n=11) received one nut (around 5 g, averaging 57.75 μg Se/g) a day for 6 months, and Control group (CG, n=9) did not receive anything. Erythrocyte GPx activity was determined using the commercially available Randox® kit.

Results: GPx activity was not different between groups in baseline (BN=252.66±87.78 U/L; CG=247.28±70.16 U/L; p>0.005). However, after 6 months treatment, GPx activity was significantly higher in BN (335.02±119.80 U/L; p<0.001), while CG showed a slight, but not significant decrease (237.27±73.90 U/L; p>0.05).

Conclusions: The data revealed that the consumption of only one Brazilian nut a day (5 g) during 6 months was effective to increase erythrocyte GPx activity. Brazilian nut is an excellent option of supplying selenium through a normal diet, so it can be recommended to MCI patients in order to reduce oxidative stress damage.

Key words: selenium, oxidative stress, glutathione peroxidase

PO555

MARINE OMEGA 3 FATTY ACIDS PREVENT THE TRANSMISSION OF MATERNAL-FETAL OBESITY AND INSULIN RESISTANCE IN RATS.

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Background and objectives: We investigate whether fish oil FO into a high fat (HF) diet in pregnant rats impedes IR in offsprings.

Methods: Rats randomized into 3 groups receiving for 6 weeks a control diet (C: 13% corn oil), a HF diet (60% corn oil) or a HF diet with ω3 (HFω3, 40% corn oil + 20% FO (TG 1050 Quick Silver ®, Polaris Pleuven). An OGTT was performed at T + 6 w, before coupling. Following weaning (D21), male pups nursed by each of the 3 groups of rats were randomized to receive over 6 w (D63) either C diet or HF diet without ω3 (6 groups of pups). OGTT performed on D21 then D63.

Results: 1) Rats before coupling were obese and IR (data not shown). 2) Pups at D0 weight of pups born to C: 8.1 ± 0.2 g; HF: 10.2 ± 0.4 g (p <0.05 vs C); HLω3: 8.0 ± 0.3 g. At D21 pups born to C: 36.0 ± 0.6 g; HL: 46.6 ± 1.4, (p <0.05 vs C) HFω3: 32.8 ± 4.3 g, (p <0.05 vs HF). AUC glycaemia at D21 not different between C, HF, HFw3. At D63, T/T: 9699±99 vs 1222. AUC insulinaemia C: 36.4±6.4; HF: 53.0±5.1, p<0.05); HFw3: 29±3. At D63, AUC glycaemia not different between 3 groups; AUC insulinaemia in pups consuming the HF diet: C: 163.4±21.3; HF: 295.6 ±52.4, p<0.05 vs C; HFw3: 101.7±2.0, p<0.01 vs HF.

Conclusions: Pups born to mothers fed a HF diet rich in ω3 did not develop IR at weaning or in adulthood.

Key words: omega 3, fetal programming

PO556

HEALTH-RELATED QUALITY OF LIFE AND FOOD VARIETY OF EUROPEAN ELDERLY

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Background and objectives: Research on the variety of food consumption is scarce but is of potential relevance due to its role in the wellbeing and quality of life of elderly populations. We aimed to identify the associations between health-related quality of life and variety of food consumption.

Methods: The sample included 3291 elderly aged 65+ years stratified by sex, age (65-75, 75+ years) and living circumstances (living alone, living with others). The participants belonged to 8 European countries: Denmark, Germany, Italy, Poland, Portugal, Spain, Sweden and United Kingdom. Data was collected by a food variety questionnaire and the SF-8 Health Survey. The FV score (FVS) was calculated by the sum of food items consumed in the previous week. We computed summary scores for all domains, including general health perception (GH), vitality (VT) and mental component (MCS). The analysis included a descriptive analysis by country and Spearman correlation between the SF8 scores and the FVS.

Results: The total mean value for FVS was 28.30 (SD= 6.326), with higher values for Sweden (31.32, SD= 6.007) and UK (29.88, SD= 6.346), and lower for Italy (26.59, SD= 5.810) and Portugal (27.34, SD= 6.724). For the MCS, we found lower values for Portugal (48.06, SD=10.189) and Italy (49.15, SD= 8.563), and the highest for Denmark (54.59, SD= 6.712) and UK (53.05, SD=8.420). The FVS presented a low correlation with all health scores ($p< 0.001$), with higher values for VT (0.205) and GH (0.191).

Conclusions: Countries with lower FVS, as Italy and Portugal, presented also the lower values for the mental component and the ones with higher scores (Denmark and UK) presented the highest values, suggesting a possible association between food variety and mental well-being.

Key words: food variety, health-related quality of life, elderly

PO557

MUSCLE MASS AND MUSCULAR STRENGTH IMPACT OF A SUPPLEMENTATION WITH NUTRALYS® PEA PROTEINS OR WHEY PROTEINS IN VOLUNTEERS PARTICIPATING IN PHYSICAL TRAINING.

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Background and objectives: Protein supplementation in sport nutrition is of common use today. Our study aims at comparing the muscular impact of a supplementation with NUTRALYS® pea proteins or whey proteins.

Methods: Males, aged 18 to 35 years practicing a moderate or occasional sport, were given 25 g of either NUTRALYS® pea proteins (n=52) or whey proteins (n=54) or placebo (n=54) twice a day for twelve weeks in a randomized placebo-controlled clinical trial. In addition, volunteers participated in a moderate muscular training. The impact of the supplementation was assessed using thickness measurement of the biceps brachii using ultrasonography, muscle strength, body composition and weight.

Results: All groups were comparable at baseline. In all groups, biceps brachii thickness (primary endpoint) displayed a significant increase as a result of muscular training. Muscle relative increase tended to be significant between groups in the total population ($p=0.09$). Using sensitivity analysis on previously less muscularly developed volunteers (Maximum concentric Strength 1-RM at inclusion <25Kg), this increase was significantly different between groups ($p=0.01$). Absolute changes in muscle thickness were also significantly different between groups ($p=0.01$). A Scheffe test on all groups as well as a t test comparing NUTRALYS® versus placebo confirmed that the overall difference observed came from a statistical difference between NUTRALYS® and placebo. Although an increase in the biceps brachii thickness was observed with whey supplementation, it was not significantly different from placebo. Secondary outcomes (muscle strength, weight, body composition) did not vary significantly between groups and results obtained from a supplementation with whey or with NUTRALYS® were similar.

Conclusions: In addition to an appropriate training, the consumption of NUTRALYS® pea protein promoted a significant increase of the muscular mass as compared to placebo and especially for people starting or returning to a muscular training.

Key words: pea proteins, muscle, sport nutrition

PO558

OVERWEIGHT AND OBESITY IN XAVANTE INDIANS FROM MATO GROSSO, BRAZIL

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Background and Objectives: It has been observed a considerable increase in the prevalence of overweight and obesity and chronic non-transmissible diseases (DCNT) among Brazilian indigenous population, which can be attributed to dietary changes and reducing the frequency and intensity of physical activity. The aim of this study was to evaluate the prevalence of overweight and obesity in XavanteIndians, that live in the Central Brazil, and are recently undergoing an intense change in their traditional life style.

Methods: A cross-sectional study was carried out among 947 Xavante Indians from theSão Marcos and Sangradouro/ Volta Grande reservations. We considered gender, age and anthropometric variables: weight, height, body mass index (BMI), waist circumference (WC), hip circumference (HC) and waist / hip ratio (WHR). To evaluate the nutritional status, we adopted the criteria recommended by the World Health Organization for BMI. For WC and WHR were considered the benchmarks of the Brazilian Society of Cardiology. We used descriptive statistics and Chi square test. Data were analyzed with SPSS version 17, which set a significance level of 5%.

Results: The examined population was composed by 464 men and 483 women, aged 20 years or more (43.03 ± 19.35). Prevalence rates across the study population were: overweight (34.6%), obesity (50.7%), waist circumference compatible with very increased risk – ≥88cm in women and ≥102cm in men (58.9%) and WHR compatible with increased risk – ≥0,80 for women and ≥0,95 for men (79.8%). In general, the prevalence was higher in women and in the age-group40 to 59 years.

Conclusions: The results demonstrate a worrying nutritional status between adults XavanteIndians, with high prevalence of overweight and nutritional indicators consistent with DCNT risk, especially among women. It is necessary to be adopted strategies for prevention and control of overweight among indians.

Key words: overweight, obesity, anthropometry, indigenous population

PO559

PREVALENCE OF OVERWEIGHT AND OBESITY IN SCHOOLCHILDREN 2-12 YEARS OLD FROM FERNANDÓPOLIS-SP, BRAZIL

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Background and objectives: The current obesity epidemic has the main characteristic the impact in the pediatric community. Data from the Brazilian Society of Pediatrics (SBP) and the Brazilian Institute of Geography and Statistics (IBGE) show that reaches more than 5 million Brazilian children and increased in 30 years, 14% in males and 8% in females. The aim of this study was to determine the prevalence of overweight and obesity among schoolchildren 2-12 years, in the municipality of Fernandópolis, SP, in 2009, separating the results by gender and type of school.

Methods: We conducted a cross-sectional study, with analysis of 2409 students from 14 schools of Fernandópolis / SP, Brazil (-20 º 17'02" Latitude and Longitude -50 ° '14 '47"). The sample consisted of 1209 (51.0%) females and 1798 (74.6%) students from private institutions. Anthropometric data assessed: body weight in kg and height in meters. The diagnosis of obesity or overweight was made according to the cutoff international table proposed by NCIN IEH.

Results: the prevalence of overweight schoolchildren was 34.7% (836), and 15.3% (368) were considered obese. Among females 36.2%, with 15.6% obese and, in males, 29.28%, with 13.62% obese (p = 0.154). The prevalence of obesity among public school students was 11.5%, and in particular of 20.6% (p = 0.002).

Conclusions: The prevalence of overweight and obesity in Fernandópolis for students from 2 to 12 years, agrees with the levels of Brazil. Between the sexes, unlike the literature, there were no statistical differences. We observed significant differences in overweight and obesity in private schools, which is used by a population more economically advantaged, corroborating other studies. Thus presents the peculiarities of Fernandópolis, demonstrating the importance of conducting regional studies, which will propose new models of action to combat the advance of this epidemic.

Key words: obesity; overweight; Brazil; schoolchildren.

PO560

QUANTITATIVE ASSESSMENT OF BREASTFEEDING PRACTICES IN MOROCCAN LACTATING WOMEN DURING 6 MONTHS AFTER BIRTH USING STABLE ISOTOPIC DILUTION TECHNIQUE

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Background and objectives: The evaluation of breast milk intake is of particular importance for setting future breast-feeding recommendations and to investigate success strategies for breastfeeding promotion. Exclusive breastfeeding during the first 6 months of an infant's life is an important factor for optimal growth and health of the child. Moreover, the assessment of postpartum changes in maternal body composition provides important information on her nutritional status and for identifying intervention strategies aimed at improving living conditions. In Morocco, this is the first time that breastfeeding practices and human milk intake have been quantified, and that changes in maternal body composition postpartum have been assessed.

Methods: This study included 32 mother-baby pairs. The exclusive breastfeeding rate, intake of human milk and water from other sources, and the body composition of the mothers were measured at 1st, 3rd and 6th month postpartum by using the deuterium oxide dose-to-mother technique.

Results: Results showed that the exclusive breastfeeding rate was 33.3% at the first month, 26.7% at the third and 12.5% at the sixth. Mean intake of breast milk was 615.6 g/d, 741.9 g/d and 843.6 g/d at 1, 3 and 6 months respectively. As expected, there was a significant change in the mothers' body composition between the first and sixth months. As a proportion of body weight, fat free mass increased by 13.4% and fat mass decreased by 33.4%.

Conclusions: In conclusion, the rate of exclusive breastfeeding in Morocco remains low, despite advice on the benefits of breastfeeding, clearly showing a resistance to change the behaviour of these mothers.

Key words: Exclusive breastfeeding, body composition, deuterium.

PO561

EATING RATE IS ASSOCIATED WITH EATING BEHAVIORS ACCORDING TO GENDER AND OBESITY

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Background and objectives: To compare the differences in eating behaviors and masticatory performances between genders or obesity status, and to determine the associations between eating behaviors and masticatory performances in both genders according to obesity status, twenty four (50% M and 50% F) adults were matched on age, gender, obesity status and dental health.

Methods: Eating behaviors were assessed by the Three Factor Eating Questionnaire (TFEQ) and chewing performances were measured using electromyography (EMG) while eating a boiled-rice (150 g).

Results: Compared with lean participants, obese participants had significantly higher level of disinhibition ($p<0.05$ for M; $p<0.01$ for F). Chewing performances were not significantly different by obesity status. Males had greater bite size ($p<0.05$ for lean; $p<0.01$ for obese) and chewing power ($p<0.001$) and faster eating rate ($p<0.01$ for lean; $p<0.05$ for obese) than females. Females habitually chewed more ($p<0.01$ for lean; $p<0.05$ for obese) and had longer meal duration ($p<0.05$) than males. In lean males, the eating rate was negatively($r=-.812$, $p<0.05$) associated with disinhibition and total number of chew (TNC) was positively ($r=.902$, $p<0.05$) associated with the hunger sensitivity on the TFEQ. In obese males, the eating rate was negatively($r=-.860$, $p<0.05$) associated with cognitive restraint and positively ($r=.871$, $p<0.05$) associated with the hunger sensitivity. No significant associations between eating behaviors and chewing performances were observed in females.

Conclusions: In conclusion, disinhibited eating was differentiated in obese adults. Eating behaviors were related to the rate of ingestion or TNC in males but not in females. Therefore, gender specific intervention and counseling aimed to improve the eating rate could be promising for the eating behavioral treatment in the obese.

Key words: obesity; gender; eating behavior; TFEQ; eating rate

PO562

CONSUMPTION EFFECT OF CALORIC AND NON-CALORIC BEVERAGES ON FOOD INTAKE IN RATS

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Background and objectives: The consumption effect of caloric and non-caloric beverages on food intake is controversial and studies in this issue are sparse and inconclusive. In several animal experimental researches, it has been evidenced a reduction in solid food intake during the exposure to caloric soft drinks. On the other hand, in human studies, it has not been observed compensation in energy intake in individuals exposed to sucrose beverages. The present study aimed to evaluate the effect of caloric and non-caloric soft drink on the quantitative and qualitative intake of solid food in rats.

Methods: Thirty twenty-one-day male rats were divided into 3 groups: control group (standard diet and water "ad libitum"), caloric soft drink group (standard diet, caloric soft drink and water "ad libitum") and non-caloric soft drink group (standard diet, non-caloric soft drink and water "ad libitum"). The animals received treatment within 17 weeks.

Results: The consumption of caloric and non-caloric soft drink at the end of treatment did not cause changes in total energy intake, body weight and intra-abdominal fat. However, the caloric soft drink consumption resulted in a reduction in solid food intake, increased carbohydrates consumption and high total liquids intake. While the non-caloric soft drink intake didn't influence the total intake of solid food at the end of treatment.

Conclusions: it was concluded that exposure to and intra-abdominal fat during the evaluation period. However, the caloric soft drink caloric and non-caloric soft drink caused no changes in total energy intake, body weight intake influenced the amount and the quality of solid food consumed. The non-caloric soft drink intake didn't influence the food intake.

Key words: Food consumption; soft drink intake; rats.

PO563

A QUALITATIVE INTERVIEW STUDY ON ETHICAL ASPECTS OF MARKETING AND FOOD ADVERTISING FOR CHILCHREN. EVALUATION OF PERCEPTIONS, ATTITUDES AND BELIEFS OF PARENTS

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Background and objectives: The "obesity risk" has become a major concern of the food industry since the World Health Organisation in 1998 recognised obesity as a problem of epidemic proportion. If advertising for food high in fat, sugar and salt alone does not make children and adolescents fat, it is an important contributory factor to their overweight. This study attempts to fill this apparent gap by examining parents' ethical views of food advertising targeted at children and adolescents in Spain.

Methods: Qualitative interviews were conducted with a total of 280 parents of children and adolescents aged between 3 to 16 years, who were recruited through state schools in the city of Granada (Spain). A semi-structured interview schedule was developed based in the aim of the study and relevant literature. Different scales were designed to analyze behavioral intentions and ethical judgments (dependent variables). As independent variables, moral intensity, idealism, relativism, attitude toward food advertising aimed at children and adolescents, and attitude toward the parents' use of nutrition information were obtained. Qualitative analysis and ANOVA was used with the SPSS version 20.0.

Results: Parents' perceptions regarding the importance of ethics and social responsibility in relation to food advertising for children and adolescents can be explained by both dimensions of moral philosophies. Those who are more idealistic tend to perceive ethics and social responsibility to be important, and less relativistic parents tend to perceive these aspects as important.

Conclusions: The survey results partly indicate that there is a positive relationship between ethical values and parents' perceptions regarding the importance of ethics and social responsibility of food advertising and marketing for children and adolescents. In general, parents consider that the ethical corporate environment appears to be conducive to ethical and socially responsible behavior within enterprises.

Key words: Food advertising, ethics, parents' perception, children and adolescents.

PO564

EFFECT OF TAURINE SUPPLEMENTATION, ASSOCIATED WITH NUTRITIONAL COUNSELING, ON ENERGY METABOLISM IN OBESE WOMEN

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Background and objectives: Researchers found decreased levels of plasma taurine in obese subjects and animals and reduced expression of an important taurine synthesis enzyme. These evidences, coupled with findings that taurine supplementation increased mRNA levels of transcription factors involved in energy expenditure and β-oxidation in rats fed high fat diets highlighted the use of taurine in obesity treatment. Thus, the aim of the present study was to investigate whether taurine supplementation improves energy metabolism in obese subjects.

Methods: A double-blind placebo controlled study was conducted. Sixteen obese volunteers were divided into two groups stratified by BMI and age, and supplemented with taurine (3g/d) or placebo for 8 weeks. The volunteers also participated in a weekly nutritional counseling group. Plasma taurine, weight, BMI, body composition (by deuterium dilution), total energy expenditure (by doubly-labeled water) and resting energy expenditure and substrates oxidation (by indirect calorimetry) were evaluated just before and after supplementation. Energy metabolism data was adjusted for body composition.

Results: both taurine and placebo groups showed significant reductions in weight (-4 vs -4 kg, respectively), BMI (-2 vs -2 Kg/m², respectively) and body fat (-4.2 vs -4.1 kg, respectively) without significant differences between groups ($p>0.05$). Taurine group showed significant increase in total energy expenditure after 8 weeks of supplementation (2248 ± 273 to 295 ± 264 kcal/day, $p<0.01$) compared to placebo (3025 ± 265 to 2796 ± 270 kcal/day, $p>0.05$). There were no differences between groups for resting energy expenditure and carbohydrate oxidation. It was found a slight but not significant increase in fat oxidation by taurine supplementation (81 ± 9 to 92 ± 9 gram/day) and decrease by placebo (96 ± 8 to 88 ± 9 gram/day).

Conclusions: taurine is able to improve total energy expenditure in obese.

Key words: taurine, obesity, energy expenditure, fat oxidation.

PO565

IMPACT ASSESSMENTS CONDUCTED AT TIME OF EXIT INCONSISTENTLY PREDICT LONGER TERM PROGRAM BENEFIT IN TITLE II FOOD ASSISTANCE PROGRAMS

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Background and objectives: U.S. food aid programs support health, watsan, and agricultural development to promote food security in poor communities. Impact evaluations are regularly conducted at program exit and compared to baseline.

Methods: We repeated evaluations in Bolivia, Honduras and Kenya 2-3 years after exit using similar survey methodology complemented with qualitative methods and compared behavioral and impact indicators at the two periods to assess and identify determinants of sustainability.

Results: Outcomes showing success at exit were inconsistently sustained at followup. Income from agriculture showed substantial increases from baseline to endline in Bolivia and Honduras, reflecting continued technical assistance and free inputs, but generally fell significantly at followup. Use of improved agricultural practices increased to above 90% at endline in all countries; but declined significantly (Bolivia, Honduras) or were maintained (Kenya) at followup. Availability of piped/improved water increased baseline-endline in all countries; was maintained or increased in Bolivia, Honduras, but declined significantly in Kenya. Prevalence of stunting/wasting had declined significantly by exit in all countries; rates continued to decline in Bolivia and Honduras but rebounded in most places in Kenya. Conversely health care practices were widely adopted by endline in all countries but declined significantly (Bolivia, Honduras) when CHW home visits did not provide continued reinforcement. Continued feeding of infants during illness was well adopted at exit but declined significantly in all countries. Improvements in exclusive breastfeeding were maintained or improved.

Conclusions: Sustainability of program effects on behaviors and impact indicators is not necessarily reflected in results of evaluations conducted at program exit. Assessment of longer term benefits requires attention to sustainability strategies and repeated impact evaluation in later years.

Key words: Food Aid, Sustainability, Exit Strategies

PO566

CONTRIBUTION OF STABLE ISOTOPES TO VALIDATE THE PRACTICE OF BREASTFEEDING IN BURKINA FASO

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Background and objectives: Breastfeeding is widespread in Africa but only limited information is available on this practice. The ultimate goal of this study was to evaluate the national breastfeeding promotion program in a rural area of Burkina Faso.

Methods: A cohort of 46 mothers who agreed to practice exclusive breastfeeding up to 6 months was followed with their babies. Data were collected at birth (1-2 week) and at 2, 4 and 6 mo. At each period, we used the deuterium oxide 'dose-to-mother' technique to determine human milk (HM) intake as well as the non-HM water intake. The deuterium enrichment in saliva samples collected from the mothers and their babies was analyzed by FTIR (Fourier Transform Infrared spectrometry). Exclusive breastfeeding was assessed if the non-HM intake didn't excess 25g/d.

Results: In all, 39 mother-baby pair completed the study. The mean [95%CI] HM was 576.9 [507.1, 642.7] g/d at birth. It increased ($p<0.0001$) to 849.5 [789.2, 909.7] g/d at 2 mo and reach a maximum of 913.7 [851.9, 975.6] g/d at 4 mo, then it knew a non significant decrease to 887.4 [824.4, 950.5] g/d after 6 mo. The non-HM was 44.6 [25.5, 63.8] g/d at birth and reach the maximum of 187 [137.7, 236.5] g/d at 6 mo but at each time the baby weight was strongly correlated to the HM ($p<0.0001$ and $r=0.84$ at birth, 0.82 at 2 mo, 0.77 at 4 mo and 0.76 at 6 mo). The exclusive breastfeeding was 41% at birth, 21% at 2 mo, 15% at 4 mo and none of these women reached 6 mo of exclusive breastfeeding.

Conclusions: The deuterium dilution method enable us to prove that breastfeeding is not really implemented as recommended by the WHO and national authorities.

Key words: human milk, breastfeeding, deuterium oxide.

PO567

ZINC SUPPLEMENTATION FOR THE TREATMENT OF CHILDHOOD DIARRHEA IN INDIA: THE ASSOCIATION BETWEEN PROVIDER KNOWLEDGE AND PRACTICE

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Background and objectives: Therapeutic zinc supplementation reduces diarrhea duration and severity among children under-five. The DAZT project is currently scaling-up zinc in Bihar, Gujarat and Uttar Pradesh (UP), India. Activities include supply chain support and training for informal private sector rural medical practitioners (RMPs) and public sector Accredited Social Health Activists (ASHAs) and Anganwadi Workers (AWWs). In order to understand influences on provider practices and zinc coverage, we assessed the association between reported zinc knowledge and observed zinc prescribing.

Methods: We conducted cross-sectional assessments of RMPs (N=97) in UP, and ASHAs (N=330) and AWWs (N=330) in Bihar/Gujarat. Providers were directly observed during one treatment interaction with a diarrhea case 2-59 months of age and subsequently interviewed. Survey responses regarding zinc use, dose and duration were used to compute zinc knowledge scores for each provider on a 7-point scale. Multiple logistic regression was conducted to assess the association between observed zinc prescribing and zinc knowledge score, controlling for characteristics of the provider and observed child.

Results: Zinc was prescribed by 65.5% of AWWs, 78.5% of ASHAs and 28.9% of RMPs. In the public sector, the odds of zinc prescribing were elevated by 77% (OR: 1.77; 95% CI: 1.57-2.01) per point increase in zinc knowledge score, controlling for provider (i.e. ASHA/AWW), state (i.e. Bihar/Gujarat), and age of observed child (i.e. <6 months/≥6 months). In the private sector, the odds of zinc prescribing were about two-fold higher (OR: 2.17; 95% CI: 1.50-3.16) per point increase in zinc knowledge score, controlling for RMP education (<14 years/≥14 years) and the observed child's age in months.

Conclusions: The practice of advising zinc for under-five diarrhea treatment may be positively influenced by zinc knowledge. Thus, programs aiming to scale-up adequate diarrhea management in India should invest resources in RMP, ASHA and AWW training.

Key Words: Zinc, Diarrhea, Children, India

PO568

PERSISTENCE OF RECOVERY FROM MALNUTRITION AND HIV PROGRESSION AMONG HIV+ ADULTS GRADUATING FROM THE ETHIOPIAN FOOD BY PRESCRIPTION PROGRAM

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Background and objectives: Determine 6-month persistence of effects of RUTF supplement provided to malnourished HIV+ adults with MAM or SAM (BMI <= 18.5) also receiving standard ART care on nutritional status.

Methods: RUTF was provided to subjects with MAM or SAM and that were pre ART or ART for up to 6 months at 15 clinics (n=1956), with 8 matched comparison clinics (n=639). Longitudinal nutritional and HIV status data were collected. Recovery was defined as having a BMI >= 18.5 recorded for 2 or more consecutive visits. Six months after program exit, nutritional status was re-evaluated in treatment group participants.

Results: Persistence data were collected 6 months after program exit for 17% of treatment group subjects, of which 45.3% had recovered from malnutrition and 54.7% remained malnourished. Of those recovered, 80.0% maintained or improved their BMI at >= 18.5, while 20.0% relapsed to become malnourished again. Of those that were discharged from the intervention as non-responders, 33.7% maintained or improved their BMI, while 66.3% remained malnourished.

Conclusions: Our results suggest that nutritional support that promotes recovery from malnutrition in the short term can have longer-term benefits for health and nutrition status of people on ART. This finding should be interpreted with caution because of the low proportion of total exits that could be followed-up at 6 months.

Key words: BMI, malnutrition, nutritional supplementation

PO569

OXIDATIVE STRESS IN EPILEPTIC CHILDREN AND ADOLESCENTS UNDER INDICATION TO KETOGENIC DIET PROGRAM IN BRAZIL

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Background and objectives: The ketogenic diet (KD) is indicated for the treatment of refractory epilepsy with reduction of more than 50% of seizures. However, one of the main adverse effects are the changes of lipids profile, that isn't very well studied. The aim of this paper is to evaluate the oxidative stress and to analysis of antioxidants intake KD.

Methods: The concentration thiobarbituric acid reactive substances (TBARs) was determinate in plasma after fasting 12 hours. After 12h of fasting blood samples was collected from children and adolescents. From plasma lipid profile (TC, LDL, HDL, TG) were evaluated. Analysis of TBARs were performed by standard method. Dietary intake was assessed by three food records in the program Food Processor (Esha Research®). Score-z body mass index for age (ZBMI/I) was standardized for status nutritional classification.

Results: The program included 18 subjects, both gender with 1.4 to 15 years old. According to ZBMI, 50% of the patients were eutrophics, 16.67% with risk of overweight or overweight and 33.3% had obesity or severe obesity (WHO 2006, 2007). The average TBARs level was 3.97 (0,92) μmol/ml. This profile was negatively correlated with retinol intake (r=-570, p=0,021). However, alfa-tocoferol, beta-carotene and others vitamins monitored didn't showed correlation with TBARs. Mean values of lipid profile were CT 160 (29) mg/dl, LDL 94 (25) mg/dl, HDL 44 (12) mg/dl, VLDL 17 (8) mg/dl, TG 84 (42) mg/dl. There weren't correlation with TBARs versus status nutritional.

Conclusions: The result showed that intake of Retinol is associated with the concentration of TBARs, suggesting a negative oxidative profile of epileptic children after to start the ketogenic diet.

Key words: oxidative stress, obesity, vitamins

PO570

WHOLE AND REFINED GRAINS HAVE DIFFERENTIAL EFFECTS ON CARDIOMETABOLIC MARKERS IN OVERWEIGHT INDIVIDUALS WITH NORMAL FASTING GLUCOSE VERSUS PREDIABETES

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Background and objectives: Epidemiological studies show that higher whole grain intakes are associated with lower risk of type 2 diabetes. We measured body composition and metabolic biomarker responses in individuals with prediabetes (PD; fasting glucose ≥100 mg/dL) and normal glucose levels (NG; <100 mg/dL) on healthy diets containing either whole (WG) or refined grain (RG) products.

Methods: A randomized, controlled-feeding, parallel study was conducted in abdominally obese individuals who had or were at risk for metabolic syndrome. Participants were randomized to WG (n=24) or RG (n=25) diets for 12 weeks (6 weeks isocaloric, 6 weeks hypocaloric). Body composition and metabolic biomarkers were measured at baseline, 6 and 12 weeks. Screening and baseline glucose values were averaged to determine PD (WG: n=9, RG: n=8) or NG (WG: n=15, RG: n=17) status.

Results: Compared to the NG group, the PD group had higher glucose (PD: 103.3±4.4, NG: 93.3±4.4 mg/dL, P<0.0001) and tended to have higher BMIs (PD: 34.4±2.8, NG: 32.8±4.1 kg/m2, P=0.09) at baseline. Fasting glucose was lowered in NG individuals on both diets after 12 weeks (WG: -2.4±5.4, RG: -1.4±4.8 mg/dL); however, glucose reductions in PD participants occurred on the WG diet only and not the RG diet (WG: -7.5±5.3, RG: 0.3±5.4 mg/dL; P =0.08). PD individuals on the RG diet tended to experience weaker reductions in BMI (P=0.07), % abdominal fat (P=0.06), CRP (P=0.09) and IL6 (P=0.03) compared to the other subgroups – PD on the WG diet and the NG group. PD was completely resolved on the WG diet (n=9/9) and in only 13% (n=1/8) of the RG group.

Conclusions: For individuals with prediabetes, all RG products should be substituted with WG to aid in glucose and weight control.

Key words: whole grain, cardiometabolic, prediabetes

PO571

BIVARIATE ANALYSIS: AGREEMENT BETWEEN VALUES OF WAIST CIRCUMFERENCE OR BODY MASS INDEX IN THE DIAGNOSIS OF EXCESS FAT IN ADOLESCENTS

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Background and objectives: Reassess relations between the diagnosis of nutritional risk based on body mass and body composition is an addition important for study of nutritional assessment. Objective: To assess the performance of the BMI or WC in the diagnosis of excess fat in adolescents.

Methods: We used data of 1816 adolescents in the study 'Health and nutrition of schoolchildren the city of Sao Paulo.' Nutritional status was described by BMI, WC and body composition - inferred by phase angle and sum of skinfolds. Diagnostic odds ratio (DOR), AUC values and bivariate graphs based on body composition values were analyzed to assess the ability of BMI and WC in screening for adiposity according to BMI classifications (reference Brazilian and international) and the criterion of WC (reference Dutch).

Results: BMI and WC shows a positive correlation (r > 0.70) with fat folds. In both sexes, the three criteria suggest proper identification of excess fat mass (AUC ≥ 0.90) and high levels of specificity and sensitivity. The DOR values are 64.6 and 38.6 for BMI by national and international reference, respectively and 38.3 for boys in DC. In girls, the same sequence values are 49.5, 56.2 and 31.9. A comprehensive analysis of indicators, based on the DOR or vector graphic, indicates that the performance of the BMI is greater than the WC in both sexes. The bivariate analysis of the body compartments used in this study is noteworthy since the same analysis gathers standardized values of two different dimensions of body composition.

Conclusions: Overall performance of BMI to discriminate between individuals with and without excess body fat is higher than WC. The results support the use of BMI for monitoring the health of adolescents and, for the first time present this evidence based on bivariate analysis of body composition.

Key words: Body Composition. Nutritional Assessment.

PO572

FINDING EVIDENCE TO DEMONSTRATE THE EFFECTIVENESS OF HUMAN-RIGHTS BASED APPROACHES TO NUTRITION AND HEALTH PROMOTION

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Background and objectives: Promoters of human Rights (HR) submit that all people should be well-informed about HR, empowering them to claim their rights. HR principles oblige governments to promote, protect, and respect HR. Sixty years after the Universal Declaration of HR (UDHR), and 20+ years since the Convention on the Rights of the Child (CRC), many adults and children are deprived of one or more basic HR. A HR framework offers the most substantial approach to nutrition and health promotion, by addressing cause and effect. The study aimed to document available evidence of the effectiveness of a HR-based approach in promoting nutrition and health among two vulnerable groups, women and children, in order to justify its adoption by the global community.

Methods: A literature review of scientific and peer-reviewed articles, and grey literature was carried out to identify sources of evidence on the effectiveness of a HR-based approach to nutrition and health promotion within the past decade. Case studies were developed on HR-based nutrition and health promotion in Mali, Ethiopia and the United States of America (USA).

Results: A lack of research on the effectiveness of rights-based approaches to nutrition and health promotion has resulted in the scarce availability of scientific evidence to justify their adoption by governments and other duty-bearers. Needs-based approaches are more widely known and assessed, possibly discouraging substantial shifts to rights-based frameworks.

Conclusions: A HR framework to promote global maternal and child health is promoted universally as the most appropriate, holistic, effective and sustainable approach to public health and nutrition promotion, yet lacks substantial scientific evidence to demonstrate its relative or overall advantages, compared to needs-based approaches. Further research is vital to gather evidence on interventions in order to justify the adoption of rights-based approaches to nutrition and health promotion.

Key words: HR-based approach, effectiveness

PO573

ASSOCIATION OF BMI AND NUMBER OF SIBLINGS AMONGST CHILDREN IN PERU: RESULTS OF A LONGITUDINAL STUDY

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Background and objectives: The number of siblings has been shown to be one of the factors associated with overweight and obesity in children. This study evaluated the association between number of siblings and the risk of overweight and obesity in a cohort of children followed in the Young Lives Project, Peru.

Methods: Analysis was conducted on longitudinal data of 1870 children measured on 3 occasions: round 1: 5 and 22 months of age; round 2: 53 and 75 months; round 3: 85 and 105 months. Nutritional status was evaluated using BMI Z-score (WHO 2006). Overweight/obesity was classified as z-score > 1 SD. The OR for risk of overweight/obesity was the independent variable and the number of siblings as categorical variable: 0, 1 and 2 or more siblings. Data was weighted according to the study design and adjusted for sex, age of child at round 1, maternal BMI and education, a household well-being index and geographic region (Lima, coastal Peru, highland or rain forest).

Results: 37%, 23% and 23% of the children had no siblings at rounds 1, 2 and 3 respectively. 25%, 30% and 31% had 1 sibling at each round respectively. Having 2 or more siblings was associated with 36% lower risk of overweight and obesity than no siblings when comparing data between rounds 1 and 3 (OR: 0.64; IC 95%:0.42-0.97) and 41% lower risk between rounds 2 and 3 (OR: 0.59; IC 95%: 0.39-0 .88).

Conclusions: Having siblings was associated with lower risk of overweight and obesity. The number of siblings could favour greater activity of the children and/or the distribution of food consumed in the household. Studies are required to identify the factors that favour lower risk.

Key words: obesity, overweight, siblings, Young Lives, Peru

PO574

GUIDELINE DEVELOPMENT BASED ON CONSUMER NEED

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Background and objectives: Nutrition-focussed guidelines usually commence with a review of the evidence and only once the core guidelines have been developed are attempts made to accommodate the range of issues important to consumers. We

propose that to improve the relevance and understanding by consumers that guideline development should commence with an assessment of consumer needs and understanding and an identification of factors influencing their food and nutrition behaviours. These should guide the evidence reviews and guidelines framework rather than vice versa. The objective of this study was to assess the content of guidelines driven by an assessment of consumer needs compared against statement derived from a traditional evidence review.

Methods: Prior to the development of a set of guidelines for weight management in the community, we undertook a review of the literature and defined the key messages supported by that review. The guideline development process took a different route beginning with consumer focus groups to identify current consumer understanding, priorities around weight and their perceived needs for information. Literature reviews then focussed on addressing those needs and correcting any consumer misunderstanding around weight control. The final guidelines were developed by a health communications group. We compared our purely evidence-based statements against these guidelines to identify any key variations.

Results: There was a good level of agreement between the two sets of messages but divergence in the way messages were framed, the priority they were given and the level of tailoring to different sectors of the population. The consumer guidance also addressed issues defined as important by consumers but not by the evidence review.

Conclusions: Consulting with consumers early in guidelines development process does not pervert the evidence base and may allow guidelines to be more relevant and engaging to consumers.

Key words: Guidelines, consumers, behaviour change, obesity

PO575

THE USE OF PARTICIPATORY, COMMUNITY-LED VIDEOS IN INDIA: PUSHING NEW BUTTONS FOR NUTRITION, LIVELIHOODS AND AGRICULTURE

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Background and objectives: SPRING, USAID's flagship global nutrition project, has developed a strategic alliance with Digital Green, a US/India-based NGO, to adapt and test their agriculture-centric, "human-mediated approach" for the promotion of nutrition, livelihoods and agriculture linkages; and high-impact nutrition and hygiene practices in Odisha, India. Building on an agricultural extension platform for the development/ dissemination of participatory videos, community videographers showcase improved practices, often starring early adopters of high-impact behaviors.

Methods: The adaptation of the Digital Green model was piloted in thirty villages in two blocks of Keonjhar District. Community-led formative research informed the development/ adaptation of a UNICEF training package for a range of community agents involved in the project, and the production of context-specific nutrition and agriculture-focused video content. Activities are supported by a local community-development NGO, where community agents use low-cost video cameras, simple editing equipment, and battery operated pico projectors for bi-weekly disseminations. Videos feature mothers and other community members, speaking in their own language, about their individual personal experiences with selected key nutrition practices. The approach uses a "dialogue" or "reflective" process among peers, rather than a traditional nutrition education approach of outside "experts" informing clients. Data on intention to adopt, and verification of adoptions of key behaviors is collected and organized using near real-time analytical dashboard, facilitating decision-making and the production of subsequent videos.

Results: This new application of participatory video for nutrition social and behavior change is stimulated high interest within both the nutrition and agriculture communities. Routine behavior adoption data, and implementation tools are being compiled to provide guidance for adaptation, and scale-up.

Conclusions: This project highlights the potential of community-led video for fostering both social and individual behavior change. Tools, videos and findings from monitoring related to behavior adoption will be shared with participants.

Key words: participatory video, behavior change

PO577

BODY IMAGE, DISTURBED EATING ATTITUDES, WEIGHT CONTROL BEHAVIORS OF FEMALE MIDDLE SCHOOL STUDENTS ACCORDING TO THE BODY MASS INDEX

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Background and objectives: Perception of body image is the potential predictor of attitude for the diet. Misconception for body image for female students is unexplored in Korea. In this study, body shape satisfaction, eating attitude and weight control will be examined by the Body Mass Index(BMI).

Methods: 407 female students (aged 12-16 years), completed the survey. Satisfaction of self-body shape, Risk of Disturbed Eating Attitudes(Eating Attitude Test : EAT-26), and Weight control Behavior are examined. Height and Weight were measured. Cutoff points for gender–and age–specific BMI percentile were based on the 2007 Korean National Growth Charts. Data were analyzed using SPSS(Ver 18.0).

Results: Distribution of the subjects by BMI were 1.8% of underweight, 73.2% of normal, 14.2% of overweight, and 10.9% of obese. There are significant differences between self perceived current body image and self perceived ideal body image. The dissatisfaction of body image is higher in obese than other groups(p<0.001). 51.3% of studied female students unsatisfied with their body image, while 2.6% were very satisfied. Among unsatisfied students with their body image, underweight were 3(42.9%), normal were 150(52.1%), overweight were 23(42.6%) and obese were 25(58.1%). EAT-26 total scores were significantly higher in obese group(overweight :16.50 9.03, obese :16.33 7.16) compared with nonobese group (underweight :10.71 1.79, normal :13.72 8.10)(p<0.05). Attempted to weight control were significantly different by BMI (p<0.001).

Conclusions: This study concludes that there are desire to become thin in female students, even those with normal BMI. Many female students are dissatisfied with their Boby image. It is harmful to their health and nutritional status. These finding suggest there are needs to encourage female students for maintaining health weight. Higher score of EAT-26 was associated with dissatisfaction of self- body image. It leads to unhealthy behaviors among obese female students.

Key words: Eating Attitude Test, BMI

PO578

FACTORS ASSOCIATED TO AUTO-DECLARED HYPERTENSION IN A POPULATION-BASED STUDY IN CAMPINAS/SP - BRAZIL

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Background and objectives: Hypertension is a chronic health problem,associated to complications that decreases quality of life and increase health expenses. Objectives: To describe demographic, socioeconomic and health variables associated with hypertension.

Methods: Cross-sectional study with a population-based random sample of adults 18 years or older living in an industrial city of one million inhabitants in tha state of Sao Paulo. A household survey was carried out in 2011-2012 and 546 people were interviewed. Hypertension was considered present when people informed that they had had this diagnose made by a physician. A multiple logistic regression model was built with independent variables that were associated with hypertension at a significance level of less than 0.20 in the univariate logistic regression; variables with p <0.05 remained in the final model.

Results: The prevalence of hypertension was 31.6% varying from 13.3% among 20-34y to 56.4% among 60y and older. The only food meaningfully associated to hypertension was eating green leaves less than daily (OR 1.79 95%CI1.19-2.69). Variables that remained in the final regression model were age range, occupation, having cholesterol problem, diabetes and overweight/obesity defined by anthropometry; with a higher chance of hypertension among people 50 years and older (OR 2.52, 95%CI 1.57 - 4.04) (p <0.001); without formal permanent occupation (OR 2.08 95%CI 1.20-3.60) (p = 0.008), cholesterol problem (OR 2.38 95%CI 1.49-3.79) (p <0.001), diabetes (OR 2.64, 95%CI 1.37-5.07) (p=0.004) and overweight/obesity (OR 1.72, 95%CI 1.03-2.88) (p=0.040). Although being in hypertension on the mean of three measures of arterial pressure at the survey is correlated to the dependent variable, it was included in the model because the correlation coefficient was relatively low (0.280) (OR 2.63, 95%CI 1.60-4.32%) (p<0.001).

Conclusions: health factors associated to hypertension are those described to integrate the metabolic syndrome.

Key words: hypertension; diabetes; obesity, chronic diseases

PO579

EXPERIMANTAL DESIGN OF REVERSED-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC CONDITIONS FOR SIMULTANE DETERMINATION OF CAFFEINE, ALLURA RED, PONCEAU AND CARMOISINE

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Background and objectives: Box-Behnken design for three factors and three levels was applied to optimize the chromatographic conditions of the RP-HPLC separation of caffeine, allura red, ponceau and carmoisine. Using the C18 reversed phase column, the influence of pH, flow rate and solvent ratio of mobile phase were investigated. To study of effects of selected three factors fifteen runs are used. The resolution was chosen as analytical response. The optimum conditions for this determination were found to be pH 7, flow rate 1.2 mL-1 , solvent ratio 20:80 acetonitril/buffer . As a result the separation is accomplished in a short analysis time with a good resolution for all components peaks of interest. The optimized method was successfully applied to the determination of caffeine, allura red, ponceau and carmoisine in food.

Key words: Caffeine, allura red, ponceau, carmoisine, RP-HPLC determination.

PO580

KETOGENIC DIET [KD] AS A SUCCESSFUL TREATMENT FOR FEVER INDUCED REFRACTORY EPILEPSY SYNDROME [FIRES]

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Background and objectives: Status Epilepticus [SE] is associated with a high risk of morbidity and mortality despite the availability of Anti Epileptic Drugs [AEDs]. OBJECTIVE : To establish the role of KD in Refractory Status Epilepticus [RSE].

Methods: A 7 yr ,6 months old boy with FIRES successfully treated with KD

Results: A previously healthy , male admitted to the Pediatric Intensive Care Unit [PICU] with recurrent partial seizures with secondary generalization. EeG showed electrographic seizures from bilateral temporal lobes with generalization. Treated with multiple AEDs including Valproate, Levetiracetam, Phenobarbital and Phenytoin but electrographic seizures persisted. Midazolam infusion did not stop the seizures. Intravenous Methylprednisolone was ineffective.IVIG was initiated but seizures continued. A 4:1 ratio KD was initiated via nasogastric tube,after which he experienced significant improvement in seizure control. Seizures stopped by day 5 of initiating the KD. Later, the patient developed choreo-athetoid movements, which resolved spontaneously over 2 weeks. Autoimmune work up including NMDA antibodies was negative. At 3 months follow-up, patient has remained seizure free on KD and anti convulsants. Repeat EEG shows only mild background slowing without any interictal epileptiform abnormalities.

Conclusions: After achieving seizure control with concurrent use of KD and AEDs the patient has continued to make progress in motor and cognitive function. FIRES associated SE patients may benefit from the inclusion of KD in their treatment regimen.

Key words: Ketogenic Diet, SE, FIRES

PO581

COMPARISON OF INFANT FEEDING PRACTICES IN TWO HEALTH SUB-DISTRICTS WITH DIFFERENT BABY FRIENDLY STATUS IN MPUMALANGA PROVINCE

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Background and objectives: To assess the impact of the implementation of the Baby Friendly Hospital Initiative on infant feeding practices in two sub-districts with different Baby Friendly status.

Methods: The design was a cross sectional, descriptive, observational study with an analytical component. The study population consisted of mothers with infants from birth to six months old, attending postnatal care at primary health care facilities in the two sub-districts on the days of data collection. Data was collected through two interviewer-administered questionnaires. In Emalahleni (all public health facilities were Baby Friendly), 218 mother-and-infant pairs took part in the study and 217 in Mbombela (none of the facilities were Baby Friendly), totalling 435 respondents. Five infant feeding indicators were used in data analysis, namely: early initiation of breastfeeding; exclusive breastfeeding, exclusive replacement feeding and mixed feeding rates and the age of introduction of complementary foods.

Results: In Emalahleni, 11.5% (n=25) of the infants received infant formula as a first feed, compared to 34.7% (n=75) of the infants in Mbombela. Early initiation of breastfeeding occurred in 70.2% (n=134) of the breastfed infants in Emalahleni, compared to only 39.4% (n=54) of the infants in Mbombela. The exclusive breastfeeding rate was significantly higher in Emalahleni (n=131; 60.1%) compared to Mbombela (n=103; 47.5%). Mixed feeding rates did not differ significantly between the two sub-districts. The mean age of introduction of complementary foods were 45 days, ranging from birth to 4 months, which is earlier than the recommended age of 6 months.

Conclusions: The implementation of the BFHI is associated with more optimal infant feeding practices among mothers with children under 6 months of age. It is concluded that strengthening of the implementation of the BFHI will improve infant feeding practices at a community level.

Key words: Baby Friendly Hospital Initiative, Infant feeding practices, Breastfeeding

PO582

ASSOCIATION BETWEEN VITAMIN B12 STATUS AND NEURAL ACTIVITY ACROSS LIFE CYCLE: AN INDIAN SCENARIO

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Background and objectives: The true prevalence of vitamin B12 deficiency in India is unknown, however it is likely to be high which may impair absorption of vitamin B12. Objectives: To compare cardiac autonomic, peripheral neural activity and cognitive functions in elderly and young adults stratified by vitamin B12 status and following vitamin B12 supplementation. To assess autonomic nervous activity in children born to women with vitamin B12 deficiency during pregnancy.

Methods: 47 healthy elderly subjects, 79 healthy children born to deplete and replete mothers and 34 young adults were evaluated. All subjects underwent plasma vitamin B12, anthropometry, heart rate variability (HRV), peripheral neural and cognitive assessment. Young adult and elderly subjects also underwent vitamin B12 supplementation for 3 months. In subsample plasma MMA and Hcy were also estimated.

Results: Low frequency (LF) HRV was significantly lower in elderly participants with low vitamin B12 levels; this was reversed with supplementation. LF HRV reduced significantly (by 53%) in children of vitamin B12 deplete mothers (P=0.03). There was a significant association between LF and total power HRV with cord blood vitamin B12 levels. There was no difference in cardiac autonomic function in young adults of low vitamin B12 levels as compared to those of higher status. However, in a subgroup analysis there was a strong negative association between MMA and LF-HRV (r=-0.80, P=0.01).

Conclusions: Cardiac autonomic nervous activity is reduced in vitamin B12 deficient subjects across the entire life cycle. Cardiac autonomic nervous changes in vitamin B12 deficient subjects occur in the absence of peripheral neural and cognitive deficits. Plasma MMA is more strongly associated with HRV measures than plasma vitamin B12. Vitamin B12 supplementation in elderly vitamin B12 deficient subjects is associated with a significant improvement in cardiac autonomic activity.

Key words: Vitamin B12, Healthy, Autonomic nervous system, Heart rate variability, life cycle

PO583

FOOD NUTRITIONAL TABOOS AMONGST ESAN WOMEN IN EDO STATE, NIGERIA

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Background and objectives: Food taboos can be described as beliefs that forbid the ingestion of certain foods that are highly nutritious by a particular group of people. These taboos most of the time are maintained by culture, beliefs, religion, customs and-economic status of specific groups. This paper examines food nutritional taboos among the Esan women in Edo State, Nigeria. women aged 20 years and above in the five Local Government Areas in Esanland in Edo State were the study partiicipants.

Methods: Data were collected using a questionnaire and focus group discussion. The data collected were analysed using descriptive statistics.

Results: The result revealed among others that food nutritional tabomos is one of the harmful traditional practices that exists among the Esan people of Nigeria; that its perceived harmfulness is very high and its prevalent rate is also high. The factors that subsist the practice include the following: fear of what will happen if they disobey the tradition by eating the forbidden foods; obedience to traditional norms and values and religious beliefs.

Conclusions: Based on the findings and conclusion, recommendations are advanced which includes, eradication of taboos through advocacy, mobilization, capacity building and service delivery, government intervention and institution of health education programmes that will include healthy nutrition for the masses, educating them on the disadvantages of food taboo practices and these are to be disseminated using television, mass campaign media,mobilization of community leaders and one-one reach programme for rural dwellers.

Key words: Nutrition, Advocacy, Mobilization, Health Education

PO584

NUTRITIONAL AND TOXICOLOGICAL EVALUATION OF OIL PALM ORYCTES RHINOCEROUS LARVA OIL

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Background and objectives: Oil palm rhinoceros beetle larva (popularly called itu in Southwest Nigeria) is considered as a delicacy in Nigeria and are collected for food. It is indeed a good source of protein and other nutrients and it is sold along road side in the Niger Delta region of Nigeria. The oil does not contain any unusual fatty acids, and it is a rich source of essential fatty acids C18:2 and C18:3 that make up 60.3% of its total fatty acid composition.

Methods: Acute toxic potential in rats and the systemic effects and nutritional quality were assessed in a 13 week feeding study in weanling albino rats using a diet containing Oryctes larva oil (OLO) or soybean oil (SBO) (as the control) at a 10% level as the sole source of dietary fat. RSO did not manifest any acute toxic potential. Food consumption, growth rate and feed efficiency ratio of rats fed OLO were similar to those fed SBO.

Results: The digestibility of this oil was found to be 95%, as compared to 97% for SBO. There were no macroscopic or microscopic lesions in any of the organs which could be ascribed to the OLO incroporation in the diet.

Conclusions: Thus the current data show that OLO could be used for edible purposes. However, it will be necessary to process the oil to remove free fatty acids to make it organoleptically acceptable.

Key words: Oryctes rhinocerous larva, oil, nutritional quality

PO585

NUTRICION EN LA AMERICA LATINA

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Estudios acerca de nutricion en America Latina y Brasil incluyendo la alimentacion en escuelas de primer grado y problemas relaccionados con la salud. Conclusiones - 45% de las escuelas no tiene una alimentacion adecuada a la edad

PO586

EFFECT OF TWO-DAYS SEVERE CALORIE RESTRICTION ON ADIPOKINE SECRETION IN SUBCUTANEOUS ADIPOSE TISSUE IN OBESE WOMEN

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Background and objectives: Beneficial metabolic effects of calorie restriction are found in the early stage after bariatric surgery procedures or during very-low-calorie diet (VLCD) regimens. They appear before a marked weight reduction occurs and may be caused by calorie restriction per se. Modulation of endocrine function of adipose tissue could play a role in this process. The aim of this study was to examine the secretion of adipokines in adipose tissue during early stage of VLCD.

Methods: 13 obese women (BMI 33,3+/-1,3 kg/m2, fat mass (FM) 40,2+/-2,5 kg) were examined at the 3rd and 60th day of VLCD (providing 3400 kj/day). Body composition (using bioimpedance), blood sampling and needle biopsies of subcutaneous abdominal adipose tissue (SCAAT) were performed. Secretion of a set of adipokines (leptin, interleukins (IL) -6,-8,-10, TNFalpha, macrophage-chemoattractant-protein (MCP-1)) was measured in the conditioned medium of the biopsy-derived explants of SCAAT incubated in Krebs/Ringer phosphate buffer for 4 hours. Insulin resistance was assessed using Homeostasis Model of Assessment (HOMA-IR).

Results: On day 3, body FM did not change (40,2+/-2,5 vs 40,1+/-2,6 kg, NS), HOMA-IR was lower (2,41+/-0,25 vs 1,64+/-0,16, $p<0,01$) and secretion of all of the adipokines was not changed when compared with the pre-diet condition. On day 60, FM was lower ($p<0,001$), HOMA-IR was lower ($p<0,01$), secretion of leptin was lower ($p<0,05$) and secretions of IL-8, IL-10, MCP-1, and TNFalpha were higher (for all of them $p<0,05$) when compared to the pre-diet condition.

Conclusions: Secretion of adipokines from SCAT is not changed at the early stage (3rd day) of VLCD. This suggests that the diet-induced modulation of adipokine secretion in adipose tissue is not involved in pathogenesis of the early metabolic changes induced by severe calorie restriction without weight loss.

Acknowledgement: Study was supported by PRVOUK grant of MSMT Czech Republic

Key words: very-low-calorie diet, adipose tissue, adipokine

PO854

IMPACT OF PERINATAL DIFFERENT INTRAUTERINE ENVIRONMENTS ON CHILD GROWTH AND DEVELOPMENT IN THE FIRST SIX MONTHS OF LIFE – IVAPSA BIRTH COHORT

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Background and objectives: Epidemiological studies in different parts of world have shown the relation between the influences of perinatal events and impact the individual's health in the medium and long term. The aim was describe the effects of variations in perinatal environmental on children's health in the first six months of life.

Methods: This is a thematic, prospective, birth cohort to assess the interactions between the maternal phenotype during gestation (maternal smoking, hypertension, diabetes-DM, intrauterine growth restriction-IGR) and their associations with outcomes related to growth, behavior and neurodevelopment. Participants were postpartum women assisted by Grupo Hospitalar Conceição and Hospital de Clínicas de Porto Alegre (HCPA) residing in Rio Grande do Sul, Brazil. Six interviews were performed at home (7, 15 days and 3 month) or at the clinical research center (CRC) in HCPA (postpartum, 1 and 6 month). Interviews were conducted with 90 mother-child pairs (16 DM; 24 smoking; 13 hypertension; 10 IGR; 27 control groups). The main race reported was Caucasian (54). The mean age was 26.3 years (16.5-41.5 years) and the average education was 8.63 years. Only 18 (20%) women reported being unmarried.

Results: Multiparous were 60 (66.7%), with an average of 2.05 (± 1.32) children. The average family income was 670.3 (± 331) dollars. The average number of people living in the home was 4.9 (2-13 persons). The average Body Mass Index before pregnancy was 25.3 kg/m² (overweight). Most of the children were vaginal delivery (51), being more prevalent in boys (47). Mean weight, length and head circumference of children at birth was 3132.1 (± 538.0) g, 47.7 (± 2.6) cm and 33.9 (± 1.7) cm, respectively.

Conclusions: The research is not concluding and the sample is small and descriptive results, but we emphasize the following schedule and meeting the targets set in relation to outcomes.

Key words: Infant, DOHaD, Programming, Barker hypothesis.

PO1425

WORKING TIME CAN INFLUENCE DIET QUALITY

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Background and objectives: Shift work is known to increase risk for chronic diseases. To prevent the harmful effects more detailed knowledge of shift workers' lifestyle habits are needed. Particularly studies on women are lacking. Our aim was to determine the effect of different working times on dietary intake.

Methods: The occupational health care of an airline conducted type 2 diabetes prevention programme. The health check-up included physical examinations, laboratory tests and a questionnaire containing a validated 16-item food intake questionnaire. Intake of fat (E%), saturated fat (E%), sucrose (E%), fiber (g), vitamin C (mg), vitamin D (μ), and iron (mg) were calculated. Altogether 1347 employees were eligible for analyses. They were divided into three working time groups: day work, shift work and in-flight work. Nutrient intakes between the working time groups were compared using analysis of variance.

Results: In men, the energy intake from fat and saturated fat was the highest in shift work group and the lowest in in-flight work group (fat 33.4 E% vs. 32.5 E%, $p<0.05$; saturated fat 12.4 E% vs. 12.1 E%, $p<0.05$). After adjustment for age and education the differences between the groups were no longer statistically significant. Male in-flight workers had lower intake of iron than the other male workers. In women, energy intake from sucrose was the highest in in-flight work group (8.8 E%) compared with day work group (8.3 E%, $p=0.02$). Adjustment for age, education, or stress did not affect the association. There were no differences between the groups in the intake of fiber, vitamin D, or vitamin C among men or women.

Conclusions: Irregular working hours may impair diet quality and increase the risk for chronic diseases. Nutrition counselling should be part of shift workers' health check-up to lower the risk for chronic diseases.

Key words: shift work, diet quality

PO1697

THE RELATIONSHIP BETWEEN SUBJECTIVE SYMPTOMS OF COMPLAINT AND DIETARY, EXERCISE HABITS OF SCHOOLCHILDREN

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Background and objectives: Physical and psychiatric complaint?are increasing problem among Japanese schoolchildren. The purpose of this study was to examine the relationship between subjective symptoms of complaint and the dietary and exercise habits in schoolchildren.

Methods: A questionnaire on fatigue content, physical and psychiatric complaints of 19 items was administered to 166 male and 170 female schoolchildren 5th grade, and data from properly completed questionnaires were analyzed by the ?2 test and a p-value of less 0.05 was considered to indicate a significant result.

Results: In male, fatigue in the whole body was related to low frequency of protein products and vegetable at breakfast, want to lie down was low frequency of protein consumption at breakfast and dinner, feel stiff in the shoulders was low frequency of vegetable at dinner, ach of waist and hand was low frequency of dinner, dizziness was low frequency of dinner and high midnight snacks, in males. In females, feel stiff in the shoulders was related to high frequency of protein products consumption at dinner and midnight snacks, constipation and diarrhea were related high frequency of protein products consumption at dinner and midnight snacks, constipation and diarrhea were related high frequency of dinner and midnight snacks consumption.

Conclusions: Complaint was related to low frequency consumption of protein products and vegetables, vegetables at breakfast and dinner, and low frequency of dinner, high frequency consumption of midnight snacks in males. In females, Complaint was related to high frequency consumption of protein products at dinner and midnight snacks.

Key words: Schoolchildren, Complaint, Dietary habits, Exercise habits

PO1439

EFFECT OF DIFFERENT PHYSICAL ACTIVITY ON BONE MINERALS IN RATS

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Background and objectives: It is well known that osteoporosis are affected by aging and insufficiency gravity stimulus as the human walking. The present study investigate the influence of such resistance training as drop jump compare to low impact exercise as swimming in improving of bone minerals.

Methods: The study was carried out with 21 Wister rats divided into three groups each 7 rats, i.e. resistance exercise, low impact exercise and control. It is well known that osteoporosis are affected by aging and insufficiency gravity stimulus as the human walking. The present study investigate the influence of such resistance training as drop jump compare to low impact exercise as swimming in improving of bone minerals. The experiments were performed after basically 5 weeks breeding. During experiments periods for 8 weeks all animals were given standard laboratory diet and water feed freely per day. It was increased physical activity effects on drop jump from 25cm(1 week), 30cm(2 week), 35cm(3 week) to 40cm(4-8 weeks) as hight impact training. In swimming group exercise were performed swimming 1 hour per day in 5 times per week by automatically pumping wave. The present study was carried out allowed experiments on laboratory animals in Nippon Sport Science University accordance to the princeples of laboratory animal care.

Results: No significant changes in body weight in response from initial week to until 5 weeks were observed. Significant change in increasing was observed in 6 and 7 weeks training body weight ($p<0.05$). After each one week exercise, hole femoris bone was isolated, bone density diagnosis both bone mineral content(BMC,g) and bone mineral density (BMD, g/cm^2).One-way ANOVA was used for statistical analysis of data between difference group, and $P<0.05$ was accepted for significance.

Conclusions: We observed more increased BMD in high impact training. However there was no significant difference in muscle mass.

Key words: training, bone minerals

PO3299

CAFFEINE PREVENTS EXPERIMENTAL LIVER CIRRHOSIS BY SNAIL-1 INHIBITION AND NRF2 ACTIVATION

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Background and objectives: Activation of hepatic stellate cells is crucial in liver fibrosis, which is perpetuated by growth factors and pro-inflammatory molecules. Caffeine has been shown to be able to modify these events in vitro studies. The aim was to determine if caffeine prevents experimental liver cirrhosis.

Methods: Liver cirrhosis was induced in Wistar rats. Animals were treated with caffeine (15mg/kg/day). The fibrosis degree and inflammatory infiltrate were evaluated and classified by Knodell index. Inflammatory infiltrate was quantified by immunohistochemistry. Gene expression was analyzed by QRT-PCR for Col-1, CTGF, TGF-β1, TNF-β, IL-1β, IL-6, SOD and CAT. Nrf2 and the activation of Snail-1 was analyzed by western blot. Expression of TNF-β was checked by ELISA, and the activity of SOD and CAT antioxidant enzymes was determined by zymography.

Results: Treatment with caffeine decreased fibrosis index. Knodell index also showed lower levels of fibrosis and necroinflammation. Expression of pro-fibrogenic genes CTGF, Col-1 and TGF-β1, and pro-inflammatory genes TNF-β, IL-6 and IL-1β significantly decreased in rats that received caffeine. Caffeine treatment decreased CD11b positive areas. SOD and CAT expression was greater in animals treated with caffeine, and we found a strong correlation with the enzymatic activity. Lower levels of the transcription factor Snail-1 were detected in treated rats, in contrast to NRF2, which increased in the presence of caffeine.

Conclusions: Our results suggest a potent effect of caffeine to limit pro-fibrogenic and pro-inflammatory response even in the presence of an inducer of liver cirrhosis. The mechanisms by which caffeine acts involve inhibition of transcipcional factor Snail -1, down-regulation of the expression of pro-fibrogenic genes as well as the activation of transcription factor Nrf2 which in turn activate the antioxidant enzyme systems, resulting in the prevention of inflammation and fibrosis. This results could be applied in different types of fibrosis.

Key words: Caffeine, hepatic cirrhosis, antifibrogenic, anti-inflamatory, antioxidant.

PO3301

ERYTHROCYTE ZINC PROTOPORPHYRIN IN SOUTH AFRICAN CHILDREN IS NOT AFFECTED BY LOW LEVEL LEAD EXPOSURE BUT BY SAMPLE PREPARATION (FREEZING)

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Background and objectives: Increased erythrocyte zinc protoporphyrin (ZnPP) is an indicator of iron deficiency (ID), along with serum ferritin (SF) and transferrin receptor (TfR). However, ZnPP may also be elevated by lead exposure and chronic lead poisoning is widespread in poor urban areas. Our objective was to determine the usefulness of ZnPP as an indicator of ID in the presence of elevated serum lead (SPb) and to test the impact of freezing samples on the results.

Methods: We analyzed iron, lead and infection (C-reactive protein (CRP)) status in 1'106 South African children in an area with low infection rate and high prevalence of moderately increased SPb. In a subsample (n=190), we measured ZnPP additionally in fresh samples. The relationship between ZnPP and SPb was assessed using multiple-regressions with SF and TfR as co-variants. ID prevalence for each indicator was determined using established cut-offs. Correlation between fresh and frozen samples was determined using Pearson's correlation coefficient. Results: Prevalence of infection was 2.6% (CRP>10 mg/L) and did not affect the results significantly ($p>0.05$). ID prevalence ranged from 4.9% (SF) to 100% (ZnPPfrozen) and mean SPb was 5.3 µg/dL (Bootstrapped 95%-CI 5.0-5.5 µg/dL). We found no significant relationship between SPb and ZnPP ($p> 0.05$), even after correction for SF and TfR. ZnPP in fresh and frozen samples correlated well ($r=0.988$, $p<0.001$), but showed an intercept of 24 µmol/mol heme, partially explaining the high ID rate according to the latter. Prevalences vary as they reflect different ID stages and due to the chosen cut-offs.

Conclusions: ZnPP is a promising indicator for iron status due to the simplicity of use in a field setting. However, before

its use can be advocated, adequate cut-offs for fresh and frozen samples respectively are needed. Also, the lack of effect of moderately elevated SPb on ZnPP needs to confirmation.

Key words: Zinc protoporphyrin, Iron deficiency, Lead

PO3306

BLOOD CELL TRANSCRIPTOMICS AS A SOURCE OF BIOMARKERS OF ARTICULAR HEALTH

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Bakground and objectives: We aimed to explore the feasibility of using total human blood RNA as a source of biomarkers of articular health improvement related to glycosaminoglycan (GAG) intake.

Methods: Healthy individuals with joint discomfort were enrolled in a prospective nutritional randomized, double-blind, placebo-controlled study. The supplemented group ate a yoghurt containing MobileeTM - a preparation containing hyaluronic acid (65%) and other GAGs from rooster comb. The effect of Mobilee intake was evaluated in terms of functional and quality-of-life parameters. Whole-genome microarray analysis of blood samples from a subset of 20 subjects collected pre and post intervention was assessed.

Results: The daily supplementation with Mobilee significantly reduced pain intensity as compared to placebo. 165 known genes were differentially expressed in blood cells between Mobilee and placebo groups post-intervention, but not pre-intervention ($p<0.05$; fold-change>1.2). Some of them are related to GAG metabolism and extracellular matrix dynamics. In particular, a lower expression of glucurodinase-beta, matrix metallopeptidase 23B (MMP23B), xylosyltransferase II and heparan sulphate 6-O-sulfotransferase 1 (HS6ST1) was found in the Mobilee group. Correlation analysis indicated that the higher the expression of MMP23, involved in the breakdown of extracellular matrix, the higher the pain intensity, and the higher the expression of HS6ST1, responsible for 6-O-sulfation of heparan sulfate, the lower the indicators of knee muscular strength.

Conclusions: Genes related to GAG metabolism and extracellular matrix dynamics are differentially expressed in blood cells between the supplement and placebo groups post-intervention, and the expression of some of these genes correlated with indicators of articular pain and muscular strength. Thus, expression levels of specific genes in blood cells could be used as biomarkers of therapeutic benefit of preparations that promotes articular health.

Key words: Biomarker, glycosaminoglycan, articular health.

PO3304

RESISTANT STARCH PROMOTES INCREASED FAT OXIDATION IN HEALTHY ADULTS

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Background and objectives: Resistant starch (RS) is any starch that is not completely digested in upper digestive tract and, so, passes to the bowel where it acts as dietary fiber and is a good substrate for fermentation. This study was conducted to determine the effect of RS consumption on whole body total energy expenditure (TEE) and substrate oxidation in healthy adults.

Methods: This was a randomized, single-blind, cross-over study. 18 healthy adults spent 24h in a whole room calorimeter to measure TEE and substrate oxidation rates in response to two different diets which were matched for total energy and macronutrient content (15% protein, 30% fat, 55% carbohydrate): 1) a digestible starch (DS) diet containing 0% RS, and 2) a RS diet containing 5% RS. All subjects were in energy balance for 3d prior to calorimetry and during the 24h calorimetry period.

Results: There was no difference in TEE or protein oxidation between the DS and RS diets. However, RS consumption caused a 30% increase in fat oxidation ($p=0.049$) with a concomitant 20% decrease in carbohydrate oxidation ($p=0.025$) relative to the DS diet. These data agree with an earlier report which showed that RS consumption increases fat oxidation relative to DS ingestion in adults. The current data, however, show that this is not associated with any change in TEE.

Conclusions: RS consumption, relative to DS, does not cause any change in TEE so its ingestion is unlikely to promote weight loss. However, changes in substrate oxidation that occur in response to a RS diet are likely to cause favorable changes in body composition over time. Thus, RS may prove useful for

successful weight maintenance and could possibly aide obesity prevention in conjunction with other lifestyle factors.

Key words: Resistant starch, fiber, energy expenditure, fat, obesity, substrate oxidation.

PO3300

COMPREHENSIVE LIST OF ENDOGENOUSLY PRODUCED VITAMIN D3 METABOLITES

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Vitamin D3 is essential for the maintenance of human health. It can be obtained either by diet or is synthesized in the skin from 7-dehydrocholesterol under the essential control of UV-B radiation. Vitamin D3 is then metabolized to 25-hydroxyvitamin D3 (25(OH)D3), the prevalent form of vitamin D in serum, and further to its hormonal active form, α,25-dihydroxyvitamin D3 (α,25(OH)2D3). α,25(OH)2D3 acts as pleiotropic endocrine hormone via the transcription factor VDR and is involved in many physiological processes, such as the control of metabolism, cellular growth and immune functions. Some vitamin D3 metabolites, such as 25(OH)D3 or 24,25(OH)2D3, have been well described, while on others detailed information is largely elusive. Based on the triage theory of Ames (PNAS 2006;103:17589-94) additional endogenously produced vitamin D3 metabolites may serve similar functions in the human body as α,25(OH)2D3 or could be used as nutritional biomarkers. In order to obtain a most comprehensive overview on vitamin D3 metabolites, we employed the ontology-based knowledge management (Ontochem) approach. The Ontochem Miner (OCMiner) protocol compiled all published endogenously produced vitamin D3 derivatives formed by the human body. OCMiner uses novel algorithms that allow interconnecting chemical and biological ontologies in published data. The present approach was limited to vitamin D3 metabolites, i.e. vitamin D2, D4, D5, D6 or D7 were excluded. However, already for vitamin D3 we could identify more than 50 vitamin D3 metabolites, which were reported since the 1960's. The finding of this large group of vitamin D3 compounds was surprising and requests future follow-up activities to explore their function and roles. The approach, the vitamin D3 metabolite ontology and potential applications in terms of nutritional biomarkers will be discussed.

Key words: Cholecalciferol, vitamin D3 metabolites, triage theory.

PO3303

PROFILING OF GLYCEMIC INDEX OF RICE SAMPLES USING HIGH RESOLUTION MELTING TECHNOLOGY

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Background and objectives: Currently for regulatory and labelling purposes, the Glycemic Index (GI) of foods has to be determined by in-vivo testing which is expensive and time consuming. Thus, we looked at exploring novel and highly sensitive technology like High Resolution Melting (HRM) technology that was developed recently. HRM is used for the genetic analysis which can detect mutations, epigenetic differences and polymorphisms in double-stranded DNA. In this project, HRM is used to detect polymorphisms such as single base changes (SNPS) in the 16 different rice samples.

Methods: In vivo GI testing of 16 different types of local rice samples were conducted in an accredited GI testing laboratory. This was followed by genetic analysis using HRM technology. Genome sequences of rice were sourced from gene bank, conserved sequences were located and specific primers were designed to distinguish low, medium and high GI of rice samples. Results: The in vivo GI values of the 16 rice samples were categorised based on low, high and medium GI classification. This was then compared with the HRM profile. There a positive correlation between in-vivo GI values and HRM profile of rice.

Conclusion: The HRM technology is a novel, sensitive, cost-effective, high throughput technique, which can be used as a screening tool to characterise various rice samples, which can be beneficial to farmers, traders and end users.

Key words: Glycemic Index, High Resolution Melting technology.

PO3305

ESSENTIALITY OF NUTRIENTS: NEW FRONTIERS

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Background and objectives: The objective was to examine existing definitions of nutrient essentiality and surrounding concepts.

Methods: An environmental scan for scientific literature was conducted January 2013 using combinations of the terms "criteria", "definition", "essential nutrient", "nutrient essentiality", and "conditionally essential nutrient", using the search engines PubMed and Google Scholar. Contemporary nutrition textbooks were also consulted and hand searching carried out within the reference lists of textbooks and articles. Inquiries were forwarded to international regulatory bodies asking whether the terms "nutrient" and/or "essential nutrient" are regulated in their respective jurisdictions.

Results: They were reviewed by a panel of international experts. Results: Based on current definitions, a "nutrient" includes food constituents from six broad categories (minerals, water, carbohydrates, lipids, proteins and vitamins). "Non-nutrients" were defined as food constituents which do not fit in the six aforementioned categories, (e.g., phytochemicals, pigments and additives). Regulatory bodies including EFSA, FSANZ, HC and the US FDA do not currently have regulated definitions for the term "essential nutrient", and generally refer to standard definitions found in textbooks. Definitions for the terms essential nutrient, non-essential nutrient, and conditionally essential nutrient were thus collated from various documents and textbook sources. Other terms have been proposed to describe food constituents which may not be considered essential in the traditional sense yet still provide additional health benefits. These include "lifespan essential" in reference to polyphenols; "physiological modulators", originally proposed for antioxidant vitamins, but also applicable to many other food constituents; and "desirable". The importance of the gut microbiome was not taken into account in the definition of essentiality nor nutrients.

Conclusions: In summary, existing categorization of nutrients as essential needs to be expanded to reflect advances in current science, as well as evolving definitions of the concepts of essentiality.

Acknowledgements: Supported by Danone Institute International.

Key words: Nutrient essentiality, guidelines, recommendations, food.

PO3307

BIOMARKERS OF DAIRY FOOD INTAKE IN ERYTHROCYTES

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Most nutritional and epidemiological investigations study the relationship between the intake of dairy products and the development of cardiovascular disease using dietary surveys to determinate food intake. Coefficients of variation tend to be high, probably due to the high degree of subjectivity of dietary surveys, among other possibilities. In the literature, few studies show that some odd chain fatty acids (FA) (C15:0 and C17:0) and some trans isomers of C16:1 and C18:1 FA can be used as biomarkers of dairy fat intake, because they are present almost exclusively in ruminant foods.

A crossover intervention study was carried out (n=10) in two different groups, for 36 days. Half of the participants followed a daily diet of over 400g of whole fat dairy products during the first 18 days, while the other half had no dairy products. On day 18 both groups change diets. Blood samples were collected at the start, the change of diet and the end of the study.

FAs from erythrocytes were methylated by adding sequentially sodium methoxide and boron trifluoride. FAMEs were extracted with hexane and separated by GC/FID, on a 100 m CpSil88 column. Peak identification was done by retention time and quantification by the internal standard method.

Of the 46 FA quantified, only 8 are presents in dairy foods. The erythrocyte concentrations of C17:0, vaccenic and rumenic acids highly correlated with dairy food intake (r=0,7332; r=0,7689; r=0,7804; P<0,05; respectively). These FA could be used as biomarkers of dairy food intake.

Key words: Biomarkers, dairy fat, fatty acid, erythrocytes.

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T2. Nutrition through life course

PO444

A SYSTEMATIC REVIEW AND IMPLEMENTATION EVALUATION OF FEEDING PROGRAMMES FOR INFANTS AND YOUNG CHILDREN: FINDINGS AND IMPLICATIONS

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Background and objectives: Under-nutrition contributes to five million deaths of children under five each year. Throughout the life cycle, under nutrition contributes to increased risk of infection, lowered cognitive performance, chronic disease in adulthood, and mortality. In order to intervene effectively, we need to understand what works, what doesn't, and why. The aims of the present study were: 1to assess the effectiveness of feeding programs for children aged three months to five years. 2 To undertake an implementation evaluation.

Methods: We included RCTs, CCTs and CBAs. Programs provided energy and nutrients through: hot or cold meals, snacks, take-home or home-delivered rations. Recipients had to be aged three months to five years, from all countries. We used standard systematic review methods and evaluated implementation, including nutritional quality of the food.

Results: Searches identified 29387 papers: 290 were retrieved and 28 studies met inclusion criteria; 26 were from LMIC. Energy provided in 15 studies ranged from 20% to 157% of the recommended daily allowance (RDA) and protein ranged from 18% to 425% of the RDI. Our meta-analyses showed small (.26 cm) significant effects on height gain in RCTs, but no other effects on growth. A few studies showed effects on cognitive ability (SMD = 3.06, 95% CI = 2.6 to 3.6) and psychomotor development (SMD = 1.4, 95% CI .56 to 2.2) in RCTs. We will present results of subgroup analyses by age, initial nutritional status, nutritional adequacy, and delivery mode. Our implementation review identified potential reasons for the ineffectiveness of some programs, including: inadequate energy, redistribution of food within the family, lack of supervision, pipeline breaks, caregiver stress and child disease.

Conclusion: This review provides evidence that feeding programs for young children can work, but that many do not. Our review suggests several ways that program design can be improved.

Key words: Feeding programs, implementation, systematic review

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PO587

SUPPLEMENTRY FOOD FOR LACTATING MOTHERES

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Background and objectives: Previous survey revealed deficits and nutritional deficiencies among the Egyptian vulnerable groups. Protein energy malnutrition had seen most frequently in infant and young children especially in rural areas and among families of low income. Accordingly, this study aimed to prepare high protein supplementary food for lactating mothers to protect them against malnutrition and its associated diseases.

Methods: Two formulas were prepared based on indigenous commodities through twin extruder technique capable of meeting nutritional requirements at minimal cost. These formulas consisted of extruder mixture of wheat semolina, soy protein, yeast, fenugreek, skimmed and full cream milk powders, sugar, lecithin, 13 vitamins and 10 minerals were fed to 120 lactating mothers daily (24 grams) for 3 months in Abo El- Rich Hospital, Cairo. Socioeconomic data including health status, food habits, food consumption patterns, food intake and anthropometric measurements were collected before and after study. Also, laboratory investigations on blood serum for hematocrit, calcium, albumin and hemoglobin before and after feeding were carried out. All data were statistically analyzed and significance was tested using Chi-Square test.

Results: The supplementation process was effective to increase percent satisfaction of RDA requirements. The increment percentages were 54% to 55%, 120% to 128%, 29.6% to 44.6%, 23.7% to 27.6% and 228% to 240% for calories, protein, calcium, phosphorus and iron respectively. As for vitamins the increment percentages were 185.5% to 685%, 118% to 131% and 63% to 73.6% for vitamin A, vitamin C and niacin respectively. All the anthropometric measurements increased due to the effect of supplementary food when compared to (Jellife1966).

Conclusion: The continues supplementary food including protein, vitamins and minerals has an improving effect on health status of lactating mothers in general and their children in particular.

Key words: Intervention, lactating, formula

PO588

DIETARY PRACTICES OF PREGNANCY WOMEN AND ITS EFFECT ON THEIR PREGNANCY OUTCOME-TAMALE (NORTHERN REGION)

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Background and objectives: This study was conducted in the Tamale metropolis in the Northern Region. Three main hospitals in the metropolis were selected on the basis of selection criteria. The aim of the study was to identify the dietary practices of pregnant women and the effect on the pregnancy outcomes in the study area. The study population was defined as mothers who had delivered and were within their first four weeks. One hundred and thirty-one mothers were interviewed in all.The objectives of the study included the dietary practices of the women during pregnancy, factors that could influence pregnant women to pick up certain dietary practices, level of education, knowledge about nutritional requirements during pregnancy and the frequency of their food consumption.

Methods: The methodology used in the study included semi-structured questionnaires, secondary data as well as observation.

Results: Educational levels of the respondents were quite sufficient as 40.5% of the women had never received any form of education and 59.5% of them were educated either non-formally or formally. The level of knowledge of the women on the nutritional requirements during pregnancy was high as 77.9% of the respondents were taught at the ANC what to eat and what not to eat during pregnancy. From the study, it was realized that the respondents' main source of energy was from their staple food (TZ) and other sources from yam, banku and fufu. They gained minerals and vitamins from their soups and stews which were prepared from vegetables (green leafy vegetables, tomatoes, garden eggs and others).

Conclusions: It is therefore recommended in the study that pregnant women should be encouraged to increase their intake of foods especially protein, minerals and vitamin rich foods to promote healthy growth of both mother and child.

PO589

AN INVESTIGATION INTO CHILD FEEDING PRACTICES OF YOUNG MOTHERS FROM TSHILATA VILLAGE, VUWANI, LIMPOPO PROVINCE, SOUTH AFRICA

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Background and objectives: The aim of this study was to explore infant practices of young mothers residing in Tshilata village.

Methods: Snowballing method was used to select 20 young mothers (with children aged six months to three years) that were willing to take part in the study. Data were collected during face to face interviews using a structured questionnaire. Qualitative information was obtained from open ended questions that used probes to get more information from the respondents' responses. Quantitative data from structured questionnaires were analyzed using descriptive statistics to generate frequencies. Content of qualitative data were analyzed to generate themes that formed units of analysis.

Results: The findings revealed that 60% of young mothers were taught about child feeding by the nurse before their children were born and 65% were taught by relatives after their children were born. While 65% of young mothers were encouraged to eat fruits only 35% were encouraged to eat vegetables. Introduction of solid food was early in a large proportion (65%) of the mothers. A 24 hour food recall showed that only a few children were given foods from different food groups and the feeding frequency was low. About 55% of the mothers wanted the government to help them to access employment.

Conclusions: There seem to be limited nutrition intervention programmes in the form of nutrition education at clinics targeting young mothers and pregnant women. As a result many mothers are not breastfeeding exclusively for the recommended six months; introduced solids early; were not feeding children a variety of foods from the different food groups. Intervention programmes need to improve mothers' access to nutrition information. Nutrition Intervention Programs need to be broader and must assist mothers' access basic resources and skills for employment and self employment.

Key Words: child feeding, breastfeeding, weaning practices

PO590

EVALUATION OF OXIDATIVE STRESS AND OXIDANT DEFENCE IN PREECLAMSIA.

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Background and objectives: To evaluate the parameters of oxidative stress and anti oxidant defense in preeclampsia.

Methods: Study was carried out on pregnant and non pregnant women attending in the Obstetrics ward of imam hospital, tehran. Each serum sample was evaluated for malondialdehyde (MDA), a product of lipid peroxidation process as a marker for oxidative stress and reduced glutathione, superoxide dismutase, and catalase for antioxidant enzyme activity and a comparison drawn and analyzed using t-test and (2) test.

Results: The levels of MDA (a lipid peroxidation product) increased significantly in pregnancy compared to non-pregnant females and further significantly increased in preeclampsia compared to normal pregnant females. The other factors were found to be increased in preeclamptic females as compared to normal pregnant females.

Conclusions: Preeclampsia is found to be a condition with markedly increased oxidative stress as is evidenced by highly significantly increased levels of MDA, a marker of lipid peroxidation. Levels of antioxidant enzymes, viz. reduced glutathione, superoxide dismutase, catalase and vitamin E have been found to be increased in preeclampsia as compared to normal pregnant females. This may be a compensatory mechanism for handling the increased oxidative stress.

Key words: preeclampsia, oxidative stress, pregnancy

PO591

MATERNAL VITAMIN DEFICIENCY INCREASE THE RISK OF PREECLAMPSIA

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Background and objectives: Vitamin D has direct influence on molecular pathways proposed to be important in the pathogenesis of preeclampsia .We aimed to assess the effect of maternal 25-hydroxyvitamin D [25(OH)D] concentration on the risk of preeclampsia and to assess the vitamin D status of newborns of preeclamptic mothers.

Methods: nested case-control study was conducted. Patients included nulli parous pregnant women with singleton pregnancies who developed preeclampsia (n=100) or did not develop pre eclampsia (n=300). Women's banked sera were newly measured for 25(OH)D. The main outcome measure was preeclampsia.

Results: Adjusted serum 25(OH)D concentrations in early pregnancy were lower in women who subsequently developed preeclampsia compared with controls. Newborns of preeclamptic mothers were twice as likely as control newborns.

Conclusions: Vitamin D supplementation in early pregnancy should be explored for preventing preeclampsia and promoting neonatal well-being.

Key words: vitamin D, pregnancy, preeclampsia

PO592

THE EFFECT OF ATTITUDES TO NUTRITION AND HEALTH ON CONSUMPTION OF FAT, FIBRE AND FOOD INTAKE VARIETY IN POLISH GIRLS

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Background and objectives: No relationship has been identified between pro-healthy or non-healthy nutrition behaviour and attitudes towards nutrition and health in Polish girls. The aim of the study was to analyze attitudes towards nutrition and health on selected characteristics of food intake in girls.

Methods: The research involved 232 girls aged 13-21 years. Using three food frequency questionnaires fibre intake, fat intake and food intake variety were determined. Attitudes towards nutrition and health were assessed using the Health Concern Scale (HCS) and the Health Taste Attitude Scale (HTAS).

Results: The mean index of food intake variety was 28.4 foods/week (range:0-60), mean fibre intake was 16.1 points (range:0-36), while mean fat intake was 18.4 points (range:0-52). In HCS neutral attitudes (30-50 points) were found in 72% girls, negative attitudes (10-19 points) in 19% girls, while positive attitudes (51-70 points) in 10% girls. In HTAS neutral attitudes (114-190 points) were found in 93% girls, positive attitudes (191-266 points) in 6% girls. None of girls presented a negative attitude (38-113 points). Girls from the upper-positive tercile of attitudes in subscales HTAS-1: interest-in-health had the odds ratio for adequate fat intake (<22 points) of 3.01 (95%CI 1.29; 7.03) in comparison to girls from the central-neutral tercile (OR=1.00). Girls from the lower-negative tercile of attitudes in subscale HTAS-2: light-food had the odds ratio of adequate fat intake (<22 points) of 2.19 (95%CI 1.03; 4.66) in comparison to girls from the central-neutral tercile (OR=1.00). The relationship between fibre intake or food intake variety and attitudes of girls in HCS, HTAS and its subscales was non-significant.

Conclusions: Positive attitudes of girls towards health and negative attitudes towards light food promoted better food choice and lower fat intake, but no significant effect on fibre intake or food variety intake was observed.

Key words: attitude, food intake, girls, health

Acknowledgements: The study was financed within the framework of NCN project no. N N404 068540

PO593

THE EFFECT OF AGE ON FOOD INTAKE VARIETY IN REPRESENTATIVE SAMPLE OF POLISH GIRLS AGED 13-21 YEARS

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Background and objectives: Attitudes to the daily diet change with age under the influence of environmental stimuli and individual personal development. Knowledge on changes in the diet of Polish girls in the period of adolescence and maturity is limited. The aim of this study was to analyse the effect of age on variation in food consumption in girls.

Methods: Analyses were conducted on 1107 girls from the representative sample of Polish girls aged 13-21 years. A total of 2104 individuals were randomly selected from the PESEL data base. Interviews were conducted with 52.6% respondents from the initial sample. The food intake frequency method was used to assess food intake variety, which was expressed in the number of foods consumed within a week (range: 0-60foods/week). The validated Food Intake Variety Questionnaire (FI-VeQ) was used.

Results: The mean food intake variety index in the total sample was 31.1 foods/week, for girls aged 13-15 years 31.3 foods/week, for girls aged 16-18 years 31.0 foods/week, while for girls aged 19-21 years 30.9foods/week (p>0.1). An unacceptable food intake variety (below 34foods/week, i.e. below 66 percentile) was found in 68%, 70% and 71% girls aged 13-15, 16-18 and 19-21 years, respectively(p>0.1). A very good variety of food consumption (40-60foods/week) was observed in 10%, 9% and 10% girls, aged 13-15, 16-18 and 19-21 years, respectively(p>0.1).

Conclusions: In Polish girls aged 13-21 years in terms of their food intake a relatively limited variety was observed, which did not depend on age. Stability of nutrition-related behaviour was shown for food variety and its earlier development in the pre-adolescent period and prior to maturity. Results indicate the need to provide an early influence on nutrition-related behaviour of girls starting as early as the childhood period.

Key words: age, food intake variety, girls

Acknowledgements: The study was financed within the framework of NCN project no. N N404 068540.

PO594

MARKERS OF COGNITIVE FUNCTION: CRITERIA FOR VALIDATION AND CONSIDERATIONS FOR INVESTIGATING THE EFFECTS OF FOODS AND NUTRIENTS IN AGEING

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Background and objectives: Increasing interest in the effects of particular foods and/or nutrients on cognitive function stems from the desire to understand how cognitive performance may be influenced by nutrition over the life course, from neurodevelopment to cognitive decline. A first step in determining if and how foods/nutrients may exert a significant influence on cognition is to have a battery of tests that can be used in experimental trials as valid surrogates or (bio)markers of the neural processes of cognitive performance. Tests chosen to measure cognitive function should meet multiple study-specific requirements and have the support of a consensus within the scientific community that allows them to be used as evidence for consideration of nutritional benefit claims by regulatory expert panels.

Methods: The International Life Sciences Institute, European Branch assembled an Expert Group to evaluate tests specific to various cognitive domains and key features of each as applicable to nutrition intervention studies, particularly in the elderly where cognitive abilities may decline.

Results: Markers in the following cognitive domains were reviewed: Memory (verbal, visual, spatial, and spatial working memory), attention (selective and sustained), information processing speed, executive function, and global or general cognitive function. Evaluation features of cognitive domains reviewed included: •Underlying brain correlates •Validity •Reliability and correlates between tests •Sensitivity to nutritional interventions •Appropriate target populations.

Conclusions: This review provides guidance for nutritionists, neuropsychologists, psychiatrists, and neurologists interested in assessing mental health in terms of cognitive performance and for scientists wishing to test the effects of food or food components on cognition.

Key words: cognition, memory, attention, executive function, nutrition, validation

PO595

COLOSTRUM AND MATURE MILK COMPOSITION OF LACTATING WOMEN IN UMUAHIA, URBAN NIGERIA

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Background and objectives: This cross sectional study evaluated breast milk composition of colostrum and mature milk of mothers in Umuahia.

Methods: The study was conducted among 27 lactating women volunteers aged 26-35 years who participated in a longitudinal study aimed at determining the 'effect of maternal nutrition and body composition on lactation performance'. Colostrum and mature breast milk samples were collected at 2 days and 6-8 weeks postpartum, respectively. Samples

were analysed for macro and micronutrients using standard methods. Data was analysed using means (SD) and t-test.

Results: The mean values for energy, protein, fat and lactose in colostrum were 64±0.04 kcal, 1.4±0.01 g, 2.58±0.07 g, and 5.50±0.11 g, respectively, while the levels in the same macronutrients in mature milk were 0.69±0.01 kcal, 1.09±0.26 g, 3.32±0.06 g and 6.75±0.05 g, respectively. The mineral composition of colostrum were calcium (141.45±1.08 mg/L), iron (0.63±0.04 mg/L), zinc (5.5±0.16 mg/L) and magnesium (41.16±2.00 mg/L). The levels in the same micronutrients in mature milk were 231.44mg/l, 0.54±0.03 mg/l, 5.95±0.22 mg/l and 62.41±7.77 mg/L, respectively. There were differences in colostrum and mature milk concentration of protein and iron ($p<0.05$). All the nutrients in the breast milk samples were adequate except calcium when compared to standards.

Conclusions: The levels of nutrients obtained in this study are consistent with past studies in developing countries.

Key words: mature milk, colostrum, composition, lactation

PO596

ASSESS OF A SCHOLAR MENUS VALIDATION PROGRAMME IN THE HEALTH DEPARTMENT OF ELDA (ALICANTE)

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Background and objectives: A Childhood Obesity Prevention program has been developed in our department. Scholar menu validation and posterior reemission of results to each center, along with a series of recommendations for improving it, are some of the activities involving the program. The impact of this program within the six year it has been operating has been analyzed in this paper.

Methods: 6 years longitudinal research of menus served in the department. The software DIETSOURCE 1.2 has been used to analyze the nutritional composition of menus served in all educational centers with school dining room in the department between years 2007 and 2012. A total of 58 centers where analyzed. Statistical software Epi Info 6.04 was used for statistical treatment and analysis of all data.

Results: In 2007 proteins were 21.02% (SD = 2.10) of macronutrients, lipids were 41.11% (SD= 6.81) and carbohydrates were 38.35% (SD = 6.95). Scholar menus are this year closer to OMS recommendations, being now within recommended percentages for both for lipids with 30.37% (SD = 6.01) of total and carbohydrates with 52.63% (SD = 6.34), that were high and low respectively; and for proteins that are within the normal values (16.99% , SD = 1.72). A lineal regression analysis has been developed being the lipids and carbohydrates tendency lines the most notables with an R2 of 0.84 and 0.97 respectively. The less notable case is proteins (0.83) with a sharp decrease in second year and keeping stable afterwards.

Conclusions: The scholar menus assessing and reemitting back results to schools strategy has been found to be effective. This strategy provides a series of individual as well as general recommendations.

Key words: School, menu, nutritional , obesity, preven

PO597

ASSESSING THE PATTERN OF MEALS IN SCHOOL-GIRLS WITH EATING DISORDERS IN COMPARISON WITH HEALTHY GROUP, 2010

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Background and objectives: Nutrition status is strongly affected by Eating Disorders. Present study was carried out to determine the snacks and meals' pattern in secondary school girls with eating disorder compared to healthy group.

Methods: In this descriptive cross-sectional study, 2734 high school students were selected with a stratified random sampling from 5 distinct of Tehran regarding to pupils population in each distinct. Two-stage approach was used to diagnose eating disorders. At the first phase, screening was done using validated Farsi translation of EAT-26 questionnaire. In the 2nd Phase, subjects were evaluated by Eating Disorder Diagnostic Inventory questionnaire and a supplementary clinical interview. Then, 255 diagnosed ED and 285 healthy individual, completed meals pattern questionnaire. Data were analyzed by χ^2 and Fisher tests using SPSS.ver17.

Results: The most frequent pattern of meal consumption during the day (32%) was 2 meals in case group and 3 meals plus a snack in control group. The most skipped meal in both groups was breakfast, 40.7& and 38.2% in case and healthy groups, respectively. The most common breakfast in both groups was bread and cheese with tea or milk. 75% of ED subjects and 86.7% of healthy group reported the permanent consumption of lunch ($p<0.05$). Lunch was combination of cereal, meat and vegetables in case group (21.8%) and cereal, meat and dairy products in control groups (21%). Skipping diner was significantly higher ($p<0.001$) in ED subjects than healthy ones, 14% and 1.2% respectively. Dinner was commonly the combination of cereals, meat and vegetables in both groups. The majority of subjects were consuming 1 snack per day.

Conclusion: Reduction and elimination of meals can considerably affect adolescents' dietary intake which respect to their nutritional vulnerability, is considered as an important point.

Key words: adolescent, eating disorder, meal pattern

PO599

THE RELATIONSHIP BETWEEN EATING HABITS AND STRESS RESPONSE IN YOUNG STUDENTS

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Background and objectives: Recent changes in social environment have led to changes in eating habits in young students, and problematic eating habits such as eating alone and skipping meals are becoming a concern. The purpose of this study was to clarify actual circumstances regarding lifestyle habits, eating behavior, and stress response in young students and to examine the relationship between their stress response and factors such as lifestyle habits and eating behavior.

Methods: In March 2009, self-administered questionnaires were given to dependants of employees in Company A that ranged from fourth grade elementary school students to high school seniors. Excluding those that were incomplete, analysis was conducted on responses from 116 students. Questionnaires consisted of (1) questions on subjects for personal attributes, (2) questions relating to stress response (psychological stress response and physical stress response), and (3) questions relating to lifestyle habits (such as eating habits and lifestyle satisfaction).

Results: Comparing students who ate instant food once a week or more with those who did not showed students who ate instant food to have stronger physical stress response ($p<0.001$), worse temper and anger ($p<0.001$), increased lethargy ($p<0.001$), and more feelings of depression and anxiety ($p<0.01$). Comparing students who ate fast food once a week or more with those who did not showed students who ate fast food to have more feelings of lethargy (pp<0.01) and of depression and anxiety ($p<0.01$).

Conclusions: Among lifestyle habits, previous studies have already confirmed a link between skipping breakfast and stress response. The present study confirmed that consumption of instant food and fast food is also associated with stress response. These results suggest that dietary education from early on can help students develop stress-coping techniques.

Key words: eating habits, sleeping habits, stress response, dietary education, health support

PO600

FOOD SOURCES OF VITAMIN D AND ITS DEFICIENCY IN LATVIAN MALES

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Background and objectives: Over 50% of population is found to suffer from vitamin D deficiency. Vitamin D deficiency in Europe, Northern Europe, Asia and Africa, especially in elderly people was revealed by many epidemiological researches.

Methods: There were included 134 males aged 45-80. None of the research participants have taken any vitamin D supplements or supplements containing vitamin D. Serum vitamin D level was detected in all the participants ((25 hydroxyl vitamin D: 25(OH)D) and the amount of the consumed vitamin D was determined. The participants height and weight were measured to calculate BMI. The survey was conducted to acquire information about the amount of vitamin D consumed with food.

Results: Insufficient Vitamin D intake was detected in 78,4%, vitamin D deficiency with consequent low vitamin D serum level in 94,1 %. Mean data: vitamin D in food 6,9 μg, 25(OH)D - 16,9 ng/mL, BMI 28,1 kg/m, age 59,4 years. The amount of vitamin D in food statistically reliably directly correlate with serum vitamin D level ($r=0.961$; $p=0.01$), and there is an inverse correlation with age ($r=0.226$; $p=0.009$). D vitamin serum level correlate inversely with age ($r=0.184$; $p=0.033$). No statistical reliable correlation was found between serum 25 (OH) D levels and BMI. Major food sources of Vitamin D are fat-rich sea fish, eggs, dairy product.

Conclusions: Insufficient intake of vitamin D with food and low serum level is marked in males of advancing age. Vitamin D levels directly correlate with vitamin D intake. Not found statistically significant correlation between vitamin D levels, vitamin D diet and BMI, but indirectly correlates with age.

Key words: body mass index, vitamin D, fat-rich sea fish

PO601

THE ENERGY REQUIREMENT OF SENEGALESE EXCLUSIVELY BREASTFED INFANTS IS COVERED BY HUMAN MILK UNTIL 6 MONTHS OF AGE

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Background and objectives: Exclusive breastfeeding until 6 months of age is advised as the best practice to feed infants. The aim of this study was to measure the infants' energy intakes from human milk in 6-months-old Senegalese lactating infants in order to assess the adequacy of WHO recommendations.

Methods: A comprehensive study was undertaken in 59 mother-infant pairs. Breast milk intake was measured by the dose-to-the mother deuterium oxide turnover method, and energy content of milk was estimated on the basis of creamatocrit in full milk samples. Infants' energy intakes were calculated using daily breast milk intake and the fat content of milk.

Results: Of the 59 mother-infant pairs enrolled, 15 infants were exclusively breastfed (Ex) while 44 were partially breastfed (Part). Infants' breast milk intakes were significantly higher in the Ex group (992±135 g/d, n = 15) compared to the Part group (828±222 g/d, n = 44, p = 0.009). Breast milk energy content as well as infant growth was comparable in both groups. However, infants' energy intake from human milk was significantly higher in the Ex group than in the Part group (364 ± 50 vs. 289 ± 66 kJ/kg/d, p= 0.000). Human milk alone covered WHO recommendations in the Ex group, but not in the Part group.

Conclusions: At 6 months of age, growth of the Senegalese infants was not affect by their feeding pattern, yet energy intake from breast milk was low in partially breastfed infants. In contrast, exclusively breastfed infants receive adequate energy from human milk which is the most complete food for infants. Advocacy of exclusive breastfeeding until 6 months should continue to be strengthened in Senegal.

Key words: exclusive breastfeeding, partial breastfeeding, infant energy intake, Senegal.

PO602

RELATIONSHIP BETWEEN UNSATURATED FATTY ACID (DHA) WITH THE GROWTH AND DEVELOPMENT OF SEVERE MALNOURISHED CHILDREN UNDER TWO YEARS

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Background and objectives: Malnutrition remains a public health problem in Indonesia. Children under two years with severe malnutrition will experience obstacles in growth and development. Adding DocosaHexaEnoic Acid (DHA) as unsaturated fatty acid into food supplement for severe malnourished children has been done to increase the intake of fatty acids such as DHA and its growth and development.

Methods: The research site was at Nutrition Clinic in Bogor. The research sample was severe malnourished children aged 6-24 months with inclusion criteria was a parent willing to participate and exclusion criteria; children do not have severe complications or fatal acute infection and children do not have congenital abnormalities. Then, samples were grouped into 2 treatment groups that received regular packets (control) and got the regular package plus DHA (DHA). The duration of intervension lasted for 3-months. Data collected: weight, height (growth), clinical examination, and dietary intake of DHA and the child development (Motoric and Psychomotor Development). Data were analyzed using t test.

Results: Results showed improved growth and development of DHA group but the improvement was found no significant differences compared to the control group (p> 0.05). Intake of DHA is higher in DHA group than in the control group but there was no significant relationship between DHA intake with child development (p> 0.05).

Conclusions: Adding DHA into food supplement for children should considered the adequacy of calorie and protein intake of the children

Key words: unsaturated fatty acid, docosaHexaEnoic Acid, severe malnutrition, growth and development.

PO603

COST AND EFFECTIVENESS OF TRAINING AND SUPERVISION OF FRONTLINE WORKERS ON EARLY BREASTFEEDING PRACTICES IN BANGLADESH

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Background and objectives: The objective of this operational research was to test whether community volunteers training could be an effective way of improving behaviors and whether it was cost effective to add supervision to the training a in relatively isolated, low-income rural area of Bangladesh.

Methods: The study was randomized by union and a total of 124 villages from 9 unions of three upazilas were included under project. Front line workers from the two intervention areas received a 5-day training course. A baseline survey and at end of this project after six months an endline evaluation was carried out both intervention and control areas with a representative samples using a similar questionnaire.

Results: The proportion initiating breastfeeding within one hour increased greatly in both intervention groups, but only marginally in the control area. The practice of offering prelacteal feeds declined in all three areas but training decreased it more and supervision more still. Exclusive breastfeeding (children <3 months of age) was also increased, though similarly in the Intervention 1 and 2 areas while little change occurred in the control area. Adding the cost of employing a supervisor more than doubled the cost of the intervention and also increased impact but not cost effective.

Conclusions: While further research is needed on a larger scale, this study already provides evidence adequate to argue that TBAs in rural Bangladesh should be provided with a modified training course on IYCF issues and they can make substantial influence over practices.

Key Words: TBA, exclusive breastfeeding, cost effectiveness.

PO604

ASSESSING PRESENT BEHAVIOR OF MOTHER'S AND HEALTH WORKERS TOWARDS IYCF PRACTICES, IN NORTHERN RURAL PART, BANGLADESH.

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Background and objectives: The objective of this study was to identify the insights of communities IYCF behavior and front line workers experiences during providing nutrition services to figure out effective strategy to modify program design in preventing childhood malnutrition.

Methods: This study was cross sectional and followed both quantitative and qualitative methods. Total, 363 beneficiaries and 56 local level filed staffs of National Nutrition Program (NNP) were interviewed and 12 FGDs were conducted with family members and community leaders.

Results: Socio demographic information shows that, more than two- third of respondents are relatively young (age 16 to 25), of them more than one third had family income ranged 3000-6000 BDT. However, almost all mothers have good knowledge on initiation and exclusive breastfeeding but poor knowledge on child's proper age of introducing CF. In this KAP survey, less than 50% mothers had knowledge on meal frequency. Staffs knowledge on different aspects of IYCF also assessed. Training may have an effect on their knowledge and the findings shows that, on an average, 48.8% of Field Staffs from the entire study area expressed their satisfaction with duration of the training period. However, dissatisfaction has also been observed in some places of study areas. Almost two-third field staffs informed that they arrange meeting with the community people and counseled mother frequently while they faced any problem. Around three fourth of the field staffs suggested that creating awareness amongst mothers as well as their family members can improve existing child feeding practices.

Conclusions: With little modification of monitoring and supervision of field staffs and partnering with other organizations can be explored more to enhance the outcome of the intervention and further strengthen it.

Key words: IYCF, KAP, pregnant women, lactating women.

PO605

DIETARY BEHAVIOR AND NUTRITIONAL STATUS OF THE SELECTED ADOLESCENT GIRLS IN DHAKA CITY

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Background and objectives: Adolescence is a transitional stage of physical and mental human development generally occurring between puberty and legal adulthood but largely characterized as beginning and ending with the teenage stage The aim of the present study wasto investigate the dietary behavior and nutritional status of the selected adolescent girls in Dhaka City.

Methods: A descriptive cross sectional study was conducted among 210 adolescent girls of aged 10-14 years to assess their dietary practices, life style pattern and nutritional status. A questionnaire both structured and unstructured was used collect relevant information.

Results: Result shows that 24.7% of the girls were underweight was (BMI <18.5), 54.8% were within normal limits (BMI 18.5-24.99), and 6.2% were obese (BMI>30). Majority of the studied adolescent girls like to consume normal foods (60.9%).On the other hand 19.1% and 20% prefer fast foods and rich foods respectively. Only 25.1% adolescent girls consume four or more meals per day which is recommended by nutritionist. Others (74.9%) take two or three meals per day. The studied adolescents consume rice frequently in three meals that is breakfast, lunch and dinner. Protein source meat, fish and egg consumption was inadequate in their meals analyzing three days food consumption history. All types of vegetables were frequently consumed by all the adolescent girls. They consume milk and fruits occasionally.

Conclusions: Adolescent girls in Bangladesh especially school girls from the family of low income get insufficient nutritious food by which their physical and mental growths do not get fulfilled.

Key words: BMI: Body Mass Index

PO606

CASE-CONTROL STUDY ON ANEMIA AMONG ELDERLY WOMEN IN THREE DISTRICT OF CHINA

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Background and objectives: Anemia affects about one-quarter of worlds population and various conditions are associated with anemia including nutritional deficiency, infectious diseases and genetic mutations.

Methods: A case-control study was performed in 1938 women samples (50-70 years old) where 949 case (hemoglobin<120g/l) and 989 control (hemoglobin>130g/L) from three provinces of China. Each participant was interviewed and a basic health examination was done. Those with serious diagnosed diseases were excluded from our study. After an overnight fast, venous blood samples were collected and questionnaires on diet, life style, medical history and physical activity were completed. Blood indices such as serum iron, ferritin, transferrin, total iron-binding capacity, transferrin saturation, free erythrocyte protoporphyrin and C-reactive protein were tested.

Results: After SAS 9.1 statistic analysis we found that anemic women have lower BMI(22.08±3.22 vs 23.16±3.51 kg/m2), waist circumference/height ratio(0.49±0.06 vs 0.51±0.06), less soybean food intake (median (lower quartile, upper quartile) was 5.56 (0.33) vs 11.11 (0,40) μg/d), lower hemoglobin (113.83±6.97 vs 140.57±8.50 g/l), serum iron (13.55±5.52 vs 16.68±5.74 μmol/l), ferritin (108.44±86.41 vs 132.08±92.73 ng/ml), and transferrin saturation (20.64±9.33 vs 25.23±9.53 %) levels but higher free erythrocyte protoporphyrin concentration(43.81±23.10 vs 39.62±17.83 μg/dl) than non-anemic women, the differences were statistically significant by t test and chi-square test. Iron deficiency was defined as persons with one of following status: transferrin saturation <16%, serum ferritin concentration <15 ng/ml, free erythrocyte protoporphyrin/hemoglobin ratio >3.0 μg/g. People with both iron deficiency and anemia were regarded as iron deficiency anemia (IDA), thus the percentage of IDA was 34.42%. Logistic regression models showed that the odd ratio and 95% CI of BMI, waist circumference/height ratio and soybean food was 0.72 (0.63-0.93), 0.66 (0.41-1.05) and 0.80 (0.64-1.00) respectively.

Conclusions: It was possible to improve the hemoglobin concentration by increasing BMI, waist circumference/height ratio and soybean food intake.

Key words: anemia case-control study elderly women

PO607

FEEDING PRACTICES AND NUTRITIONAL PARAMETERS OF CHILDREN AGED 6-14 YEARS IN MAKEPE MISSOKE (CAMEROON)

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Background and objectives: The national demographic and health survey in 2004 in Cameroon showed that malnutrition was implicated in the death of 50 % children less than 5 years. However, in there is too little information concerning nutritional statut after that age. The aim of this study was to evaluate some nutritional parameters of children aged of 6 to 14 years in Makèpè Missokè, (Douala-cameroon).

Methods: Two hundred and fifty five students children of 6 to 9 years (63.9 %) and children of 10-14 years (36.1 %) were recruited in "Bilingual Confidence School Group". Their nutritional status was evaluated after the analysis of anthropometric parameters (height for age, weight for age and BMI for age). Nutritional indicators were calculated using WHO Anthroplus 2007 and Epi info 2000. Protein energy malnutrition was evaluated biochemicaly by the determination of albuminémia in the blood of 99 children, using the colorimetric method with bromocresol green. Foods habits and practices were assessed during a survey in that school using questionnaires. Statistical analyses were performed by SPSS.

Results: Stunting was observed at 18.0 %, wasting at 5.1 % and overweight at 1.6 % in children. Stunting was frequent in families of more than 5 persons and in families where mothers had the lowest instruction level (primary). Protein energy malnutrition determined by albuminemia was found in 16.2 % of the study population. There was a significant difference between the average albuminemia of stunted children (37.6 ± 7.7g/l) and albuminemia of unstunted children (48.9± 11.1 g/l).

Conclusions: Foods habits and practices showed that the foods of those children was diversified but consumption of fruits and legumes was low. An imbalance diet characterized by an excess of fat and carbohydrates, and a deficit of fiber and protein, was found in their diet. keys words: malnutrition, albuminemia, stunting, Cameroon

PO608

PREVALENCE AND TRENDS OF CHILDHOOD MALNUTRITION IN GHANA

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Background and objectives: Malnutrition is currently the leading cause of the global burden of disease and has been identified as the underlying factor in about 50% of deaths of children under 5 years of age in developing countries. This paper reviews the prevalence and trends of malnutrition among Ghanaian children during the past two decades.

Methods: A review of nutrition data provided by the Ghana Demographic and Health Survey between 1988 and 2008.

Results: Between 1988 and 2008, the prevalence of stunting reduced from 35% to 28%. At the same time, the percent of children underweight fell from 23% to 14%. The prevalence of stunting however remained the same (9%) over the 20 year period. The percentage of children who were overweight increased from less than 1 percent in 1988 to 5 percent in 2008.

Conclusions: Child nutritional status, in terms of weight-for-age and height-for-age, has improved over the years. However stunting is still a problem. Another development of concern is the increasing trend of childhood overweight and obesity. To continue making progress, there is the need to intensify intervention programmes currently in place such as the Accelerated Child Survival and Development approach, Micronutrient supplementation, Food Assisted Child Survival project and Behaviour Change Community Programme. Attention needs to be given to young/child feeding practices, maternal empowerment and community resources to ensure optimal childhood nutrition. Issues related to poverty would have to be tackled as it leads low purchasing power and hence inadequate dietary intake. All these would help reduce childhood malnutrition further.

Key words: Malnutrition, stunting, underweight, overweight

PO609

IMPACT OF NUTRITION AWARENESS OF MOTHERS ON NUTRITIONAL STATUS, IQ & ICDS COVERAGE OF THEIR CHILDREN IN WEST BENGAL, INDIA

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Background and objectives: Physical and intellectual development of a child is mainly dependent on the early nourishment and care by their mother. Integrated Child Development Services (ICDS) is also having a significant role to achieve this among pre-school Indian children, particularly the underprivileged. However, availing the benefits of ICDS for the children is dependent on the nutrition awareness of their mothers. The objective of the study was to assess the impact of nutrition awareness of mothers and ICDS coverage on the nutritional status and IQ development of their children.

Methods: Nutritional status and IQ of 158 rural primary school children between 6-8 years (86 boys and 72 girls) of West Bengal, India was assessed by BMI and Raven¡¯s Progressive Matrix test, respectively. ICDS coverage for the children was confirmed from the ICDS centre records. Nutritional awareness of the mothers was assessed by a self structured pretested knowledge, attitude and practices (KAP) questionnaire.

Results: 54%, 29%, 41% of the students were underweight, stunned & thin, respectively while 4% were overweight according to BMI. 6%, 25% 10% & 59% of them achieved B, C, D & E intelligence grade, respectively. 89% children were under ICDS coverage & 41.2% of their mothers had acceptable level of KAP score.

Conclusions: Significant positive correlation between mothers nutrition awareness and nutritional status of their children ($p<0.05$) as well as ICDS coverage for them ($p<0.01$) exist. However, though positive but insignificant correlation observed between ICDS coverage and nutritional status as well as IQ of the children.

Key words: children, mothers, BMI, IQ, ICDS.

PO610

COMPARATIVE STUDY OF NUTRITIONAL STATUS OF BOARDING AND NON-BOARDING PUPILS IN SELECTED SCHOOLS IN THE ACCRA METROPOLIS

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Background and objectives: Ghana is currently being faced with the double burden of over and under nutrition among school age children. The quality of diet served at school goes a long way in determining the nutritional status of school children. In Ghana there is a popular perception that diet served in the boarding school is of poor quality compared to diet served at home. The aim of the study was to assess the nutritional status of boarding and non-boarding pupils aged 8 to 10 years in the Accra Metropolis, Ghana.

Methods: A cross-sectional study was conducted among 124 pupils in three private schools with boarding facilities in the Accra Metropolis, Ghana. A two day 24 hour dietary recall was used to assess dietary information. Anthropometric measurements of weight and height were taken. WHO Anthroplus software was used to determine WAZ, HAZ and BAZ. Ghanaian food composition tables were used to estimate the nutrients in foods eaten by subjects. Analysis of data was done using the Statistical Package for Social Sciences (SPSS, version 20.0). Descriptive statistics such as means and percentages were used. T-test was used to determine differences between nutritional status of boarders and non boarders.

Results: The prevalence of stunting, underweight, overweight and obesity among the pupils were 0.8%, 0.8%, 12.1% and 11.3% respectively. Among the 8-8 years 11 months group, non boarders had significantly higher intakes of fat ($p=0.035$), vitamin B1 ($p=0.002$) and vitamin C ($p=0.007$). With all groups combined, the study saw no differences between the nutritional status of the boarders and non boarders.

Conclusions: Overweight and obesity were found to be high among the children. Also no significant differences were observed in the dietary intakes of both the boarders and non boarders.

Key words: Pupil, boarders, non boarders, Ghana

PO611

COMPARATIVE STUDY OF IODINE NUTRITURE OF SCHOOL-AGE CHILDREN (6-12 YEARS) AT LOCAL GOVERNMENT LEVELS IN NIGERIA

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Background and objectives: Iodine Deficiency (IDD) and control programmes and monitoring need to be constantly sustained due to the fact that IDD simply reappears if salt iodisation is interrupted (WHO/UNICEF/ICCIDD,2007). Hence it is imperative to reassess iodine nutrition of communities after several years of iodised salt in Nigeria. The aim of the present study was to determine and compare the current iodine status of the school-age children in two local government areas (LGA) of Ibadan.

Methods: Four hundred primary school consisting of 200 males and 200 females children aged 6–12 years were recruited from ten schools in the areas of study using a simple random sampling technique. Casual urine samples were collected from the children and analyzed for urinary iodine using ammonium persulplate method. Salt samples were also collected from households of the studied children and analyzed for iodine content using titrimetric method. Thyroid volume size was determined also by palpation method.

Results: Median urinary iodine excretion in these school-age children was 106g/l. The proportion of population with urinary iodine levels below 100g/l in the two areas of study were <50% and <20% with levels below 50g/l, hence, revealed optimal iodine nutriture. The analysis of table salt from the households showed that 92% and 78.5% (11.5%<benchmark) of households in Ibadan–North LGA and Ido LGA respectively consumed salts with adequate iodine content. The Total Goiter Rate (TGR) in this study was 20% which is < 5% benchmark. The study indicated presence of visible goiter in Ido LGA (3%) and Ibadan–North LGA (8.5%).

Conclusions: The TGR which was the criterion for IDD elimination despite the recorded optimal iodine nutriture asserted that it takes longer to correct goiter prevalence than urinary iodine after implementation of Universal salt iodization (Delange et al., 1999).

Key words: urinary Iodine, Goiter rate, households iodine content

PO612

PREVALENCE OF METABOLIC CHANGES ASSOCIATED WITH BODY WEIGHT IN CHILDREN AND ADOLESCENTS AT A REFERENCE CENTER FOR NUTRITIONAL TREATMENT

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Background and objectives: The nutritional profile has changed in world population over last decades, with a reduction in the prevalence of low weight and an increase in overweight. These nutritional changes associated with high rates of cardiovascular diseases emphasize the importance of monitoring its risk factors in children. The objective of this study was to describe the distribution of anthropometric and biochemical variables in a sample of children and adolescents according to the occurrence of weight excess (WE).

Methods: A cross-sectional descriptive study comprising children and adolescents (2-18 yr) attending a nutritional pediatric outpatients center in Rio de Janeiro, between 1997 y 2009, was carried out. The following secondary data base were collected: age, sex, sexual maturity, BMI (z-score), waist/abdominal circumferences, blood pressure, birth weight (BW), diary activities, WE family history, lipidic profile and glycemic levels. Descriptive statistics, independent samples t test, logistic regression of metabolic changes were ascertained with 95% confidence intervals.

Results: The total sample included 942 individuals, being 53.5% female. All anthropometry parameters showed high distribution in WE, where BMI ranged from -5.9 to +9.1. The cholesterol and LDL-c had similar distributions. The HDL-c and triglycerides were superior without WE and with WE, respectively. The logistic model showed the following risk estimates to the presence of overweight: age over 10 years (OR= 1.78), TG>100 mg/dL (OR= 2.26), TC>150 mg/dL (OR=1.73), PN> 4.0 kg (OR= 4.64), familiar obesity (OR=2.76), presence of physical activity (OR=0.57) and BW<2.5 kg (OR= 0.43). The WE sample showed higher parameters distribution of age, weight, BMI, BW, TG curves and lower values of HDL-c comparatively to the no-WE sample, which are exposed to a broader range of risk factors for CVD. Family history of obesity, lack of physical activity, and the adolescence were the most significant variables for the occurrence of WE in the studied sample.

Key words: adolescence, risk factors, obesity

PO613

LONGITUDINAL STUDY OF THE STATURO-PONDERAL STATUS ACROSS FOUR COHORTS OF MIDDLE SCHOOL STUDENTS IN NORTH WESTERN MOROCCO

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Background and objectives: this study aims to compare the staturo-ponderal status across 4 cohorts of the middle school students (2009 until 2012) and verify the stability of the prevalence of malnutrition in the only middle school in the rural county Sidi El Kamel. Methods and subjects: The statistical analysis of anthropometric indices allowed to compare the stature and weight status across four cohorts of the middle school students; its size are (295, 675, 775, 410); 2155 in total; the ages vary from 11 to 19 years.

Results: A global average of 9.6 % stunting was found during the four years study. The analysis of variance (ANOVA) with one factor confirms the equality of the means of the Z score of 4 cohort for the 4 forms of malnutrition (p>0.05).Stunting (F=2.6; ddl=3;p=0.06>0,05) ; Underweight (F=1.7; ddl=3; p=0.17>0.05) ; Risk of overweight (F=1.4; ddl=3;p=0.24>0.05) ; obesity =1.2; ddl=3; p=0.33>0.05).

Conclusion: a longitudinal study reveals a stable prevalence of weight and height deficit exceeding the WHO growth reference 2007 for adolescents and a less frequent obesity.

Key words: Adolescents, Stunting, Morocco

PO614

BREAST MILK INTAKE OF 9-MONTH OLD ZAMBIAN INFANTS GIVEN FORTIFIED COMPLEMENTARY FOODS

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Background and objectives: Adequate complementary feeding is crucial to health in late in infancy and early childhood. We assessed the effect of industrially processed fortified complementary blends with or without á-amylase on breast milk intake of Zambian infants.

Methods: Infants were randomized at 6 months of age to receive either a fortified blend (CBM, n = 37) or a similar blend with α-amylase (CBMA, n= 44) for 3 months. Breast milk intake was measured at 9 months by the deuterium-dose-to-the-mother dilution technique in the two groups and in a control group of infants (n= 69) not receiving the study blends.

Results: Breast milk intake was not significantly (p= 0.87) different among the groups [CBM: 614 (SD 271) g/dl, CBMA: 635 (SD 193) g/dl and control: 653 (SD 221) g/dl. There were no significant differences in total energy intake (p= 0.63) among the three groups. The average breast milk intake observed is higher than published values for older infants obtained by test-weighing likely due to insensible water loss and inability to measure milk intake at night by test-weighing.

Conclusions: The consumption of the study blends did not reduce breast milk intake, but displaced traditional complementary foods; α-amylase addition had no additional benefit. Such blends may be used to improve nutritional status and health of infants in developing countries.

Key words: bBreast milk intake, infants, deuterium-dose-to-the mother method.

PO615

EATING PATTERNS OF BRAZILIAN ADOLESCENTS AND THEIR COMPLIANCE WITH THE FOOD GUIDE PYRAMID

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Background and objectives: Adolescence is a crucial period for the development of dietary behaviors; they continue into adulthood and influence the risks of chronic diseases later in life. The health of children and adolescents is dependent upon food intake to provide sufficient energy and nutrients to promote optimal physical growth, social and cognitive development. The objective of this study is to determine to which extent adolescents are meeting healthy eating recommendations and to explore associations between background variables, physical activity, and nutritional status.

Methods: 480 adolescents from fifth grade of public schools of Piracicaba, Sao Paulo, Brazil were enrolled in this cross-sectional survey. A Food Frequency Questionnaire was administered to obtain food intake information. Foods were aggregated into 8 groups according to Brazilian Food Guide Pyramid. Height and weight of all participants were measured. Physical activity pattern was determined by questioning about participation in regular sport activities, how much time spent watching TV, playing computer games.

Results: The mean age of the participants was 11.1±0.82 and 54.6% were female. According to body mass index (BMI) 35.6% were overweight. No adolescent met all the recommendations of the Brazilian Food Guide Pyramid. Only 7.3%, 6.5%, 1.7% and 13.1% of adolescents met the recommendations of fruits, dairy products, vegetables and cereals, respectively. Eating patterns showed no difference between gender and nutritional status. Physically active adolescents consumed more fruits, dairy products and cereals.

Conclusions: Adolescents are not having healthy eating patterns and their eating habits do not meet the recommendations of the Brazilian Food Guide Pyramid.

Key words: adolescent, food guide pyramide, eating patterns

PO616

AUTOPHAGY ALLEVIATES NEURODEGENERATION CAUSED BY THIAMINE DEFICIENCY

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Background and objectives: Thiamine deficiency (TD) causes mild impairment of oxidative metabolism and region-selective neuronal loss in the brain, which are mediated by neuronal oxidative stress, endoplasmic reticulum stress, and neuroinflammation. The molecular mechanism for TD-induced neuronal death is still unclear.

Methods: We hypothesized that autophagy might be activated and be responsible for neuronal damage in the TD brain. Mice and neuroblastoma cell line, SH-SY5Y cells, were used to verify the hypothesis.

Results: The results demonstrated that TD induced the accumulation of autophagosomes in neurons in the thalamus measured by transmission electron microscopy, and the upregulation of autophagic markers, LC3-II, Atg5 and Beclin1 measured with western blotting. TD also increased the expression of autophagic markers and induced accumulation of LC3 puncta in SH-SY5Y cells. TD-induced expression of autophagic markers was reversed once thiamine was re-administered. Both inhibition of autophagy by wortmannin and downregulating the expression of Beclin1 by siRNA potentiated TD-induced death of SH-SY5Y cells. In contrast, activation of autophagy by rapamycin alleviated SH-SY5Y cell death induced by TD. Intraperitoneal injection of rapamycin stimulated neuronal autophagy and attenuated TD-induced neuronal death in the submedial thalamus nucleus (SmTN) of mice. TD inhibited the phosphorylation of p70S6 kinase, which suggested mTOR/p70S6 kinase pathway involved the TD-induced autophagy.

Conclusions: These results suggested that autophagy is neuroprotective in response to TD-induced damage to the brain, and opened a new avenue for neurodegenerative diseases caused by mild impairment of oxidative metabolism.

Key words: autophagy, oxidative stress, neurodegeneration, thalamus, vitamin B1

PO617

SOCIOECONOMIC DISPARITIES IN DIETARY INTAKES AND DIETARY QUALITY OF FRENCH ADOLESCENTS AGED 11-17 YEARS

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Background and objectives: In European adolescents, a lower Socioeconomic Status (SES) has frequently been associated with a lower dietary quality, a lower intake of Fruits and Vegetables (FV), fish, dairy products and a higher intake of starches, snacks or soft drinks, but few data are available for France. The objective of the current study was to examine these associations in a representative sample of French adolescents aged 11-17 years.

Methods: Data from the second French national food consumption survey (INCA2, 2006-2007) were used. Information on food consumption and nutrient was available. Dietary quality indicators included: Dietary Diversity (DD) score, Nutrient Adequacy Ratio (NAR), dietary Energy Density (ED). SES indicators included: occupational and educational level of the adolescent's adult caregiver, household income, composite indices of SES. Multivariate regression analyses were performed on 881 adolescents.

Results: According to the SES indicators, adolescents in a lower SES context have a significant ($p<0.05$) lower mean intake of FV, yoghourts and cakes-pastries; and a higher mean intake of processed meat, dairy desserts and soft drinks. No significant association was found with fish consumption. They also have a significant lower NAR and DD score ($p<0.04$). No significant association was found with dietary ED. The largest differences were mainly observed for the caregiver's educational level. For instance, adolescents whose caregiver has a low educational level have a mean FV intake of 241 g/d (vs 312 g/d for higher level) and a mean NAR of 77.8% (vs 80.5%).

Conclusions: French adolescents in a lower SES context have lower FV and higher soft drinks' intakes and a lower die-

tary quality. The parents' educational level seems to be the most influential factor. This suggests the need for specific messages to improve food intake to meet dietary recommendations and to reduce health inequalities in nutrition.

Key words: dietary quality, socioeconomic status, French adolescents

PO618

SOCIOECONOMIC DISPARITIES IN DIETARY INTAKES AND DIETARY QUALITY OF FRENCH CHILDREN AGED 3-10 YEARS

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Background and objectives: In European children, a lower Socioeconomic Status (SES) has frequently been associated with a lower dietary quality and a lower intake of Fruits and Vegetables (FV), fish, dairy products and a higher intake of starches, snacks or sugar drinks, but few data are available for France. The objective of the current study was to examine these associations in a representative sample of French children aged 3-10 years.

Methods: Data from the second French national food consumption survey (INCA2, 2006-2007) were used. Information on food consumption and nutrient was available. Dietary quality indicators included: Dietary Diversity (DD) score, Nutrient Adequacy Ratio (NAR), dietary Energy Density (ED). SES indicators included: occupational and educational level of the child's adult caregiver, household income, composite indices of SES. Multivariate regression analyses were performed on 574 children.

Results: According to the SES indicators, children in a lower SES context have a significant ($p<0.05$) lower mean intake of FV, yoghourts and confectionary; and a higher mean intake of starches, meat, milk, soft drinks, and pizzas-sandwiches. No significant association was found with fish consumption. They also have a significant lower NAR, higher dietary ED and lower DD score ($p<0.02$). The largest differences were mainly observed for caregiver's educational level. For instance, children whose caregiver has a low educational level have a mean FV intake of 211 g/d (vs 286 g/d for higher level) and a mean NAR of 84.2% (vs 85.5%).

Conclusions: French children in a lower SES context have lower FV and higher starches and soft drinks' intakes and a lower dietary quality. The parents' educational level seems to be the most influential factor. This suggests the need for specific messages to improve food intake to meet dietary recommendations and to reduce health inequalities in nutrition.

Key words: dietary quality, socioeconomic status, French children

PO619

RISK OF CHILDHOOD MALNUTRITION AT 24 MONTHS RELATED TO SMALL FOR GESTATIONAL AGE AND LOW BIRTH WEIGHT IN RURAL WESTERN CHINA

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Background and objectives: China as the biggest developing country continue to experience a large burden among children in rural area. Poor fetal growth continues to be high and with subsequent growth faltering in the first two years childhood malnutrition. The primary aim of this study was to assess the relationship between fetal growth restriction and childhood malnutrition at 24 months.

Methods: A longitudinal follow-up of a subset of newborns (n=1032) whose mothers were randomly assigned to receive the supplements of folic acid, iron–folic acid or multi-micronutrients daily during pregnancy in the original trial was conducted. Children's weight and length were measured at 24 months of age. Anthropometric indices weight-for-age Z-score, length-for-age Z-score and weight-for-length Z-score were calculated with WHO Anthro 2005 (WHO, 2006) and WHO Child Growth Standards 2006. Relative risk (RR) and 95% confidence intervals (CI) were estimated by Logistic regression model compared with reference category.

Results: Small-for gestational age (SGA) of newborns were significantly associated with their stunting (RR 2.57, 95%CI 1.74 - 3.78), wasting (RR 6.16, 95%CI 1.37 - 27.78) and underweight (RR 8.41, 95%CI 3.78 -18.69) at 24 months of age compared with adequate-for-gestational age (AGA). Low birth weight (<2.5kg) of newborns also increased the risk of stunting (RR 2.20, 95%CI 1.04 - 4.62), wasting (RR 21.21, 95%CI 4.57 - 98.41) and underweight (RR 11.00, 95%CI 4.33 - 27.93) at their 24 months of age compared with those newborns with birth weight ≥2.5kg.

Conclusions: Fetal growth restriction increased the risk of childhood under-nutrition at 24 months in northwestern rural China, with implications for programs and policy focusing on pregnant women and more broadly maternal nutrition.

Key words: stunting, birth weight, small for gestational age

PO620

IRON DEFICIENCY ANEMIA: A BURNING HEALTH ISSUE AMONG ADOLESCENCE IN DEVELOPING COUNTRIES

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Background and objectives: In India, adolescents represent over 1/5th of the population. Adolescent girls, at this stage need macro and micro-nutrients to support growth spurt and meet body's increased demand for iron during menstruation. Hence, to study problem of micro-nutrient deficiencies in adolescent girls, study was carried out . The aim of the present study was to assess micro-nutrient deficiencies by clinical examination and Iron deficiency anemia by estimating Hemoglobin(Hb) level among girls.

Methods: A cross-sectional study was carried out among 467 adolescent girls belonging to slums during a period of 18 months in 10 wards of Ahmedabad Municipal Corporation. Girls were selected by Simple Random Sampling technique using Random tables. Clinical examination was carried out to detect micro-nutrient deficiencies and Hb estimation was done using cyanmethemoglobin method after obtaining written consent from parents/guardians of the girls. Appropriate statistical test were applied.

Results: Mean Hb was 10.18+1.28 gm /dl. The prevalence of anemia was 85.9%. Mild, moderate and severe anemia was observed in 59.1%, 26.2% and 0.6% girls respectively. On clinical examination, 9% girls had signs of Vitamin-A deficiency, 28.1% had refractive errors and 0.6% had signs of iodine deficiency. The difference observed in different BMI categories and proportion of girls with anemia was highly significant (p=0.012). A Strong negative correlation was observed between age of girls and mean Hb concentration("r"=-1)which was statistically significant(p=0.001). A significant association was observed between birth order and anemia(p=0.009). In multivariate logistic regression model, low level of education among mothers (odds ratio[OR]:4.26,95% confidence interval[CI]:2.42-7.51); not consuming Vitamin-C (OR:2.70,95% CI:1.59-4.58) and consuming tea after meal (OR:1.7,95% CI:1.2-3.11) remained significant correlates of anemia in this population.

Conclusions: As age of the girls increases, body's demand for iron also rises. Therefore, importance of regular consumption of green leafy vegetables and iron rich foods should be taught to girls right from the childhood by parents, teachers and health workers.

Key words: anemia, adolescence, hemoglobin

PO621

ASSESSMENT OF ENERGY EXPENDITURE AND IRON STATUS OF PREGNANT WOMEN IN URBAN AND RURAL COMMUNITIES IN NIGERIA

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Background and objectives: The study was carried out to evaluate the energy expenditure and iron status of 400 pregnant women in their various trimesters from two hospitals (urban and rural) in Umuahia in Abia State.

Methods: The subjects were randomly selected. Anthropometric measurements, haemoglobin level, packed cell volume, serum ferritin level, energy intake and energy expenditure assessment were carried out on the study population using standard procedures.

Results: Results of the analysis showed that the mean BMI of the mothers-the first, second and third trimesters were 25.25±3.81, 26.24±3.37 and 30.64±17.61kg respectively. Arm circumference values ranged between 9.74, 9.85 to 11.15 cm in the third trimester. Abdominal circumference ranged from 48.24±10.56 to 49.26±10.61. The result further showed that 19%, 12.8% and 0.5% had mild, moderate and severe anaemia respectively. A total of 40% of the pregnant women in the rural areas had various forms of anaemia as against 24.5% in the urban areas. A total of 32.2% of the pregnant women had iron deficiency anaemia. The prevalence of iron deficiency anaemia was also significantly associated with the trimesters (c2 = 22.58, p = 0.00).

Conclusion: The study found that the pregnant women had a positive energy balance. About 12% and 14% of the women in their second and third trimester respectively had protein intake above the recommended intake. A total of 40.0% of rural women were anaemic.

Key words: anaemia, energy expenditure, pregnant women, body composition.

PO622

EFFECT OF SUPPLEMENTATION OF IRON –FOLIC ACID RICH BISCUITS ON ANAEMIC ADOLESCENT GIRLS

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Background and objectives: Anemia is a major public health problem in India widely prevalent among adolescents. Adolescence for a girl is a period of physical and psychological preparation for safe motherhood. Early marriage, early conception and anemia during adolescence reduce growth velocity and increase the risk of maternal health, pregnancy complications, obstructed labor and low birth weight. The present study was aimed to reduce the incidence of anemia and also to improve the health status of adolescent girls through micronutrient supplementation.

Methods: 500 adolescent girls (12-19 yrs) were interviewed on socio-economic background, anthropometric details, menstruation details, dietary pattern, influence of individual and environmental factors on dietary pattern, knowledge regarding nutrition and anemia etc. Hemoglobin levels of 202 subjects revealed that 57% were anemic. Two groups of 50 subjects each were constituted. One group were supplemented with five biscuits (20 g each) daily, rich in iron and folic acid, adjunct to main meals, other group formed control. The supplementation was for three months and the impact was analyzed biochemically.

Results: The results revealed that, supplementation in the form of iron and folic acid rich biscuits made a significant improvement in all the parameters studied. Total iron, heamoglobin and serum folic acid levels of the experiment group were compared with control group and significant improvement was observed in experimental group with one percent level ($p<0.01$) significance.

Conclusions: Supplementation of iron and folic acid rich biscuits serve as an effective strategy to combat iron and folic acid deficiencies.

Key words: adolescent girls, anaemia, supplementation, folic acid, iron

PO623

FREQUENCY OF NUT CONSUMPTION AND RISK OF MORTALITY IN THE PREDIMED STUDY

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Background and objectives: Prospective studies in non-Mediterranean populations have consistently related increasing nut consumption to lower coronary heart disease mortality. A small protective effect on all-cause and cancer mortality has been suggested. To examine the association between frequency of nut consumption and mortality in individuals at high cardiovascular risk from Spain, a Mediterranean country with relatively high nut intake.

Methods: We evaluated 7,216 men and women aged 55-80 y randomized to one of three interventions (Mediterranean diets supplemented with nuts or olive oil and control diet) in the PREDIMED (PREvención con DIeta MEDiterránea) study. Nut consumption was assessed at baseline and mortality was ascertained by medical records and linkage to the National Death Index. Multivariable-adjusted Cox regression was used to estimate hazard ratios (HR) for mortality by frequency of nut consumption.

Results: During a mean follow-up of 4.8 y, 323 total deaths, 81 cardiovascular deaths and 130 cancer deaths occurred. Nut consumption was associated with a significantly reduced risk of all-cause mortality (p-trend <0.05, all). Compared to non-consumers, subjects consuming nuts >3 servings/wk (32% of the cohort) had a 39% lower mortality risk (HR: 0.61; 95% CI: 0.45, 0.83). A similar protective effect against cardiovascular and cancer mortality was observed. Participants allocated to the Mediterranean diet with nuts group who consumed nuts >3 servings/wk at baseline had the lowest total mortality risk (HR: 0.37; 95% CI: 0.22, 0.66).

Conclusions: The frequency of nut consumption was associated with a significantly reduced risk of mortality in a Mediterranean population at high cardiovascular risk.

Key words: nuts, PREDIMED study, mortality, cancer, cardiovascular.

PO624

THE PHASE ANGEL OF BIA-AN EVALUATION MARKER OF AN INTERVENTION IN THE DAILY MEALS OF GERIATRIC PATIENTS

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Background and objectives: In institutionalized, geriatric patients protein-energy-malnutrition is one of the most common comorbidities. Therefore the PRINT (PRotein-energy-INTervention)- Study (publication in press) was carried out in order to optimize the nutritional status of such patients. As the phase angle of the bioelectrical impedance analysis (BIA) is a valued marker to evaluate the quality of nutritional status it was examined if the phase angel of the geriatric patients could be improved through the intervention.

Methods: The intervention was designed as a controlled parallel intervention trial and compared the protein-energy intake of geriatric patients from protein-energy optimized meals (intervention group) with common meals (control croup). The phase angel of bioelectrical impedance (BIA) was measured with Bodystat 1500®MDD in a multi-frequency (5/50kHz) technique on the right side of the body in supine position at the beginning (week 1) and at the end (week 36) of the intervention-time. The statistical evaluation was done using the non-parametric Wilcoxon-Rang-Test. P-value<0.05 was considered statistically significant. 85 institutionalized, geriatric patients take part. 82% (70) were female and 18% (15) were male. In the intervention-group data of 39 patients with a mean (±SD) age of 84.8 (±7.8) years and a mean (±SD) BMI of 26.5 (±3.9)) and in the control-group data of 46 patients with a mean (±SD) age of 83.7 (±10.8) years and a mean (±SD) BMI of 25.9 (±5.4) were evaluated.

Results: In the intervention-group median (±SD) phase angel (3.6 (±0.88)/3.7 (±0.82)) increased significant (p<0.05) and decreased (3.3 (±0.73)/ 3.1 (±0.53)) significant (p<0.05) in the control-group.

Conclusions: The phase-angel-evaluation indicated an optimized nutritional status in the intervention group. It shows that institutionalized, geriatric patients benefit from protein-energy-interventions to optimize their daily meals.

Key words: phase-angel, geriatric-patients, nutritional-status, intervention

Acknowledgement: The PRINT-Study was financially supported by a grant of Uniscientia Stiftung Vaduz/Liechtenstein

PO625

PREVALENCE AND SEVERITY OF MALNUTRITION AMONG INFANTS AND YOUNG CHILDREN IN AN HIV AND MALARIA PRONE RURAL SETTING, WESTERN KENYA

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Background and objectives: Malaria and HIV are highly prevalent in Western Kenya. There is scarcity of data on the nutritional status of infants and young children in this setting. We aimed to determine the prevalence and severity of malnutrition among children aged 6-24 months in a rural District in Western Kenya.

Methods: In a cross-sectional survey conducted between November and December 2011, we measured nude weight and recumbent length among 618 infants and young children aged 6-24 months in Mumias District, Western Kenya. Weight and length data were used to calculate the prevalence and severity of stunting, wasting and underweight.

Results: Mean WLZ was -0.10 (95% CI:-0.20; 0.00), mean WAZ was-0.57 (95% CI:-0.67;-0.46) while mean HAZ was -0.90 (95% CI:-1.04; -0.77). HAZ for girls was significantly higher (p=0.009), thus Infant sex was a determinant for undernutrition with boys more affected than girls. The prevalence of stunting, wasting and underweight were 30%, 4%, and 20%, respectively. A greater proportion of children aged 18-23 months were stunted (44%) and underweight (34%) compared to younger infants (p<0.01). 12% of all infants were severely stunted while 1% and 5% were severely wasted and severely underweight, respectively. Infants of older caregivers (women) were significantly lighter/shorter than those of younger caregiver (p=0.008).

Conclusions: Malnutrition is highly prevalent and severe in this area placing children 6–24 months at high risk of premature death. More attention is needed for boys who are more affected than girls. There is need for context relevant interventions to combat malnutrition in this region and other similar settings.

Key words: stunting, wasting, malnutrition, infants and young children, Western Kenya.

PO626

EFFECTIVENESS OF AN EDUCATIONAL INTERVENTION ON NUTRITION AND PHYSICAL ACTIVITY FOR ADOLESCENTS

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Background and objectives: Recent studies show an alarming increase in levels of overweight and obesity among children and adolescents. The objectives of this survey were twofold: firstly, to verify if an educational intervention improves the nutritional state of a sample of students and, secondly, to check if students adopt good eating habits and healthy physical activity, after implementing a health educational intervention.

Methods: The sample consisted of 91 adolescent between 15 and 17 years old, 46 males (51.1%) and 44 females (48.9%), from a public educational center in Almería (Spain). The survey was conducted in three phases. The first stage comprise the second half of September 2012. In this stage, an assessment of the nutritional status of all the students was done by an anthropometry. The second stage (from October 2011 to the first half of June 2012), was to implement the educational intervention on healthy eating and physical activity. And the last phase was extended to the second half of June 2012, where the intervention was evaluated.

Results: After the intervention, all the students significatively improved their nutritional state, regardless their age (p<0.000). Regarding the adoption of healthy habits, significant differences were obtained in test Kreceplus scores (p<0.000). No significatively differences were found for physical activity after the intervention (p=0.568).

Conclusions: These results show the effectiveness of the procedures applied in this intervention to modify eating habits. In conclusion, the practice of physical activity is still a big problem in the study population.

Key words: educational intervention, obesity, nutritional status, physical activity.

PO627

POSITIVE ASSOCIATION BETWEEN ACTIVITY ENERGY EXPENDITURE AND APPENDICULAR SKELETAL MASS INDEX IN A GROUP OF BLACK SOUTH AFRICAN URBAN WOMEN

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Background and objectives: The European Working Group on Sarcopenia in Older People (EWGSOP) defines sarcopenia as appendicular skeletal mass (ASM) index (ASM /height squared [ASM/h2])<5.5 kg/m2 in women, plus a criterion of low muscle strength or low physical performance. There is a lack of data on the prevalence and determinants of sarcopenia in Africans. The aim of this study was to determine the prevalence and determinants of sarcopenia in a group of urban black women aged 43-100 y in South Africa.

Methods: In this longitudinal study, anthropometric, demographic and physical activity measurements (by questionnaire) were done in 2005, 2010 and 2012. Dietary intakes were measured (2005 and 2010) by quantitative food frequency questionnaire. DXA was used to measure ASM in 2012 and ASM/h2<5.5 kg/m2 was used as criterion 1 for sarcopenia. Grip-strength<20 kg was the additional criterion for low muscle strength and gait speed<0.65 m/s over 6 m was the criterion for low physical performance. Determinants of sarcopenia were assessed using multiple regression analysis with ASM/h2 as the dependent variable. Age, HIV status, smoking, dietary intakes and physical activity measured by questionnaire during 2005 and 2010 and by accelerometer/heart rate monitor (Actiheart) in 2012 were covariates in different models.

Results: According to the EWGSOP definition 12.7% of the women were sarcopenic. After the 14.8% HIV-infected women were excluded, 7.9% were sarcopenic. In the total group, the negative association between age and ASM/h2 was not statistically significant. Only HIV-status and activity energy expenditure (by Actiheart) were significant predictors of ASM/h2. When HIV-infected participants were excluded, animal protein intake and activity energy expenditure were positively associated with ASM/h2.

Conclusions: HIV-infection, animal protein intake and activity energy expenditure were the most important predictors of sarcopenia in a group of urban African women.

Key words: African women, sarcopenia, physical activity, HIV

PO628

USING COMMUNICATION SKILLS TO IMPROVE MOTHER'S PRACTICE ON INFANTS AND YOUNG CHILD FEEDING AND NUTRITIONALL STATUS OF THE CHIDREN

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Background and objectives: Malnutrition is public health problem in Vietnam, one of reasons was improper mother's practices on breast-feeding (BF) and complementary feeding (CF). So improving nutritional status of children by correctly feeding them is necessary. To determine changes of mother's practices on breast and complementary feeding according to WHO criteria and nutritional status of children under 24 months.

Methods: Two repeated cross-sectional studies in pairs of mothers and their children under 24 months were conducted in Phu Tho and Quang Ngai province in 2008-2010. During intervention time, mothers had been consulted by trained nutritional collaborators with 7 home visits in intervention time and group discussion focused on practices: early BF, excusive BF, proper time for introducing complementary food, sufficient amount of complementary meals, diversity of complementary food, child illness care and feeding, continuing breast feeding, using fortified complementary food

Results: After 2 year of intervention: Prevalence of initiative breastfeeding with one hour increased, exclusive breast feeding increased from 46.1% up to 86.2 and from 27% to 42%. Prevalence of children aged 12-15 months and 20-23 months continuing breast feeding increased from 79% to 86.5% nd from 11.1% to 31.9%. Prevalence of children aged 6-23 months consumed vitamin A rich food increased 21.1% to 38.2% and diversity of food increased from 49.6% to 82.4%. Anthropometric index of children were improved: WAZ, HAZ respectively from -0.85±0.97 and -1.16±1.08; up to -0.58±0.90 and -1.03±1.02. Hemoglobin concentration was increased from 111.2 ± 10 g/L up to 112.8 ± 10 g/L. Prevalence of underweight and stunting significantly decreased from 13.0% down 4.7% and from 24.1% down to 16.7%, prevalence of anemia was decreased from 38.4% into 24.4%.

Conclusions: Nutrition collaborator's skill consulting help mothers up-graded infants and young child feeding practices and help children improve nutritional status.

Key words: children, feeding, practices, nutrition

PO629

BIOPSYCHOLOGIC NUTRITIONAL SYSTEM- PHYSIC AND BREATHING TECHNIQUES

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Background and objectives: To Prevent disease and maintain health through Biysociologic Nutrition, * 1 * 2 given that the function of nutrition is to restore tissues and regain energy. * 1 As we eat we are affected by external stimuli psychic, mental or emotional, which modify our biological response. * 2 (Registered Nationwide, Copyright. Filing 1560 of February 28, 1994)

Methods:-By Applying nutritional correction which ensures proper handling of biological solids, liquids and air (gas feed). -With physical and breathing techniques in order to improve, activate and detoxify organs, glands and systems, and to balance mental states.

Results: In 48 years of study, research and practice abroad and in the country, including in public sectors as well as private and also educational environments at hospitals Direct-Care: 4944 people Indirect-Care: 11773 people Broadcast in Regional Radio and Television (2000-2010), on National (2012). -Patients record are being systematized for further studies. A book is being written for illustrating students and health care personal

Conclusions: Changing eating behaviors -awareness against poor eating habits. -Knowledge of nutritional values of foods and techniques applicable in daily routine.

Key words: Nutrition, Joy, Health (NAS)

PO630

GENDER DIFFERENCES BY SKIPPING BREAKFAST IN MOOD STATES AND NERVOUS SYSTEM OF SCHOOL CHILDREN

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Background and objectives: Studies on the relationship between breakfast consumption and cognitive function, knowledge, attitude and behavior of school children are few. Ages of the primary school children are the best growing period and increasing their appearances as a result of gender differences in the life cycle.

Methods: We searched the gender differences by breakfast omitting on the activities of the sympathetic nervous system and mood states in 32 students (5th grade) of an elementary school. We compared the difference of amylase activity as a marker of the activity of sympathetic nervous system, 6 values of POMS (profile of mood states) and 3 values of VAS (Visual Analogue Scale) as a mood states in both cases of breakfast feeding and skipping. Amylase activity and POMS and VAS were measured before and after Kraepelin and Stroop tests in fourth period.

Results: In the values of POMS, Tension (T), Anger (A), Fatigue (F), Confusion (C) by boys and values of T, Depression (D), F and C by girls in the case of breakfast skipping (BS) were significantly higher than the case of feeding (BF) before the tests. After the tests only 3 values by boys were higher, while all 6 values of POMS include Vigor (V) were more significant difference by girls of BS than that of BF. Furthermore values of VAS (sleepiness, lassitude and hunger) and amylase activity of BS were higher than that of BF by girls before and after tests.

Conclusions: The present results suggest that breakfast skipping gives much more effect to girls than boys in the sympathetic nervous system and mood states. We may suggest that these huge metabolic changes of girls caused by breakfast skipping are associated with cognitive function or problem solving.

Key words: gender differences, skipping breakfast, mood states, nervous system, school children

PO631

PREVALANCE OF ORTHOREXIA NERVOSA AMONG ADOLESCENTS AND YOUNG ADULTS

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Background and objectives: Healthy nutrition is generally considered as positive behavior by the general public but people who exhibit highly sensitive behavior about their consumption of healthy nutrition carry the risk of developing orthorexia nervosa (ON) in the future. The aim of this study was to determine the prevalance of orthorexia nervosa among adolescents and young adults.

Methods: The study included 438 female (66.1%), 225 male (33.9%), totally 663 university students with a mean age of of 22.8±2.07 years. There were two subgroups by age as adolescents (29.7%) and young adults (70.3%). The 44.8% of the students were educated in health related departments. A self-reported questionnaire about demographic and anthropometric information was administered. The ORTO-15 test was used to propose a diagnostic proceeding and to try verify the prevalence of ON. ORTO-15 scale used for diagnosis of orthorexia symptoms consists of 15 questions and a 1-to-4 likert type scale. Consistent and valid ORTO-15 test described people at and under 33 points with Turkish standards as orthorexic. Data were analyzed by SPSS 11.5 statistical software for Windows.

Results: The mean BMI of females and males were 21.19±3.19 kg/m2 and 23.69±2.91 kg/m2. The prevalence of underweight and obese among participants was 13.4% and 17.4% respectively. There was no significant correlation between BMI and ORTO-15 mean scores. Mean score of the participants from the ORTO-15 test was 38.2±3.43 and there was no statistically difference by gender and education programs. But young adult group (38.4±3.47) had higher mean score from ORTO-15 than adolescent group (37.7±3.30) and the differences between groups were statistically significant ($p<0.05$). A total of 9.7% of the participants scored below 33 in the ORTO-15 test.

Conclusions: Healthy eating obsession (Orthorexia nervosa) is one of the pshychosocial problems. For solving this problem, effective nutrition education is essential.

Key words: orthorexia nervosa, BMI, prevalence

PO632

STUDIES ON MILK FAT OF DIFFERENT SOCIOECONOMIC GROUPS OF BENGALI MOTHERS IN DIFFERENT STAGES OF LACTATION

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Background and objectives: Human milk is the best food for the neonates as it meets the needs of growing infants. The lipid fraction of milk is more important as it has many important physiological roles in neonates. The study aims to determine the total lipid content, fatty acid composition, cholesterol and phospholipids content of colostrum, transitional milk (TM) and matured milk (MM) of Bengali mothers of three different socioeconomic groups, lower income group (LIG), medium income group (MIG) and higher income group (HIG). Particle size of milk fat globules was also determined.

Methods: Samples were collected from 250 healthy, aged 17-35 years, non-smoking, full-term, non-vegetarian mothers belonging to LIG (n=91), MIG (n=69) and HIG (n=90). Socioeconomic status and details of food consumption were analyzed by food frequency questionnaire. Lipid was extracted and fatty acid composition was determined by gas liquid chromatography after converting fatty acids into methyl esters. Cholesterol and phospholipids contents were determined by the method of Toshiaki Ohshima (2001) and Chen et. al. (1956), respectively. Milk fat globule size was analyzed by Particle Analyzer, Delsa Nano-C (A53878) from Beckman Coulter, Mumbai, India.

Results: Lipid contents mostly showed greater values towards matured milk from colostrum in each group. Phospholipids and cholesterol contents also showed the similar fashion as lactation progressed. MIG-colostrum and MM showed the highest amount of saturated (40.41±7.46) and monounsaturated fatty acid (41.50±2.54) respectively, whereas, HIG-TM and colostrum composed with highest n-6 (19.15 ± 1.07) and n-3 (6.99 ± 1.87) PUFA respectively. Erucic acid (C22:1n-9) and nervonic acid (C24:1n-9) were two important fatty acids present in Bengali mothers' milk. Fat globule size of colostrum, TM and MM were 3917.9±358.33, 1543.3±136.14 and 844.88±232.28 respectively.

Conclusions: May be compared with other countries, but further study with higher number of subjects is required.

Key words: PUFA, food frequency questionnaire, particle size.

PO633

EATING BEHAVIOUR AND BODY IMAGE CONCERNS IN ADOLESCENTS

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Background and objectives: There has been an increased awareness of the prevalence of body image problems and disordered eating behavior in children and adolescents. The aim of this study was to determine body image and eating behaviours in adolescents.

Methods: The study was conducted on 590 high-school students with a mean age of 16.8±1.14 years. Eating behaviours and body image concern were assessed by The Eating Attitudes Test (EAT-26) and Social Physique Anxiety Scale (SPAS). The EAT-26 is the most widely used screening eating disorder. A score at or above 20 on the EAT-26 indicates a high level of problematic eating behaviors. The SPAS questionnaire is a tool used to measure Social Physique Anxiety and high score reflects high anxiety level. Body weight and height were determined and body mass index(BMI) was calculated and evaluated by WHO standards. All data was evaluated by SPSS13.0 for Windows.

Results: Participants of the study were 58.8% female, 41.2% male. The percentages of the girls and boys with a BMI ≥85th percentile were 11.5% and 22.5%, respectively. The 18.5% of the girls and 13.5% of the boys were underweight (BMI≤15th percentile). The mean scores of EAT-26 and SPAS of girls were higher than boys ($p<0.05$). In girls, there were positive correlations between BMI and EAT-26 ($r=0.136$, $p=0.011$) and SPAS ($r=0.226$, $p=0.000$) score. Among girls and boys the percentages of the abnormal eating behaviour and the high anxiety were 23.9%, 62.2% and 11.5%, 47.1%, respectively. The SPAS score was positively correlated with the BMI percentiles of all individuals ($r=0.158$, $p=0.000$).

Conclusions: Obesity in adolescence may have serious health and psychosocial consequences. Adolescents, especially girls are at high risk for abnormal eating behaviours and social physique anxiety.

Key words: body image, eating behaviours, self-esteem, adolescents

PO634

EVALUATION OF APPETITE AND NUTRITIONAL STATUS OF PREGNANT ADOLESCENTS

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Background and objectives: Adequate nutrition is essential to maintain health at every stage of life. Nutritional needs differ across various age groups and with certain health conditions. Adolescence pregnancy is one such instance in which nutritional needs are differ. The aim of this study was to determine the nutritional status of pregnant adolescents.

Methods: A total of 100 pregnant adolescents with a mean age of 20.1±2.14 years participated in this study. Pre-pregnancy body weight, current body weight, height and nutritional status were determined via a questionnaire. Body mass index (BMI) was calculated and evaluated by WHO standards. All data was evaluated by SPSS 13.0 for Windows.

Results: The mean gestational age of pregnant adolescents was 30.0±7.01 weeks and the mean of parity was 1.31±0.58. The mean pre-pregnancy and current BMI of pregnant adolescents were 21.2±3.58 kg/m2 and 25.1±3.95 kg/m2, respectively. According to pre-pregnancy BMI, 18.0% of pregnant adolescents were underweight, 70.0% were normal, 8.0% were overweight, 4.0% were obese. The mean body weight gain during pregnancy was 9.6±5:38 kg. The 42.0% of pregnant women identified their appetite appetence and 16.0% of them identified their appetite as inappetent. The average number of main meals and snacks consumed by pregnant adolescents were 2.4±0.55 and 2.7±0.96, respectively. The majority of individuals (68.0%) were skipping meals mostly lunch meal (37.8%). The mean daily energy intake of pregnant adolescents were 3490.7±952.20 kcal. The percentages of the energy from carbohydrate, protein and fat were 45.1%±5.36, 13.1%±2.16 and 41.7%±6.06, respectively. Dietary intake of vitamin A, folic acid, calcium and iron didn't meet the DRI recommendations.

Conclusions: Adolescents who become pregnant can be nutritionally at risk. Many adolescents do not have good eating habits and their diets are often high in fat and calories. So, pregnant adolescents need professional nutritional assistance.

Key words: adolescent pregnancies, nutrition, appetite, BMI

PO635

THE EFFECT OF DIFFERENT AMOUNTS OF FRUCTOSE CONSUMPTION ON SOME ANTHROPOMETRIC MEASUREMENTS AND BIOCHEMICAL PARAMETERS

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Background and objectives: An increase in high fructose corn syrup, as well as total fructose, consumption over the past ten years has been linked to a rise in obesity and metabolic disorders. The objective of this study was to determine the relations between some biochemical parameters, anthropometric measurements and dietary fructose consumption.

Methods: The study was planned on 90 (41 men, 49 women) healthy individuals with a mean age of 31.9±7.15 years. A questionnaire was administered to determine personal characteristics and anthropometric measurements [height, body weight, waist circumference, body mass index (BMI)]. The nutritional status was determined by food-frequency questionnaire and three days 24-h dietary records. Some biochemical parameters were also determined. All data was evaluated by SPSS 13.0 for Windows.

Results: The mean daily dietary fructose consumption was 42.3±22.74 g and the men's consumption of fructose was higher than women's ($p<0.05$). The daily dietary fructose consumption was higher in 41-50 age groups (44.3± 19.55 g) and the main source of fructose was sucrose. The percentages of fructose from energy were 7.2% in men, 5.7% in women. The percentages of the participants that consumes fructose daily ≥50 g and ≥10% of the total energy was 33.3% and 18.9%. There were significant positive correlations between the energy intake ($r=0.717$, $p=0.000$), body weight ($r=0.267$, $p=0.011$) and fructose consumption. The participants who consumed ≥50 g fructose have higher waist circumferences, serum glucose and total cholesterol levels than the participants who consumed <50g fructose but the differences were not statistically significant ($p>0.05$).

Conclusions: As a conclusion, dietary fructose from added sugar may cause some health problems. So, the healthy preference of fructose source in diets is fruit and the amount of safe dietary intake of fructose may accept as 10% of total energy.

Key words: fructose, high fructose corn syrup, obesity, chronic diseases, nutrition

PO636

EXCLUSIVE BREASTFEEDING: PREGNANT WOMEN'S AWARENESS AND HEALTHCARE PROVIDERS' PRACTICES DURING ANTENATAL VISITS IN MOROGORO, TANZANIA

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Background and objectives: In Tanzania about 42% of children below five years are stunted due to chronic malnutrition. Exclusive breastfeeding (EBF) may be an effective strategy to protect infants from malnutrition. Therefore, it is important to disseminate accurate information on breastfeeding recommendations to pregnant women attending antenatal visits The aim of the present study was to assess the awareness of exclusive breastfeeding among first time pregnant women attending antenatal clinics, and breastfeeding counselling practices of healthcare providers, for alignment with the WHO recommendations.

Methods: A cross sectional study of eighty first time pregnant women attending antenatal clinics (ANC) at Mzumbe Health Centre and Tangeni dispensary, and six nurses providing care in these facilities was undertaken. Questionnaires were used to evaluate women's breastfeeding knowledge and future intentions to breastfeed and nurses' breastfeeding knowledge and counselling practices.

Results: Women's knowledge in EBF was generally poor; there were no differences in breastfeeding knowledge between the two facilities. About 94% of women had never received breastfeeding counselling at the ANC, 61% received EBF information from their mothers, 37.5% said glucose water should be given immediately after delivery, only 23.8% planned to introduce solids at six months, the majority indicating that they would start solids at a younger age. Common reasons for introducing solids were; baby will be old enough (55%), baby will be hungry (32.5%), advised by the nurse (7.5%). Only one nurse had received training on breastfeeding, nurses' knowledge of WHO breastfeeding recommendations was poor; however nurses had satisfactory knowledge of how to solve breastfeeding problems. Only three nurses said they educate mothers about exclusive breastfeeding.

Conclusions: Findings highlight a need to focus on delivering information and education to women and nurses.

Key words: breastfeeding, knowledge, healthcare providers, pregnant women

PO637

VIA® INSTANT COFFEE ENHANCES EXPLOSIVE BENCH PRESS PERFORMANCE

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Background and objectives: There has been debate on whether caffeine intake enhances performance in resistance trained individuals. This study tested a new, highly caffeinated coffee product, Via® instant coffee (VIA). We hypothesized that VIA consumption will increase ($p<0.05$) muscle explosiveness in resistance-trained (8.0±4.3 y) college-aged students (n=12; 22.5+4.7 y) compared to themselves in a decaffeinated condition (DCF).

Methods: After 24 hours of dietary control and caffeine abstinence, fasted subjects performed three separate repetitions of strict Smith bench press under two conditions (VIA, DCF), with trials separated by 48-72 hours. The peak force (FOR), peak power (POW), peak velocity (VEL), and maximum rate of force development (RFD) of the VIA trial were compared to DCF. FOR, POW, VEL, and RFD were measured via Ballistic Measurement System (BMS) linear displacement, XPV6+ (Innervations, Inc. South Australia, Australia). **Results:** Results suggest a significant increase in FOR (VIA 551.6±263.2 N vs DCF 542.8±262.7 N; p=0.027); POW (VIA 505.2±246.4 W vs DCF 471.6±233.4 W; p=0.004); VEL (VIA 1.21±0.14 m/s vs DCF 1.12±0.13 m/s; p=0.0008); and RFD (VIA 1546.3±884.9 N/s vs DCF 1409.3±7585.5 N/s; p=0.024).

Conclusions: These preliminary data support the hypothesis that explosive muscle performance increases under the influence of Via® instant coffee.

Key words: caffeine, resistance exercise, sports nutrition, neuromuscular.

PO638

EFFECTS OF VIA® INSTANT COFFEE ON EXPLOSIVE SQUAT PERFORMANCE

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Background and objectives: Caffeine is commonly considered a performance enhancer during resistance training. A new, highly caffeinated instant coffee product, Via® (VIA), was tested in this study. We hypothesized that VIA consumption would increase ($p<0.05$) explosive squat performance in resistance-trained (8.0±4.3 years) university students (n=12; 22.5+4.7 y) in a double blind experimental design.

Methods: Fasted subjects performed three repetitions of strict Smith squat under two conditions (VIA, decaffeinated VIA [DCF]), after 24 hours of dietary control and caffeine abstinence, with trials separated by 48-72 hours. The peak force (FOR), peak power (POW), peak velocity (VEL), and maximum rate of force development (RFD) of the VIA trial were compared to DCF. Ballistic Measurement System (BMS) linear displacement, XPV6+ (Innervations, Inc. South Australia, Australia) was employed.

Results: Results reveal a significant increase in VEL (VIA 1.655±0.223 m/s vs DCF 1.588±0.215 m/s; p=0.006). There was no significant increase in FOR (VIA 1505.3±281.9 N vs DCF 1518.3±319.9 N; p=0.698); POW (VIA 1927.12±527.9 W vs DCF 1878.88±565.93 W; p=0.301); RFD (VIA 4327.5±1257.05 N/s vs DCF 4268.83±1141.76 N/s; p=0.793).

Conclusions: These preliminary data suggest enhancement of velocity but no other performance variables after ingesting VIA. Given other findings from our laboratory, future research should focus on differences between upper and lower body performance after ingesting caffeinated drinks.

Key words: caffeine, resistance exercise, sports nutrition, neuromuscular

PO639

ACTION OF THE NAGOYA HEALTH COLLEGE-HEALTH CARE IN THE ELDERLY PERSON

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Background and objectives: Japan is super aged society. Therefore there is the risk that health insurance system will fail in the near future. In each area, Public health center plays a key role and opens up health club. Nagoya Women's University does the healthy college in cooperation with Mizuho Public Health Center in Mizuho-ku of Nagoya City. This healthy college is carried out every year. The purpose of this healthy college is that an elderly person lives long healthily.

Methods: The participants of the healthy college were recruited by the public information magazine of Nagoya City. The elected applicant can participate in a healthy college performed in Nagoya Women's University. The content of six times of lectures is as follows: 1) Sense of taste and smell, 2) Low GI food, 3)Sleep apnea syndrome, 4)High quality of sleep, 5) Medicinal herbs dish, 6) Exercise. The participant was measured blood pressure, weight and percent of body fat every time. In addition, questionary survey was carried out before and after the college, about dietary habits and exercise custom.

Results: The age of the 28 participant are 65±3. The height, weight and percent of body fat were as follows: 156.3±6.05 cm, 54.6±9.9 kg, 22.3±3.5 kg/m^2,32.1±}4.9%. Twenty three people who participated in the healthy college were improved dietary habits. Twenty four people who participated in the healthy college were improved exercise custom.

Conclusions: Even if the BMI level was a standard, the participant body mass of fat was much. There were many people whom the quality of the sleep had not well. However, dietary habits and exercise custom of many people were improved by participation in Nagoya health college.

Key words: elderly person, healthy college, Food habits, Exercise custom, ody fat

PO640

THE EFFECT OF WEIGHT LOSS DIET AND OMEGA-3 FATTY ACIDS ON BODY WEIGHT AND SOME BIOCHEMICAL PARAMETERS IN PATIENTS WITH POLYCYSTIC OVARY SYNDROME

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Background and objectives: Being overweight and insulin resistant are prevalent in polycystic ovary syndrome (PCOS) patients. This study was planned to investigate the effects of weight loss diet and omega-3 fatty acids on body weight and some biochemical parameters in patients with PCOS.

Methods: The study was conducted on 22 new diagnosed obese (BMI=25.0-35.0 kg/m2) PCOS patients with a mean age of 27.4±4.87 years. There were three groups. First group (n=8) was treated with only metformin, the second group (n=8) was treated with the combination of metformin and weight loss, the third group (n=6) was treated with the combination of metformin and omega-3 riched weight loss diet. Nutritional status was determined by three days 24-h food records and evaluated by Dietary Reference Intake (DRI) recommendations. Anthropometric measurements and some blood biochemical parameters were evaluated at baseline, at the end of the 4th and 8th weeks. All data was evaluated by SPSS 13.0 for Windows.

Results: At the baseline, the dietary energy, carbohydrate, protein, fiber, cholesterol, vitamin and mineral intakes were similar among groups. In all groups, dietary fat intake was higher than DRI recommendations (between 2nd and 3rd groups; $p<0.05$). There were no statistically significant anthropometric changes in 1st group, but in 2nd and 3rd groups, after the treatment, the body weight, body mass index, waist circumference, body fat ratio, fat-free mass and fat-free mass index values were significantly decreased at the end of the 8th weeks ($p<0.05$). In the 2nd and 3rd groups, serum total cholesterol levels were decreased after 8th week ($p<0.05$). The serum fasting insulin levels and HOMA-IR values were statistically different between 2nd and 3rd groups ($p<0.05$).

Conclusions: Weight control is very important in PCOS patients for regulation of blood parameters and preventing from complications.

Key words: PCOS, metformin, weight loss diet, omega-3 fatty acids

PO641

MATERNAL MICRONUTRIENT-RICH FOODS INTAKE AND BIRTH SIZE IN EGYPT

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Background and objectives: Adequate supply of nutrients is probably the most important environmental factor affecting pregnancy outcome, mainly birth size. The aim of the present study was to investigate relationship between maternal nutrition and birth size in a cross-sectional study of 434 healthy pregnant Egyptian women and their neonates, focusing on macronutrient intake, diet quality specially micronutrient content; maternal and neonatal anthropometry.

Methods: Maternal weight, height and body mass index (BMI), food intake (was assessed using food frequency questionnaire of 12 food categories at each of the three trimesters of gestation) and haemoglobin levels were recorded. Neonatal birth weight; lengths (crown–heel, trunk, upper and lower arm); circumferences (head, mid-upper arm, chest, waist, hip, thigh and calf), and skin fold thickness (triceps, biceps, suprailiac and sub scapular) were attempted.

Results: Frequency of carbohydrate intake was not associated with birth size for both genders, but frequent intake of fat and protein during third trimester showed a significant relation with girl's birth size. High fat intake during third trimester was associated with triceps SF for boys and waist circumference and BMI of girls. However, birth size was strongly associated with improved maternal intake of milk and green leafy vegetables all over gestation and fruits from second trimester till late gestation leading to improved fetal growth. Significant positive correlation between maternal anthropometric variables with neonatal birth dimensions was observed and the effect was more evident in girls than boys for BMI and head circumference. Significant negative correlations were found between maternal haemoglobin levels and birth size.

Conclusions: Birth size was strongly correlated with maternal anthropometry and consumption of micronutrient-rich food at all stages of gestation. This suggests that micronutrients may be important limiting factors for fetal growth.

Acknowledgements: mothers and their neonates; without them, this study couldn't be completed and National Research Centre for funding.

Key words: maternal, micronutrient intake, birth size

PO642

COMPLEMENTARY FEEDING PRACTICES IN SOUTHEAST ASIAN COUNTRIES

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Background and objectives: In 2010, the WHO released a set of indicators for assessing infant and young child feeding (IYCF) practices to enable assessment of the situation regarding breastfeeding and complementary feeding of children at the population level. Indicators were incorporated into nationwide household surveys, particularly the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). This report reviews the latest DHS and MICS results on complementary feeding practices in Southeast Asian countries – Philippines, Indonesia, Cambodia, Vietnam–and compares complementary feeding of breastfed and nonbreastfed children age 6-24 months.

Methods: WHO indicators for assessing infant and child feeding practices were obtained from country DHS and MICS reports: timely introduction of complementary foods, minimum meal frequency, minimum dietary diversity, minimum acceptable diet, and consumption of iron-rich and iron-fortified foods.

Results: Timely introduction of complementary foods was lowest in Vietnam (50.4%), followed by Indonesia (75%), Cambodia (87.7%), and Philippines (89%). Majority (69-78%) of children in these countries were given iron-rich and iron-fortified foods. Breastfed children in Cambodia, Indonesia, and Philippines received better quality complementary diets than nonbreastfed children. The proportion of breastfed vs nonbreastfed children who received a minimum acceptable diet was 28.2 vs 10.9%, respectively in Cambodia, 52.5 vs 8.3% in Indonesia, and 68.2 vs 40.5% in Philippines. A similar pattern was obtained for the indicator minimum meal frequency – i.e, 78.8 vs 61.7% (for breastfed vs nonbreastfed children, respectively) in Cambodia, 67 vs 11.9% in Indonesia and 80.7 vs 48.2% in Philippines.

Conclusions: In certain countries, complementary feeding of breastfed children is more likely to conform with IYCF recommendations. Studies are needed to identify factors underlying differential complementary feeding of breastfed and nonbreastfed children in Southeast Asia and whether the WHO indicators reflect adequate energy and nutrient intakes.

Key words: complementary feeding, Southeast Asia, child feeding

PO643

DIETARY DIVERSITY AS A CORRELATE OF UNDERNUTRITION AMONG SCHOOL AGE CHILDREN IN SOUTHWESTERN NIGERIA

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Background and objectives: Dietary diversity has been recognized as a key element of high quality diet, which is assumed to be a proxy nutrient adequacy. This study was conducted to determine the association between undernutrition and dietary diversity among school-age children in southwestern Nigeria.

Methods: This current study is a cross-sectional study of school aged children. 600 school children were randomly selected from six private and six public schools in the region. A standardized FAO-published 24-hour diet recall questionnaire for calculating a dietary diversity score was adapted, tested, and used for all students. Weight and height measures were taken and weight-for-age, height-for-age, and weight-for height Z scores were calculated to determine the prevalence of underweight, stunting, and wasting respectively.

Results: The average age for students in the study was 8.3 years. Significant differences existed between students in private and public schools in BMI-for-age (p=0.025), in dietary diversity scores (p=0.034) and in undernutrition (p=0.003). No private school children exhibited underweight or stunting, but 11.7% were overweight or obese. No public school students were overweight. Stunting (p=0.024) and wasting (p=0.018) correlated significantly with lower dietary diversity scores. The food groups at the lowest levels in the children's diet were organ meats, milk and milk products, eggs, and vitamin A rich fruits and vegetables.

Conclusions: A dietary diversity score may be useful in identifying school children at risk of undernutrition and the food groups most often lacking in local diets. Methods of increasing dietary diversity in meals at school and at home are likely to benefit children at nutritional risk.

Key words: dietary diversity, undernutrition, school children, Nigeria

PO644

EMPOWERING WOMEN COOPERATIVES TO RAISE MALNOURISHED CHILDREN LIVING STANDARDS IN HUYE DISTRICT/RWANDA

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Background and objectives: In Rwanda, chronic malnutrition poses a serious threat to the mental and physical development of nearly half (45%) of all children under five and has been identified as an underlying factor in 43% of deaths in children under five. In rural areas of Rwanda, 154,000 children continue to die each year before their fifth birthday, mostly from preventable causes. Women in the rural community are taught repeatedly about proper maternal health and child nutrition, but lack of means to achieve it. The objective of the intervention was to better respond to women and newborn's health needs, by enabling them to produce and growing vegetables and fruits.

Methods: Providing knowledge and skills on children nutrition and maternal health to the 50 rural women cooperative with severely malnourished children received at Huye health center/Rwanda from January 2012 to December 2012. We provided through education sessions and then established Akarima k'Igikoni (Kitchen garden), household consume its product and provision of small livestock (goats) to produce organic fertilizer to use in gardens .Promoting production and consumption of fruits and vegetables at families, growing of micronutrient-rich foods (soya, groundnuts, mushrooms, sweet potato varieties that contain carotene) to improve nutrients intake for malnourished children.

Results: A child was 5 kgs, after attending teaching sessions and establishing kitchen garden for proper feeding, the kid is now 14 kgs .Rural malnourished children attending huye health center reduced from 48% to 23% among 50 women participants, after completing maternal health education sessions. Cooperative enabled local women to raise the standard of living.

Conclusions: Income generation cooperative enabled rural women to raise the standard of living for their family, provided proper nutrition for their kids. Women cooperatives could be used to improve children nutrition.

Key words: malnutrition, cooperative, garden, rural

PO645

INFANT AND YOUNG CHILD FEEDING PRACTICES AND CHILD UNDERNUTRITION IN RURAL, CHINA

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Background and objectives: To explore infant and young child feeding (IYCF) practices and determine the association between feeding indicators and nutritional status of children aged 0-23 months in rural, China

Methods: Data from the 2010 China Food and Nutrition Surveillance survey were used. A sample of 4094 children was obtained with stratified random cluster sampling method. Information on feeding practices was obtained by interviewing the caregivers, anthropometric measurements were conducted. New WHO feeding indicators were used to assess child feeding, and nutritional status was determined according to WHO child growth standards.

Results: Only 11.9% of infants were put to the breast within 1 hour of birth, and 37% of infants younger than 6 months were exclusively breastfed. About 90% of infants aged 6¨C8 months received solid, semi-solid or soft foods, 62.2% of children aged 6-23 months old met the minimum criteria for dietary diversity, 69% received the minimum meal frequency, and 43.2% had a minimum acceptable diet. Regression model indicated that children who achieved minimum acceptable diet had higher Height-for-age Z-score ($p<0.05$), desired feeding frequency was associated with higher Weight-for-age Z-score ($p<0.05$); Logistic regress models confirmed that children with minimum acceptable diet had lower risk of underweight (OR=0.56, 95% CI 0.38, 0.82).

Conclusions: The result highlight the importance of IYCF practices as determinants of child growth outcomes, greater efforts should be made to improve sub-optimal practices in rural, China, from timely initiation of breastfeeding and exclusive breastfeeding for 6 months to diet diversity, especially minimum acceptable diet.

Key words: breastfeeding, WHO feeding indicators, undernutrition

PO646

PREVALENCE OF VITAMIN A DEFICIENCY AMONG INFANTS IN WESTERN KENYA

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Background and objectives: Vitamin A deficiency (VAD) is a significant burden among children less than 5 years old and pregnant and lactating women especially in sub-Saharan Africa. We assessed the levels of vitamin A and prevalence of VAD among children age 6-23 months in 2 counties in western Kenya.

Methods: Dry Blood Spot (DBS) samples were obtained from 1850 infants in a community-based cross-sectional survey. Lab analysis of retinol-binding protein (RBP) was carried out on a random subsample (n=881) of infants using a rapid enzyme immunoassay (EIA) technique to estimate vitamin A status. Values were adjusted for influence of inflammation using C-reactive protein (CRP, >5 mg/L) and population prevalence of VAD (RBP <0.70 μmol/L) estimated.

Results: Mean (geometric± SD) concentration of RBP was low (0.88±0.42μmol/L) and consequently the inflammation-adjusted mean (±SE) prevalence of VAD was high (29.6±1.6%) in this population. The level of CRP was within normal range (0.37±1.74 mg/L) whilst 8.6±0.9% of the children had subclinical inflammation (CRP>5 mg/L). The prevalence of VAD did not differ by child sex (Chi-squared, c2= 0.68, p=0.41), child nutritional status (wasting (p=0.75) and stunting (p=0.40)), reported child intake of vitamin A capsule within the past 1 year (p=0.22), maternal vitamin A nutritional knowledge (Chi-squared, c2= 0.20, p=0.66), or reported maternal intake of vitamin A capsule within 2 months of delivery (p=0.44).

Conclusions: Prevalence of VAD in this sample of infants was high irrespective of intake of vitamin capsule or maternal vitamin A nutrition knowledge. A sustainable food-based intervention in this area of western Kenya to combat VAD especially in pregnant women and infants is warranted.

Key words: vitamin A deficiency, sub-Saharan Africa, retinol-binding protein, C-reactive protein, western Kenya.

PO647

URINARY EXCRETION LEVELS OF WATER-SOLUBLE VITAMINS IN PREGNANT AND LACTATING WOMEN IN JAPAN

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Background and objectives: The dietary habits of pregnant and lactating women are important for meeting the nutritional needs of both the women and their children. Recent studies have shown that the urinary excretion levels of water-soluble vitamins can be used as biomarkers for the nutritional status of these vitamins. The objective of this study is to determine changes in the urinary excretion levels of water-soluble vitamins during pregnant and lactating stages.

Methods: The design used was cross-sectional study. Control women (n=37), women in the 2nd (16-27 wk, n= 24) and 3rd trimester of pregnancy (over 28 wk, n=32), and early- (0-5 mo, n=50) and late-stage lactating (6-11 mo, n=49) women took part in the survey. A single 24-h urine sample was collected one day after the completion of a validated, self-administered comprehensive diet history questionnaire to measure water-soluble vitamins.

Results: The mean age of subjects was 32 years, and mean height was 160 cm. The average intakes of vitamin B6 and folate were lower than the estimated average requirement value for the Japanese Dietary Reference Intakes during pregnancy. Urine nicotinamide metabolites and folate levels were higher in pregnant women than in control women. Urine excretion level of vitamin B1 decreased during lactation and that of pantothenic acid decreased during pregnancy and lactation. These results suggest that these changes reflect the increase of nicotinamide synthesis from tryptophan during pregnancy, increase of vitamin B1 and pantothenic acid requirements during pregnancy, and excretion of pantothenic acid to breast milk.

Conclusions: These results provide valuable information for setting the Dietary Reference Intakes of water-soluble vitamins for pregnant and lactating women.

Key words: vitamin, pregnancy, lactation, human, urine

PO648

SLEEP QUALITY IN THE SURVIVAL OF ELDERLY TAIWANESE: ROLES FOR DIETARY DIVERSITY AND PYRIDOXINE IN MEN AND WOMEN

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Background and objectives: Diet may contribute to sleep and all-cause mortality among elderly men and women.

Methods: The representative Nutrition and Health Survey in Taiwan for elders during 1999–2000 was used. Some 942 men and 923 women aged. The representative Nutrition and Health Survey in Taiwan for elders during 1999–2000 was used. Some 942 men andtary recalls. Participants were examined and fasting blood taken. Sleep quality was classified as poor, fair or good. Death Registry linkage until December 31, 2008 provided all-cause mortality.

Results: For women, but not men, poor sleepers had significantly lower vegetable and vitamin B-6 intakes, compared to good sleepers (P<0.05). For men, but not women, good and fair sleepers had a lower risk of death compared to poor sleepers after relevant adjustments with corresponding hazards ratios (HR) (95% confidence intervals (CI)) of 0.60 (0.42–0.87) and 0.55 (0.36–0.86). The joint HRs for "DDS>4 and good sleep" were 0.38 (0.22–0.66) for men and 0.52 (0.30–0.88) for women compared with "DDS results: For women, but not men, poor sleepers had significantly lower vegetable and vitamin B-6 intakes, compared to good sleepers (compared with "insufficient and poor sleep" for men and women, respectively; for women, PLP adequacy provided significantly reduced HRs for good and poor sleep.

Conclusions: Sleep quality played a more important role in mortality for men than for women. Sufficient dietary diversity in men could offset the adverse effect on mortality of poor sleep. In women, PLP predicts mortality more than does sleep.

Key words: vitamin B-6, DDS, sleep, gender, mortality

PO649

UNDER-NUTRITION LOWERS LEARNING AND MEMORY ABILITY AMONG CHILDREN AGE 5-6 YEARS OLD IN BOGOR–INDONESIA

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Background and objectives: Insufficient nutrient intake during golden period (0-5 years) may influence brain development which is not possible to be paid-off on later life. Indonesian Ministry of Health reported that 17.9% Indonesian children have suffered of under-nutrition in 2010 (13% in West-Java). However, the current status needs to be identified to expand coverage. The objectives were to determine the current nutritional status of Indonesian children age 5-6 years old, to assess whether the nutritional status influenced their brain development, and to identify factors from their baby's history associated with their growth.

Methods: A survey base on cross-sectional study design was conducted to identify the nutritional status, brain development score (IQ, EQ, learning, and memory ability using Projective Multi-phase Orientation method), and some history of baby birth (birth method, birth weight, and exclusive breast-feeding) among 225 children age 5-6 years old from 7 different rural and urban areas in Bogor, West-Java and Indonesia, between November to December 2012.

Results: The prevalence of under-nutrition children age 5-6 years old in Bogor-Indonesia was 13.57%. Learning ability between under-nutrition- (n=30) and normal- children (n=179) were 44.13±29.43 and 46.98±27.03, respectively ($p<0.05$). Memory ability between severe acute malnutrition- (n=51) and normal- children (n=170) were 46.65±11.13 and 50.49±11.92, respectively ($p<0.05$). Emotional quotient (EQ) between children who did (n=111) and did not receive exclusive breast-feeding (n=110) were 374.28±46.35 and 367.51±35.88, respectively ($p<0.05$).

Conclusions: In Bogor-Indonesia, the current prevalence of under-nutrition children age 5-6 years is still high. This under-nutrition lowers their learning and memory ability. Children who received exclusive breast-feeding had a higher EQ score. Stronger efforts are needed to support the exclusive breast-feeding and nutritionally appropriate foods especially during their golden period to support their optimal growth.

Acknowledgements: This study was supported by Faculty for the Future program from Schlumberger Foundation.

Key words: under-nutrition, brain development, Indonesian children.

PO650

LEARNERS' PERCEPTIONS, ATTITUDES AND BEHAVIOUR TOWARDS HEALTHY EATING-THE INFLUENCE OF A NUTRITIONALLY-REGULATED TUCK SHOP

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Background and objectives: Tuck shops at schools often offer unhealthy items that are energy dense and high in fat and/or sugar with a low content of vitamins, minerals and dietary fibre. The availability of these items often prevent learners from making healthy food choices, since children tend to choose unhealthy foods when given a choice. The objectives were to investigate the influence of a nutritionally-regulated tuck shop on children's perceptions, attitudes and behaviour towards healthy eating in Afrikaans medium, co-education primary schools in Bloenfontein, South Africa.

Methods: In a cross-sectional survey with an analytical component, grade 2-7 learners in a school with a nutritionally-regulated tuck shop (n=116) and a school with a conventional tuck shop (n=141) completed a questionnaire, while six learners per grade took part in focus group discussions. Questions related to lunchbox contents and perceptions, attitudes and behaviours towards the tuck shop and healthy eating. Nutritional information on the food items available for purchase was also collected.

Results: The lunchboxes of children in a school with a nutritionally-regulated tuck shop contained significantly ($p<0.05$) more healthy items (fruit, water, muffins) as well as significantly more unhealthy items (sweets and chips). Children in a school with a nutritionally-regulated tuck shop liked certain fruits and vegetables significantly ($p<0.05$) more than children in a school with a conventional tuck shop. The items offered by the nutritionally-regulated tuck shop contained about half the kilojoules than items offered by the conventional tuck shop. Younger learners were more positive towards their nutritionally-regulated tuck shop than older learners. Children in both schools shared similar perceptions regarding the tuck shop and healthy eating.

Conclusions: The value of controlling the type of items available for purchase during school hours can be counteracted by lunchbox contents and certain fixed eating patterns, perceptions.

Key words: tuck shop, healthy eating, children

PO651

OVERWEIGHT, OBESITY, AND EARLY-LIFE FEEDING PRACTICES AMONG UNDERFIVE CHILDREN IN LEBANON

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Background and objectives: Childhood obesity is an increasing public-health problem worldwide. Recent evidence suggests that early-life feeding practices influence the risk of later-onset obesity; where studies demonstrate a protective role of breastfeeding, while duration of breastfeeding and timing of complementary food introduction also seem to play a role. Plausible explanations include protective effects of human milk constituents on growth patterns and metabolic pathways that may program changes in body composition. The objectives of this project were to: 1) Investigate overweight and obesity prevalence among Lebanese underfive children, 2) Characterize breastfeeding and complementary feeding practices, and 3) Examine the association between feeding practices and overweight/obesity in underfive children.

Methods: A cross-sectional nationally representative study was conducted on 1,031 Lebanese underfive children randomly selected from households by stratified cluster sampling. Sample-size calculations were based on an estimated prevalence of 13% of preschool overweight and obesity (2% error and 95% confidence interval).

Results: Preliminary data from the six governorates of Lebanon revealed: 1) Overweight and obesity prevalence of 11.8% and 3.3% among underfive children, respectively, 2) Low rates of exclusive breastfeeding (13%) with the introduction of complementary foods before the recommended age of 6 months, 3) Prevalent introduction of complementary foods (32%) earlier than the internationally accepted age of 4 months, and 4) Statistically significant association between complementary food introduction before 6 months and overweight among underfive children.

Conclusions: Preliminary findings reveal suboptimal breastfeeding and complementary feeding practices, providing preliminary characterization of early-life feeding practices in Lebanon. Promotion of exclusive breastfeeding and timely introduction of complementary foods are effective interventions that can curtail growth faltering and obesity in young children; possibly decreasing the risk of NCDs. Evidence-based protocols are needed to implement country-specific interventions to tackle available nutritional problems and feeding practices among the underfive population.

Key words: obesity, underfive, children, Lebanon, feeding practices

PO652

DEPRESSION AND PSYCHO-PHARMACEUTICAL USE ASSOCIATED WITH MALNUTRITION IN INSTITUTIONALIZED ELDERLY CITIZENS IN PRAGUE, CZECH REPUBLIC

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Background and objectives: To evaluate the relationship between depression, use of psycho-pharmaceuticals and nutritional status (assessed in an earlier study) among healthy institutionalized elderly citizens.

Methods: In an earlier study, 815 elderly, aged 65 and older (80% female), living in retirement homes in Prague, participated in a nutritional status assessment; from that group, 544 residents were included in the present study (75% female) and depression was assessed using the Geriatric Depression Scale (GDS), 15 points version. An earlier study of nutritional status, which was assessed using the Mini–Nutritional Assessment (MNA questionnaire), revealed malnutrition was correlated with (1) mild to severe depression, and (2) the regular use of psycho-pharmaceuticals.

Results: Severe depression was identified in 109 (20.0%) and mild depression in 241 (44.3%) participants. More women than man experienced depression (66.8% vs 54.9%, resp.). Previously identified malnutrition was closely associated with depression. The MNA score (0–30 pts) was significantly lower in those with severe depression (19.5) and mild depression (22.2) compared to those without depression (25.3). Use of psycho-pharmaceuticals was also positively correlated with nutritional status assessed using the MNA ($r=0.56$; $p<0.001$).

Conclusions: Study results confirmed a close relationship between depression and malnutrition among the population of institutionalized elderly citizens in Prague. Further studies are needed to determine possible ways to influence nutritional status through treatment of depression, which could include psycho-pharmaceuticals.

Key words: depression, institutionalized elderly, malnutrition

Acknowledgements: This study was supported by research grants IGA MZ ÈR No NS 9972-4/2008 and TA ÈR No TA01010765.

PO653

DIETARY HABITS AND CARDIOVASCULAR DISEASES IN ADULTS AND ELDERLY IN CROATIA

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Background and objectives: Preventive mass approach to cardiovascular diseases (CVDs) implies stimulation of lifestyle modifications with the aim of moderate risk factors lowering in general population. One of the most important preventive measures is modification with respect to dietary habits. The aim of this study was to determine dietary habits and incidence of CVDs in studied population and to evaluate if the community intervention is needed.

Methods: 100 subjects of 40 to 70 ages were recruited for this study. The study encompassed anthropometric measurements and short questionnaire on dietary and lifestyle habits and CVDs morbidity.

Results: Data analysis revealed that 55% of participants are overweight and 27% obese although 64% of participants perceive themselves as persons who take care of their health. At the same time 61% of participants had confirmed diagnosis of at least one of the studied health problems (hypertriglyceridemia, hypercholesterolemia, hypertension, myocardial infarction and stroke) and 50% of those with health problems had reported more than one problem simultaneously. Results of dietary questionnaire have shown that dietary habits are inadequate. Comparison of selected food group intakes with guidelines for the people with CVDs revealed that alignment is the weakest with respect to the fish consumption where only 3% of participants declared to eat fish 2-3 times a week, followed by 20% of participants who take fruits more times a day, while red meat was consumed 2-3 times a week or less in even 72%, and eggs once a week or less in 76% of participants.

Conclusions: Low alignment with dietary guidelines for CVD patients and the belief of taking good care of health implies the need of community intervention with the aim of reducing the incidence of CVDs and their outcomes.

Key words: CVDs, dietary guidelines, adults and elderly

PO654

QUALITY OF NUTRITION IN ELDERLY NURSING HOME RESIDENTS

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Background and objectives: Daily menu of elderly persons, as well as its nutrient content and energetic value should be adjusted to physiological changes in this population. To achieve recommended intake, food should be of high nutrient density. The aim of the study was to determine the energy and nutrient content of food served in a nursing home in Bosnia and Herzegovina.

Methods: Energy value and nutrient content of food was calculated from all meals during one month period. Obtained values were compared to the recommendations for the elderly based upon a presumption that the whole portion was eaten.

Results: The mean energy content of the served food was 2567±367 kcal per day with the contribution of carbohydrates, fats and proteins of 47%, 37% and 16% respectively. The crude intake of proteins, fatty compounds and carbohydrates was higher than recommended. Considering micronutrients, the intake of vitamin C, niacin, pyridoxine, folic acid, vitamin A, vitamin D, vitamin E, magnesium and zinc was very low while the amounts of calcium, potassium, copper were slightly lower than the recommended. The intakes of thiamine, riboflavin, vitamin K, cianocobalamine, phosphorus, iron, selenium, sodium were satisfying or higher than recommended. The values were quite unequal and varied substantially according to age and sex.

Conclusions: Although the result showed that it is possible to achieve sufficient energy and nutrient intake from the served food, fact that many nursing home residents won't eat the whole portion but just a part could have an important impact in raising the risk of malnutrition. Therefore it would be useful to make a broader study in which real food consumption would be determined in residents.

Key words: energy value, nutrient content, food, nursing home, elderly

PO655

MILK CONSUMPTION OF UNIVERSITY STUDENTS

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Background and objectives: Milk contains most of the essential nutrients for growth and it consists one of the main food groups which has to be consumed everyday. Milk is the best source of calcium which plays an important part in body functions during lifespan. The study is planned and conducted to determine the milk consumption of college students who attend Ankara University and live in dorms.

Methods: 190 Turkish and 20 foreigner students participated in the study (n=210). Data collection was made by a questionnaire. SPSS was used to evaluate data.

Results: Median age for female (56.7%) and male (43.8%) students is 21 and 22 years, respectively. 42.9% of them regularly drink milk (n=89) and 43.8% of the participants stated they made a habit of drinking milk in pre school period and 63.3% of them are encouraged to drink milk by their parents. 37.1% of the participants stated they consume milk for its nutritional value, 33.3% of them consume it before sleep and 71.9% of them apply no heat on it. Among the students who consume milk, 27.1% of them consume it 3-4 times a week, 24.0% of the subjects twice a month, 21.4% of them 1-2 times a week, 20.3% of them everyday and 7.3% of them 5-6 times a week. 33.3% of the subjects who state they drink milk everyday, consume ≥500 ml /day. Mean consumption amount is 280 ml (male: 290 ml, female: 250 ml) which is statistically significant according to gender.

Conclusions: The development of dietary habits that include the frequent intake of milk during childhood and adolescence is likely to lead to higher calcium intake in later years. Recommendations to the public should continue to emphasize increased calcium intake, perhaps most effectively achieved by increasing milk consumption.

Key words: Turkey, milk consumption, students

PO656

SOCIODEMOGRAPHIC DETERMINANTS OF FRUITS AND VEGETABLES CONSUMPTION AMONG ELDERLY IN ILA-ORANGUN, NIGERIA

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Background and objectives: Low consumption of fruits and vegetables has been implicated in the occurrence of many chronic non-communicable diseases. This study was designed to describe the frequency of consumption of fruits and vegetables and identify socio demographic factors that determine consumption of fruits and vegetables among the elderly.

Methods: This cross sectional study with a sample size of 382 participants was carried out in Ila-Orangun, Southwest, Nigeria. Multi stage sampling technique (three stages) was used for sample selection. Data on socio demographic characteristics and frequency of consumption of fruits and vegetables per day were collected using a validated semi-structured interviewer administered questionnaire and Food Frequency Questionnaire respectively. Chi square and logistic regression analysis were used to evaluate association between variables and identify sociodemographic factors that contributed to inadequate consumption of fruits and vegetables. Level of significance was set at 5% ($p<0.05$) and 95% CI.

Results: Majority (87.7%) of the subjects consumed fruits and vegetables less than five times per day. Monthly income, educational status, gender and marital status were significantly associated with frequency of fruits and vegetables consumption ($p<0.05$). Inadequate fruits and vegetables consumption were higher among females (OR=2.36; 95%CI=1.01-5.61), married participants (OR= 2.46; 95%CI=1.22-6.10), those with monthly income less than 10,000 (OR=1.18; 95%CI=0.61-2.29) and those who have no formal education(OR= 1.12; 95%CI=0.78 to 1.61). Occupation and age did not significantly influence consumption of fruits and vegetables among the elderly ($p<0.05$).

Conclusions: Majority of the subjects did not meet the minimum WHO recommendation for consumption of fruits and vegetables per day. Gender, marital status, monthly income and educational status influence fruits and vegetables consumption. Nutrition education to enlighten the public on the importance of frequent consumption of fruits and vegetables and healthy eating habit should be put in place.

Key words: sociodemographic determinants, fruits and vegetables consumption, elderly

PO657

PUERPERAL FACTORS THAT MAY INFLUENCE IN THE ESTABLISHMENT OF ORAL REFLECTIONS OF NEWBORN TO START OF BREASTFEEDING SUCCESSFULLY

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Background and objectives: The effectiveness of measures to promote breastfeeding depends mainly on the identification of mothers at increased risk of not starting or stopping early lactation. The combination of these factors and the type of delivery has been associated risks. To assess factors that may influence the puerperal establishment of specific oral reflexes of newborns to start breastfeeding successfully.

Methods: We evaluated 101 mothers, in popular obstetric center, between 20 and 34 years old. It was found as early signs for breastfeeding: the preparation of prenatal care; delivery type; sucking and swallowing reflexes soon after birth; maternal socio-cultural conditions. **Results:** 66% have professional activity. 27% were married, indicating that many mothers do not have support from their partners and, therefore, unable to share their difficulties and responsibilities. 69% of infants born between 37-40 weeks and 9% had preterm deliveries. 67% had adequate prenatal care. 43% had cesarean deliveries (CD). Mothers with cesarean have more difficulty due to bad positioning or inappropriate emotional involvement. Furthermore, CD slows or hinders change for first feeds. The endocrine responses of mother and newborn after delivery indicated that surgery causes pain and drowsiness and uses of anesthetics and analgesics affect the interaction between mother and baby. In the delivery room was checked: baby placed in his chest had good catches; they tried the nozzle and grabbed the breast; if the areola is made visible at the top above the baby's mouth. The data showed that breastfeeding was successful in 79% of patients immediately after delivery.

Conclusions: We must invest in the education of women and adequate attention in prenatal, with access to qualified health services. You need to know the structural factors, social and cultural rights, to direct the development of public health policies that result in more information to disadvantaged populations.

Key words: breastfeeding - lactation

PO658

MATERNAL DIETARY PATTERNS ARE ASSOCIATED WITH OXIDATIVE STRESS IN PREGNANCY

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Background and objectives: Metabolic and physiological changes throughout gestation predispose a pregnant woman to systemic oxidative stress. Exaggeration of oxidative damage in pregnancy was shown to impose substantial effect on adverse pregnancy outcomes. This study aimed to investigate the association between maternal dietary patterns and oxidative stress in pregnant women.

Methods: This longitudinal study was conducted from April 2010 to October 2011 in Kelantan, Malaysia. A total of 163 pregnant women aged 19-40 years were recruited in second trimester and followed up in third trimester of pregnancy. Maternal blood samples for the analysis of DNA damage, lipid peroxidation and protein oxidation were collected in both periods. Two dietary patterns (Healthy and Less-healthy) were identified using factor analysis from a semi-quantitative food frequency questionnaire.

Results: In second trimester, multiple linear regression analysis indicated that Healthy dietary pattern was significantly associated with decreased protein carbonyl ($r=-0.04$, $p<0.001$), whereas Less-Healthy dietary pattern was significantly associated with increased DNA damage ($r=0.22$, $p<0.009$). In third trimester, Healthy dietary pattern was shown to associate significantly with decreased DNA damage ($r=-0.12$, $p=0.043$) and plasma malondialdehyde ($r=-1.00$, $p=0.003$), but no association was detected between Less-Healthy dietary pattern and oxidative stress markers. These findings suggest the modifiable nature of oxidative stress by dietary patterns. Healthy dietary pattern which was characterized by antioxidant and micronutrient rich food play a protective role in combating oxidative insults in pregnancy. In contrast, Less-Healthy dietary pattern which was characterized by high sugar, sodium, fat and meat intake, tends to induce more oxidative damage in pregnancy.

Conclusions: Maternal dietary patterns are associated with oxidative stress in pregnancy. Adherence to Healthy dietary pattern is therefore encouraged to maintain a good antioxidant balance in pregnancy. This work was supported by Universiti Sains Malaysia Research University Grant Scheme.

Key words: dietary patterns, nutrition, oxidative stress, pregnancy

PO659

MACRONUTRIENT INTAKE AND INADEQUACIES IN COMMUNITY-DWELLING OLDER ADULTS, A SYSTEMATIC REVIEW

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Background and objectives: Older adults (>65 years) are at risk of nutrient deficiencies. This systematic review creates a comprehensive overview of the nutrient intake and possible inadequacies in community-dwelling older adults.

Methods: Pubmed and Embase were screened for eligible publications up to October 2011 and data from national nutrition surveys was added. Eligibility was assessed by two independent reviewers. Main exclusion criteria were mean age <65 years, absence of intake data and data from non-Western countries. Median nutrient intake data were compared with the acceptable macronutrient distribution range (AMDR), for energy and protein with the estimated average requirement (EAR).

Results: 43 studies were eligible. Median daily energy intake was 2181 kcal in men and 1744 kcal in women, both are below the EAR of 2530 and 2000 kcal respectively. Median daily carbohydrate intake was 245 g (46En%) in men and 204 g (48En%) in women, which are below the AMDR of 55-75En%. Median daily protein intake was 80 g (15En%) in men and 67 g (16En%) in women, which are within the lower half of the AMDR of 10-35En%. EAR cut-point analysis indicated that 9% (men) and 8% (women) did not reach the protein EAR of 0.66 g/kg bodyweight/day. Median daily fat intake was 80 g (35En%) in men and 69 g (36En%) in women, which is at the upper end of the AMDR (20-35En%). Saturated fatty acid (SFA) intake was 13En%, above the upper-AMDR (10En%). Mono-unsaturated fatty acid (MUFA) intake was 13En%, below the AMDR (15-20En%). Poly-unsaturated fatty acid (PUFA) intake was 5En%, slightly below the AMDR (6-11En%).

Conclusions: Community-dwelling older adults might be at risk of energy, carbohydrate, protein, MUFA and PUFA inadequacies. Total fat intake is relatively high, particularly SFA intake. Nutritional screening and implementation of guidelines, specific for the nutritional needs of older adults, are advised.

Key words: macronutrient, deficiencies, community-dwelling, older adults

PO660

LABELING OF COMMERCIALLY PROCESSED COMPLEMENTARY FOODS: A MARKET SURVEY ON CODE COMPLIANCE IN ACCRA, GHANA

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Background and objectives: Although Commercially Processed Complementary Foods (CPCF) can contribute to meeting dietary needs of infants and young children, they have been associated with unethical marketing practices that undermine practice of exclusive breastfeeding for six months. The study assessed CPCF labeling compliance to the code on marketing of breast milk substitutes (CMBMS), and the National Breastfeeding Promotion Regulation (NBPR), in Ghana.

Methods: A variety of CPCF were purchased from child welfare clinics, fuel station shops, supermarkets, 'mother/baby' care shops and pharmacies in the La and Osu Klottey sub-metropolitan areas in Accra. The labels were evaluated against best practice indicators proposed by the MIYCN Working Group based on the CMBMS, and also indicators based on the NBPR. An overall compliance was determined based on intensity of compliance to the indicators.

Results: The CPCF purchased included cereal-based products, fruit juices, fruit and vegetable purees, milk-based products, and combination meals; seventy-five percent were imported. One hundred of the 108 products identified were labeled in English and thus included in analysis. None of the products complied with all labeling requirements of CMBMS or NBPR; 84% and 17% of product labels complied with at least 50% of NBPR and 50% of CMBMS indicators, respectively. Only 5% of labels had content indicating importance of exclusive breastfeeding for 6 months. Additionally, only 5% of labels warned against the hazard of introducing CPCF product earlier than 6 months as required by the NBPR.

Conclusions: Labeling of most CPCF sold in Accra does not comply with NBPR and CMBMS requirements. Enforcement of local law on labeling of CPCF is urgently needed.

Key words: complementary foods, compliance, labeling, Ghana

PO661

DEVELOPMENT OF DIETARY PATTERNS DURING THE FIRST THREE YEARS OF LIFE

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Background and objectives: The intake of specific foods and nutrients in toddlerhood may be related to current and later health. However whole-dietary patterns of the first years of life are possibly even better markers for growth and health outcomes, but little is known about these patterns. The objective was to characterize the development of dietary patterns from 9 to 36 months of life by using principal component analysis (PCA).

Methods: The diet of 330 healthy term infants (the SKOT-cohort) was recorded for 7 consecutive days in pre-coded food records at 9, 18 and 36 months of age. Dietary patterns were identified and described by PCA and a classification method was developed, to characterize individual development of dietary patterns, based on scores from the PCA.

Results: Two main dietary patterns were identified: An age gradient describing transition from baby food, like breast milk and formula, to family food, and a health gradient, dividing the participants into having healthy and less healthy diets. The health gradient covered family food items as fish, vegetables and rye bread (healthy) to sweets, sugary drinks and chips (less healthy). The development of these dietary patterns from 9 to 36 months was classified by combining the individual scores for each age for each child and children were grouped with similar patterns. This classification showed tracking of food patterns especially between 18 and 36 month, where the children ate family food.

Conclusions: Development of early dietary patterns is complex but can to some extent be characterized by PCA. Early tracking of dietary patterns supports the relevance of early health promotion.

Key words: dietary pattern, toddlerhood, PCA, SKOT

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PO662

EFFECTS OF PROTEIN INTAKE ON CARDIOMETABOLIC HEALTH IN CHILDREN: A SYSTEMATIC REVIEW

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Background and objectives: Previous studies show that high protein intake in childhood can lead to increased body mass index and obesity. Protein intake might therefore also negatively affect cardiometabolic health in children. Studies in adults however suggest beneficial effects of protein intake on obesity, blood pressure, and lipid profile. Whether protein intake is related to cardiometabolic outcomes in children is unclear. Therefore, we conducted a systematic review of the literature to evaluate the associations of protein intake with cardiometabolic health in children.

Methods: The databases Embase, Medline, Scopus, and the Cochrane library were searched for relevant studies (September 2012). Included were interventional and observational studies in healthy children up to the age of 18 years, in which the relation between protein intake and cardiometabolic outcomes was reported. Cardiometabolic outcomes included were: metabolic syndrome, blood pressure, arterial properties, blood lipids, and measures of insulin sensitivity. Study selection, data extraction and study quality evaluation were performed by two independent investigators.

Results: In the systematic search, 5974 abstracts were initially identified. For 309 abstracts the full-texts were retrieved. After the selection process, 55 studies were included, which were all observational studies. No consistent associations were observed for protein intake in relation to metabolic syndrome, arterial properties, insulin sensitivity, or blood lipids. Of the 20 studies reporting blood pressure as an outcome, 4 found a negative association, one reported a positive association, and the other studies observed no significant association between protein intake and blood pressure.

Conclusions: The currently published literature does not show consistent effects of protein intake on cardiometabolic health in children. Future studies could be improved by using validated dietary assessment methods, incorporating longer follow-up, and adjusting the results for total energy intake and body weight.

Key words: protein intake, cardiometabolic health, children, systematic review

PO663

RISK OF UNDERNUTRITION AMONG ELDERLY SENEGALESE MEN AND WOMEN IS ASSOCIATED WITH DISABILITY IN FOOD PREPARATION ACTIVITY

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Background and objectives: Few studies have addressed the nutritional status of elderly African. The aim of this study was to assess the prevalence of undernutrition in elderly men and women in Senegal and the relationship between undernutrition and physical dependency.

Methods: Cross-sectional study was conducted in 141 Senegalese elderly men (n=78) and women (n=63) aged 60 to 85 y attending Centre Médico-Social de l'I.P.RE.S. (medical institute for retired persons) as outpatients. After a clinical examination, fat free mass (FFM) was measured by bioimpedance analysis (BIA) using a prediction equation developed in a multiethnic elderly population including Senegalese. Undernutrition was defined by FFM below the 10th percentile of FFM distribution in a reference population. Risk of undernutrition was defined as FFM between the 10th and 25th percentile. Dependency was measured using a questionnaire on activities of daily living and instrumental activities of daily living. Logistic regression model was used to identify risk factors associated with undernutrition.

Results: FFM was significantly lower in the women (41.4±6.6 kg) compared to the men (50.8±6.7 kg, p<0.0001). Undernutrition affected more men (48.7%) than women (22.2%, p=0.0012). However risk of undernutrition affected similarly men and women with an overall prevalence of 14.2%. Women were more independent than men to perform food preparation activity (74.6% vs 5.1%, p<0.0001). Although undernutrition is associated with disability in food preparation activity (OR=4.1), the relationship between risk of undernutrition and food preparation activity is stronger (OR=9.5).

Conclusions: Risk of undernutrition as well as undernutrion is high in elderly Senegalese outpatients. Food preparation activity is a significant risk of malnutrition, particularly in the elderly men and need attention while implementing appropriate nutritional interventions.

Key words: undernutrition, elderly, I.P.RE.S., BIA, Senegal.

PO664

IRON AND FOLATE STATUS AND THEIR DETERMINANTS IN A NATIONALLY REPRESENTATIVE SAMPLE OF BELGIAN PREGNANT WOMEN

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Background and objectives: Folic acid deficiency during pregnancy may lead to neural tube defects (NTD)in the foetus. Iron-deficiency anaemia is associated with adverse neonatal health outcomes.Folateand iron status were determined in a representative sample of Belgian pregnant women and their determinants were assessed.

Methods: The women were selected through multi-stage proportionate-to-size sampling. Blood samples were collected and a questionnaire was completed face-to-face with a study nurse. Erythrocyte folate concentration was measured by chemoluminescence, haemoglobin (Hb) using a Beckman Coulter HaematologyAnalyzer and serum ferritin (SF) and transferrin receptor (sTfr) concentrationsby immunoassay.

Results: In total 1311 pregnant women participated and women with a lower socio-economic status were well represented. Median erythrocytefolate concentration was 436 ng/ml among first-trimester and 496 ng/ml among third-trimester women. In the first trimester, 39% of women had a erythrocytefolateconcentration below 400 ng/ml, whereas 15% of the first-trimester women had a erythrocytefolateconcentration below 300 ng/ml. Among first-trimester women, 69.1% reported taking folic acid-containing supplements of which 41.2% started taking them before pregnancy. For third-trimester women, these percentages were 76.2% and 21.9%, respectively. Approximately 40% of third-trimester and 6% of first-trimester women had SF levels less than 15µg/L. Of the third-trimester women, 23% were iron-deficient non-anaemic(SF <15 µg/L and Hb≥110 g/L), 16% had iron-deficiency anaemia (SF <15 µg/L andHb<110 g/L), and approximately 7% had tissue iron deficiency (sTfr>8.5 mg/L). Themedian body iron stores were 8.1 mg/kg among first-trimester women, but only 3.6mg/kg among third-trimester women.

Conclusions: It was found that 39% of the first-trimester pregnant women had a folate status that might not be optimal to prevent NTD. Iron deficiency and iron-deficiency anaemia werefrequent in third-trimester women. Guidelines are neededin Belgium to optimizefolate and iron status during pregnancy.

Key words: iron, folate, pregnancy

PO665

INSULIN RESISTANCE AND VITAMIN D DEFICIENCY IN CHILEAN OLDER PEOPLE.

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Background and objectives: Vitamin D (vitD) may play a role in glucose homeostasis through its effect on insulin synthesis, secretion and sensitivity. Different studies have reported an inverse association between 25(OH)D levels and risk of diabetes, insulin resistance, HTA and metabolic syndrome. The aim of the present study was to examine obesity and metabolic disorders associated with vitD deficiency/insufficiency in Chilean older people.

Methods: Cross sectional study in 1186 community-dwelling subjects 60-98 y (807 women) residing in Santiago Chile. Plasma levels of 25(OH)D were determined by radioimmunoassay. Glucose, insulin and CRPus, were measured in a fasting blood sample. Blood pressure and complete anthropometry were measured. The relationship between vitD and metabolic disorders was studied using multivariable logistic regression models.

Results: Mean serum 25(OH)D was 63.2±33.1 nmol/L (men 66±33.0; women 62.0±33.2, p=0.048). 25(OH)D levels were under 75 nmol/L in 73% of men and 67% of women(p=0.020). Insulin resistance was present in 17.4 % of all subjects and obesity in 37.6% of women and 26.3% of men (p<0.001). Significant negative crude association between 25(OH)D across BMI categories was found in the total sample (p<0.001). Crude association of vitD<50nmol/L with obesity (p=0.002), waist circumference (p=0.011), Insulin resistance (p<0.001), metabolic syndrome (p=0.004), HTA (p<0.001) and Age>;70 y (p<0.001) was observed. After age, sex, waist circumference and season adjustment, vitD<50nmol/L was associated with increased risk of insulin resistance, OR 3.12 (95% IC 1.66-5.86) p<0.001.

Conclusions: High prevalence of vitD deficiency/insufficiency was observed in the Chilean older people. VitD deficiency is associated with insulin resistance. In the future, randomized controlled trials are needed to establish a cause-effect relationship between vitD deficiency, obesity and its metabolic consequences.

Key Words: vitamin D deficiency, nsulin resistence, obesity and older people. Funded by Fondecyt 1080589.

PO666

EFFECT OF DHA SUPPLEMENTATION DURING PREGNANCY AND LACTATION ON INFLAMMATORY SIGNALING IN PREGNANT WOMEN AND THEIR NEONATES

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Background and objectives: DHA supplementation has shown beneficial effects during pregnancy and infant development. Most studies are focused on visual and neural development. However, there are poorly studied areas, in particular the effect of DHA on inflammatory signaling, although the beneficial effects of DHA on this process are generally accepted. The aim of the present study was to evaluate the effect of DHA supplemented dairy drink consumption during pregnancy and breastfeeding on the expression of various cytokines in mothers (pregnancy, delivery and breastfeeding) and their newborns (birth and 2.5 months of age).

Methods: 60 women were randomly assigned to two intervention groups: A) Control Group (n=30): they will intake 2 glasses/day of the control dairy drink, and B) Supplemented Group (n=30): the women will take 2 glasses/day of the supplemented dairy drink (400 mg DHA/day). Dietary intervention began in week 28th of pregnancy and concluded when the mother stopped breastfeeding the baby. Samples of blood were obtained from the mothers (pregnancy, delivery and lactation), from the umbilical vein and arteries and from the newborn at 2.5 months postpartum. IL-2, IL-4, IL-6, IL-10, TNF-α and IFN-γ plasma levels were determined using a panel from Luminex xMAP technology.

Results: IL-2 was higher in the supplemented mothers during breastfeeding, whereas IL-4 shows the lowest values in the supplemented group at delivery and lactation, being higher in umbilical cord vein. IL-6 was lower in the supplemented group at delivery in umbilical cord vein, and finally IL-10 was higher at delivery, in umbilical cord artery and during breastfeeding. TNF-α was lower value in supplemented mothers and their neonates, compared with the non-supplemented groups. Finally, INF-γ did not show any difference between groups.

Conclusions: Supplementation with DHA supplemented dairy drink modulates the inflammatory signaling, increasing the anti-inflammatory and diminishing in the pro-inflammatory cytokines.

Key words: DHA supplementation, inflammatory signaling, pregnancy, breastfeeding, newborn

PO667

NUTRIPLUS PROGRAM IMPROVE MATERNAL AND CHILD NUTRITIONAL STATUS AND NUTRITIONAL KNOWLEDGE IN MULTI-CULTURAL FAMILY

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Background and objectives: This study investigated whether the NutriPlus program improved maternal and child nutritional status, nutrition knowledge and attitudes in multi-cultural family. The NutriPlus program is developed to improve maternal and child nutritional status in South Korea. Each participant receives specifically designed home-delivered supplementary food packages and nutrition education for 6 to 12 months. The number of multi-cultural family has been increased in South Korea with a dramatic rise of international marriage since 1990's. They have several dietary problems: skipping meal, unbalanced diet, excessive intake of instant food, lack of nutritional knowledge, etc.

Methods: This study included maternal women (n=820) and 1-to 5- year-old children (n=1,851) participating in the program in 2011. Anthropometric, biochemical, and dietary information was collected on maternal woman and children. Participant nutritional status was determined by anemia prevalence and intake level of 8 main nutrients. Nutrition knowledge and attitude information was collected from the children's guardian before and after the program. All analyses were conducted with SAS 9.1 for Window.

Results: The number of children with weight-for-height and height-for-weight percentile less than 10 significantly decreased ($p<0.001$). Anemia prevalence decreased from 70% to 16% ($p<0.001$) and MAR (mean adequacy ratio) was also significantly increased from 0.71 to 0.84 ($p<0.001$).

Conclusions: The NutriPlus program improved maternal and child nutritional status, nutrition knowledge and attitudes in multi-cultural family. Results suggested that more consideration should be given to ways to more education and training opportunities for participants of multi-cultural families including the husbands and the mothers-in-law to improve understanding of other country's food culture and cultural diversity. This project was funded by the Ministry of Health and welfare in South Korea.

Key words: multi-cultural family, maternal and child nutrition status, nutritional knowledge

PO668

THE HEALTHY FRESH FRUITS PROGRAM : EFFECT OF FRUITS AND VEGETABLES INTAKE AMONG LOW-INCOME ELEMENTARY SCHOOL STUDENTS

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Background and objectives: This study investigated whether the Healthy Fresh Fruits Program improved fruits and vegetable intakes, nutritional knowledge and attitudes in low-income elementary school students. The lower income parents often report that high cost of fruits and vegetables was major barrier to buying more fruits and vegetables. Lower income families have cut their grocery shopping cost resulting in rising food prices and recession. Fruits and vegetables have been reported for the prevention of childhood obesity because of their low in fat, sodium, high in fiber, vitamins, minerals, and satiety value. The prevalence of childhood obesity of low-income family in South Korea generally has been a bigger problem than one of upper-income family.

Methods: This program is based on the behavioral change theory and targeted for elementary-aged children from low-income family in an after school program of Seoul, Korea. The six lessons of nutrition education and one serving size fruits package in twice a week for four months in 2012. Nutrition education, including healthful diet and food hygiene, were designed to increase consumption of fruits and vegetable.

Results: A pre-and post-test were used to assess changes in knowledge and self-reported behavior related to fruits and vegetables consumption. Results of evaluation with 789 participants revealed significant increases in consumption of fruits, improve of nutritional knowledge and fruits preference ($p<0.05$).

Conclusions: This program was successful in increasing fruits and vegetables consumption and improving nutritional knowledge & attitudes. This project was funded by the Ministry of Health and welfare in South Korea.

Key words: childhood obesity, nutrition education, fruits and vegetable intake

PO669

DEVELOPMENT AND ACCEPTABILITY OF LOCALLY DEVELOPED READY-TO-USE COMPLEMENTARY-FOOD-SUPPLEMENTS (RUCFS) IN URBAN SLUM SETTINGS OF DHAKA, BANGLADESH

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Background and objectives: Inadequate energy and micronutrient intake during childhood is a major public health problem in many developing countries including Bangladesh. Locally produced ready-to-use complementary food supplements (RUCFS) can improve growth, development and micronutrient status of children. The study was conducted to develop recipes for RUCFS and to test their acceptability among children.

Methods: A checklist was prepared of available and commonly consumed food ingredients that have the potential of being used for RUCFS. Linear programming was used to determine possible combinations of ingredients and required micronutrient premix composition, and samples were prepared in the icddr,b food-processing lab. To test the acceptability of the RUCFS recipes compared to Pushti-packet (a cereal based food-supplement), an acceptability trial was conducted among 90 children aged 6-18 months in a slum in Mirpur, Dhaka, Bangladesh. The mothers were asked to rate the color, flavor, mouth-feel, and overall liking of the RUCFS by using a 7-point hedonic scale (1=dislike extremely, 2=dislike moderately, 3=dislike, 4=neither dislike nor like, 5=like slightly, 6=like moderately, 7=like extremely).

Results: Two RUCFS were developed, one based on rice and lentils and the other one on chickpea. Mean response for each sensory quality of all products was more than 6. The two developed RUCFS scored significantly better compared to Pushti-packet in terms of 'overall liking'. Children were offered 50 g of food and they consumed (mean+SD) 26.1±15.1 g RUCFS and 17.1±14.3 g Pushti-packet which took them 20.9±9.6 minutes. There was no significant difference between two RUCFS consumption, but there was a significant difference between chickpea-based RUCFS and Pushti-packet (28.4 vs17.1 g) consumption.

Conclusions: Locally available food ingredients were used to develop RUCFS. The study results suggest that rice-lentil and chickpea-based RUCFS are highly acceptable. Research is underway to assess efficacy of both local RUCFS in improving child growth.

Key words: acceptability, locally-developed, food-supplements

PO670

FRUIT PREFERENCES AND INTAKE AMONG PORTUGUESE SCHOOLCHILDREN

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Background and objectives: Preferences are major determinants of fruit intake. We explored the relationships between preference and intake of different types of fruit among Portuguese schoolchildren.

Methods: This study was carried out as part of the Pro Children European project. A sample of 3,083 Portuguese children (10-14 years old) was evaluated, regarding fruit intake (self–administered questionnaire using 24-hour recall) and food preferences of different types of fruit (five-item scale with response options ranging from "like very much" to have not tried"). The intake of each fruit was compared between children with high ("like very much") or low preference for each type of fruit.

Results: Fruit mean intake was 154.1 g/day. Major contributors to total fruit consumption were apple (34.4%), banana (19.7%), orange (12.0%), tangerine (11.9%) and pear (11.9%). Preference for each fruit was associated to higher consumption of that fruit. Preference for orange or tangerine was associated to higher consumption of both fruits. Preference for apple or banana was associated with lower consumption of tangerine. Preference for tangerine was associated to lower pear consumption.

Conclusions: The results of this study may be useful to plan interventions to increase fruit intake among schoolchildren, namely regarding the selection and combination of fruit types to be used in taste testing and other exposure activities.

Key words: fruit, intake, children, preferences, Portuguese.

PO671

REGIONAL AND SEX VARIATION IN THE INTAKE OF DIFFERENT FRUIT TYPES AMONG PORTUGUESE SCHOOLCHILDREN

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Background and objectives: A wide range of demographic determinants, such as sex and region, influence fruit intake. The aim of this study was to compare the intake of different types of fruit among Portuguese schoolchildren by sex and region of residence.

Methods: A sample of 3,083 Portuguese children (10-14 years old) was evaluated, regarding fruit intake (self–administered questionnaire using 24-hour recall), as part of the Pro Children European project. The percentual contribution of different types of fruit to total fruit intake was compared by sex and region of residence (North, Center, Lisbon area, Alentejo and Algarve).

Results: Mean fruit intake was 154.1 g/day. Major findings include: the higher intake of fruit in the North and Algarve; higher contribution of banana to boys' fruit intake, and of tangerine, pear and other fruits to girls'; higher contribution of orange to total fruit intake in Lisbon area, banana in Alentejo and Algarve, tangerine in Center and Algarve, and pear in Algarve.

Conclusions: These findings may prove useful in tailoring region-specific interventions to increase fruit intake among schoolchildren, as taste testing and other exposure activities should consider prior consumption of different types of fruit in specific groups.

Key words: fruit; intake; Portuguese children; sex; region.

PO672

DIETARY INTAKE OF LACTATING WOMEN IN UMUAHIA, URBAN, NIGERIA.

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Background and objectives: Lactating women constitute a vulnerable segment of the population. This is because adequate nutrition during lactation is important for both the mother and the infant. This cross section study was carried out to evaluate the dietary intake of lactating women of two socioeconomic groups in Umuahia urban, Nigeria.

Methods: A total of 213 lactating women (126 from low socioeconomic group (LSEG) and 87 from medium socioeconomic group (MSEG)) were randomly selected from a group of mothers attending postnatal clinics at the Federal Medical Centre, Umuahia. A structured, validated and pre-tested questionnaire was used to obtain information on socio-demographic characteristics. Information on dietary intake was collected using 24 hour dietary recall, weighed inventory and food frequency questionnaire over a 2 days period (a weekday and a weekend day). Mean nutrient intake was estimated and expressed as percentage of FAO/WHO recommended nutrient intake. Data was analysed means (SD) and t-test, while Chi square was used to determine relationship between categorical variables.

Results: Mothers from the MSEG were more educated and had higher total family income than the LSEG ($p<0.05$). Mean intake of fat and calcium were significantly higher in the MSEG ($p<0.05$). Intake of energy, protein, calcium and vitamin A were insufficient in both groups. The percentage of energy obtained from carbohydrate, protein and fat were 82.7%, 8.2% and 15.2% for LSEG, while 86.1%, 9.2% and 20.6% were obtained for the MSEG. Consumption of meat and meat alternate as well as leafy/non leafy vegetables and fruits were higher among the MSEG on a daily basis than the LSEG.

Conclusions: Nutrition education programs should be intensified in health facilities/centers in order to sensitize women on the importance of adequate nutrition during this period.

Key words: lactating women, food consumption pattern

PO673

MEAL PLANNINGS OF HIGH SCHOOL STUDENTS IN TURKEY

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Background and objectives: Gaining healthy eating habits during childhood/adolescence may cause to continue the habit in adulthood too. This study was made to identify the meal plannings of high school students.

Methods: The study has conducted with 497 students (male: 236, female: 261). Data collection was made by a questionnaire and SPSS program was used to evaluate data. WHO data was used to evaluate BMI percentiles (5-19 years-old). Questions about snack choises were evaluated by using the T=3T1+2T2+T3 formula. T stands for total score and T1: first choise, T2: second choise, T3: third choise. Derivative was BMI.

Results: The mean age of students was 15.90±1.00 years, mean BMI was 20.92±2.99 kg/m2. 68.4% of the subjects were in normal range according to BMI. 62.0%, 73.0% and 83.7%

of them stated they consume breakfast, lunch and dinner everyday, respectively. 51.2% of them consumed snacks and most common first choise was bread and cheese (877 points), second was toast (346 points) and third was fruits (336 points). Most common drink between meals was tea as first choise (1039 points), coffee for second choise (455 points) and carbonated drinks for third choise (381 points). There were various answers for skipping meals, lack of time was the most common reason for skipping breakfast (64.0%), students' lack of appetite was the most common reason for lunch and dinner (43.3% and 53.1% respectively) Among the subjects who consume breakfast (n=308), lunch (n=363) and dinner (n=416) regularly, the ratio of ones who have normal range BMI is 67.2% for breakfast and lunch and 67.3% for dinner.

Conclusions: Gaining the ability to choose healthy foods during childhood and adolescence is important to lower the risk of some chronical diesease in later years. It's important to provide education to parents about healthy nutrition.

Key words: students, meal planning, high school

PO674

MILK CONSUMPTION PATTERNS IN RELATION TO TOTAL DIETARY INTAKE: THE CASE OF MALAYSIAN URBAN CHILDREN AGED 1-10 YEARS

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Background and objectives: Food consumption patterns in emerging economies have generally shifted from a dependency on diets high in plant protein and carbohydrates to one that is increasingly rich in animal protein and fats. Milk consumption in relation to total dietary intake of children is not well documented in rapidly developing countries, including Malaysia. This study assessed milk consumption behaviour among young children from the suburbs of Kuala Lumpur city.

Methods: A total of 749 children aged 1-10 years representing different socioeconomic background were recruited from day care centres (1-3 years), kindergartens (4-6 years) and primary schools (7-10 years). For dietary intake of children aged 1-6 years, parents were interviewed using 24-hour diet recalls and food records. Children aged 7-10 years were interviewed based on 24-hour recalls.

Results: Out of the total, 605 (82.0%) children were milk drinkers, highest in ages 1-3 years (91.2%), followed by 86.1% and 73.7% among ages 4-6 and 7-10 years, respectively. The mean amount of milk consumed was 789 ml (~4 cups), 498 ml (~2 cups) and 286 ml (~1 cups) for ages 1-3, 4-6 and 7-10 years, respectively. Ages 1-3 years taking >3 cups of milk/day had significantly higher intake of total food, calories, carbohydrate, vitamins A, C, D, B1, B2, Ca and Fe than children taking 2-3 cups/day. Likewise, ages 1-4 years taking >3 cups had significantly higher vitamin D, Na and Ca intake compared to the same ages taking 2-3 cups/day. No significant differences were found between milk consumption patterns and nutritional status for all ages.

Conclusions: While milk intake confers nutritional benefits, excess milk consumption, especially in ages 1-3 years raises concerns for the potential lack of dietary diversity and risk of overweight, a growing problem in Malaysia.

Key words: milk consumption, Malaysian children

PO675

ASSESSMENT OF NUTRITIONAL CONTENT OF COMMERCIAL BABY FOODS IN THE UK

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Background and objectives: The introduction of solid foods is provides infants with crucial nutrients for growth and development. The World Health Organisation (WHO) recommends introduction of solid foods at 6 months. United Kingdom (UK) guidelines also encourage use of home-cooked foods, but commercial products are frequently used. Health care professionals are often asked to advise about the suitability of these foods. We aimed to describe the types and nutritional content of commercial baby foods available in the UK.

Methods: All baby foods produced by 6 UK manufacturers October 2010-February 2011 were identified. Nutritional information for each product was collected from manufacturers' websites, shelved products in store and via direct email enquiry. Using the names and food labels they were classified according to texture, content and suggested age for use.

Results: Out of 479 products, 364 (79%) were ready-made purees, 44% (201) of these were aimed at infants from 4 months and 65% were sweet foods. The energy content of these purees was almost identical to breast milk (282 (59) kJ per 100g) with only slightly higher protein: purees 2.3 (1.2) breast milk 1.3 g per 100 g and much lower than family foods (e.g. potatoes mashed with butter and cheese 567 kJ; 4.16 g per 100g)

Conclusions: The UK baby food market mainly supplies soft spoonable foods, the majority of which are sweet, and are targeted mostly to an inappropriate age. The composition of baby foods is strictly regulated by law which may explain the similarity with breast milk. However, as a result they do not serve the intended purpose of enhancing the nutrient density of infants' diets and do not provide with suitable textures and flavours. Furthermore they may confuse users about appropriate weaning age.

Key words: weaning, infant feeding, food labels

PO676

DIETARY INTAKE AND NUTRIENT SCORES OF FREELIVING ELDERLY IN UMLAZI TOWNSHIP (KWAZULU NATAL)

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Background and objectives: Umlazi is the second largest township in South African in terms of population. The objective of the study was to determine the dietary intake and nutrient scores of the elderly (>60 y) in this township of Umlazi, KwaZulu-Natal, South Africa.

Methods: The dietary assessment methods used, included three 24 hr recalls, one food frequency questionnaire analysed using a Food Finder 3 program. EAR values, means, standard deviation and nutrient intakes were calculated and compared with the DRI's interpreted by a bio-statistician.

Results: The top five foods consumed were, maize meal (100%), tea (100%), chicken stew (40.0%), brown bread (57.3%) and white cooked rice (56.9%). The energy contributions showed that 89.2% of the women consumed a diet <100% of Estimated Average requirements (EARs) and all the men consumed<100% of the EARs. For protein 63.0 % women and 91.1% of the men consumed <100% of the EARs for protein. Dietary fibre intake was 86.5% for women and 33.3% of the men consumed <100%. Results indicated low intakes of the majority minerals and vitamins for both genders due to low intake of fruit and vegetables, <400g per day for the mean RDA intake values. Total fat intake was 20% (for both genders) within the WHO, 2003 nutrient intake goals. The mean FVS (±SD) for all the foods consumed from all the food groups in a period of seven days was 25.8 (±14.6), revealing poor dietary diversity scoring.

Conclusions: Low micronutrients and a high carbohydrate diet was observed in this group, maize meal being the main staple, this could be one of the causes of weight gain in this community. Strategies of improving micronutrient consumption are essential in this community.

Key words: elderly, diet, nutrients scores

PO677

BODY FAT MASS DISTRIBUTION AS A DETERMINANT OF RESTING METABOLIC RATE VARIATION IN OLDER ADULTS

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Background and objectives: The resting metabolic rate (RMR) not only depends on fat-free mass but is also influenced by fat mass, especially by body fat distribution. The objective was to analyze the body fat mass distribution as a determinant of the variation of the resting metabolic rate in healthy adults aged 60 to 85 in Chile.

Methods: An analytical transversal study was carried out on 37 women aged 60 to 85 years. The anthropometric assessment to determine body fat distribution included weight, height, BMI, and waist/hip circumference. The RMR was determined by the indirect calorimetry method after overnight fasting and for 30 minutes at complete physical and mental rest. The following exclusion criteria were considered: fever, respiratory disease, anaerobic metabolism, use of hypo- and hypermetabolic medication, and alcohol, caffeine, and tobacco consumption The Pearson correlation was determined for the quantitative relationship of the variables. A variance analysis (ANOVA) was performed.

Results: The nutritional status of the sample showed that 5.41% of the subjects were thin, 56.76% normal, 10.81% overweight, and 27.03% obese. Mean RMR was 1101.22±242 kcal/d, which varied according to BMI. Gynoid fat distribution was significantly correlated with a higher RMR in the women under study ($p<0.05$).

Conclusions: The older adult women with android fat distribution exhibited a higher RMR than those with gynoid distribution as a direct consequence of greater metabolic activity.

Key words: resting metabolic rate, senior, fat distribution, indirect calorimetry

PO678

EVALUATION OF THE NUTRITIONAL STATE IN CHILDREN OF 10 TO 14 MONTHS OF TWO MUNICIPALITIES OF CITY HAVANA.

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Background and objectives: Evaluation the clinical state, anthropometric, dietary and biochemical of the state of children's iron of 10 to 14 months of age of two municipalities of City of the Havana.

Methods: One carries out a traverse descriptive study, in children of 10 to 14 months of age residents in two municipalities of City of the Havana; the evaluation of 80 children was designed following the approaches of the sampling probabilistic. One carries out dietary survey for collection of consumption of foods for 3 days and epidemic where the data related with the state of the boy's iron were picked up. One carries out mensuration of weight and supine longitude, biochemical evaluation of the iron state and physical exam.

Results: The ingestion of foods reflected a desbalance in the contribution from the macronutrients to the energy, with a high consumption of proteins and fatty. The iron ingested, vitamin C and vitamin A, it was faulty in most of the children. He/she was 26.9% of anemia, classified as slight, indicative of iron deficiency. The evaluation anthropometrics indicates that most of the children are in the range of normality. The variables measures in the epidemic survey didn't keep significant causal association with the anemia in the boy. The clinical indicators didn't show alterations related with the anemia.

Conclusions: The results of the evaluation in this group of children didn't show the malnutrition existence for defect and the anemia only stays as the main problem of health in this group of risk.

Key words: evaluation, mensuration, macronutrients, anemia

PO679

ANALYSIS OF THE NUTRIENT COMPOSITION OF COMPLEMENTARY FOODS PREPARED FROM LOCAL FOODS IN THREE RURAL COMMUNITIES IN EAST AFRICA

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Background and objectives: Use of locally available foods that meet the nutritional requirement of children during their complementary feeding period is critical for optimal growth and development. Complementary feeding promotion is the strategic focus of World Vision program in East Africa region. The purpose of this study is to share the World Vision experience in identification of the nutrient composition of the complementary foods in rural communities in Burundi, Rwanda & Ethiopia.

Methods: 24 hours dietary recall was conducted with the mothers who have children 6–36 months, both well nourished and malnourished. Moreover market survey was conducted to assess the types of foods available in the market and the costs per local unit. Mix of food was made to develop menus and the nutrient content was analyzed using food composition table. Menus were developed using locally available and affordable foods and nutritional composition was assessed comparing with the recommendation.

Results: cassava, maize, wheat floor, potato, sweet-potato, small fish, banana, mango, cabbage, amaranth, ground-nut, beans and haricot beans were the major affordable complementary foods identified in the community. 2 menus of 250gms , equivalent to the child stomach, were developed using different foods. The menus consisted of an average of 629.5 Kcal energy (600-800 Kcal), 322.9 REA of Vitamin A (300 REA) and 28.4 mg of vitamin C (15–25 mg) and 3mg of Zinc (3-5 mg) needs of a child meal. However, in both contexts the iron 5.7 gm and protein 21.6gm which could not meet the 10 mg and 25–27 gm need per child meal respectively.

Conclusions: local foods which commonly lack animal sources could not meet the protein and iron needs of children for optimal growth. Hence, programs need to focus on promoting interventions that can improve access to animal source foods.

Key words: food composition, animal sources, daily need, local foods

PO680

LIGHT EXERCISE AFTER HIGH-FAT MEAL SUPPRESSES POSTPRANDIAL SERUM TRIGLYCERIDE IN HUMANS

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Background and objectives: The effect of exercise performed on the day of meal intake on postprandial triglyceride (TG) concentration, which is an independent risk factor for cardiovascular disease, is unclear. The present study investigated postprandial TG concentration following low-intensity exercise, consisting of brisk walking and light-resistance exercise, performed before or after meal intake.

Methods: Ten healthy young subjects consumed a relatively high-fat diet. All subjects participated in each of the 3 trials: rest, exercise before meal, and exercise after meal. In the exercise trials, subjects performed brisk walking following light resistance exercise, either 60 min before or after meal intake. Blood samples were collected before, and 2, 4, and 6 h after meal intake. The fat utilization was measured by indirect calorimetry analysis.

Results: Exercise reduced the transient elevation in serum TG concentration observed 2 h following meal intake in the post-meal trial (131 ± 67 mg/dL) when compared with the sedentary trial (172 ± 71 mg/dL, d = -1.00). This was also observed in the pre-meal trial, although the effect was less pronounced (d = -0.57). The TG concentrations in VLDL, LDL, and HDL fractions were also decreased in both exercise trials, while the integrated triglyceride values following meal intake showed a greater decrease in the post-meal trial (d = -1.23) than the pre-meal trial (d = -0.47). The concentration of serum growth hormone was drastically increased after exercise in both trials. Fat utilization was higher in the exercise trials than in the sedentary trial, especially after meal consumption

Conclusions: Light exercise performed on the day of meal intake can effectively suppress postprandial TG concentrations, especially when performed after meal intake.

Acknowledgements: This study was supported by Grants-in-Aid from the Japan Society of the Promotion of Science (23700776).

Key words: high-fat diet, low-intensity exercise, lipid metabolism

PO681

RANDOMIZED DOUBLE-BLIND CROSS-OVER STUDY OF A NUTRITIONAL SUPPLEMENT SPECIFIC FOR PATIENTS WITH NEURODEGENERATIVE DISEASES OVER INFLAMMATORY AND CARDIOVASCULAR RISK BIOMARKERS

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Background and Objectives: An adequate nutrition could be useful in the improvement of patients with neurodegenerative diseases. The aim of this study was to assess the effects of a specific supplement for patients with neurodegenerative diseases (Supressi®) over inflammatory and cardiovascular risk biomarkers, compared with a nonspecific diet (T-Diet Plus High Protein®) when administered as enteral nutrition for three months.

Methods: 98 patients with neurodegenerative diseases were randomly divided into two groups A (n=51) and B (n=47). Subjects in group A were supplemented Supressi® for three months and a nonspecific product (T-Diet Plus High Protein®) during the next three months. Patients in group B received initially the nonspecific diet during the first three months followed by the experimental product other three months. Plasma levels of inflammatory and cardiovascular risk biomarkers were determined at baseline and after three and six months by immunoassay, with MILLIplexTM kits using the Luminex200® system based on the xMap™ technology. We examined the effect of the diets with t test for paired samples ($p < 0.050$).

Results: After receiving Supressi® for three months, there was an increase of the hormone leptin. Administration of T-Diet Plus High Protein® during three months leads to an increase of resistin along with a significant decrease in monocyte chemotactic protein (MCP)-1. Furthermore, a tendency to decrease ($p = 0.065$) was observed for soluble intercellular adhesion molecule (sICAM)-1, after ingestion of control diet.

Conclusions: The new supplement maintains plasma levels of inflammatory and cardiovascular risk biomarkers similarly to the nonspecific diet, while increases the hormone leptin involved in the regulation of food intake and energy balance, what may indicate a better nutritional status in these patients with high risk of malnutrition.

Key words: neurodegenerative diseases; nutrition; supplement.

PO682

CHANGES IN THE VALUES IN THE PHYSIOLOGICAL INDEX BY THE HYDRATION IN THE MALE JUNIOR HIGH SCHOOL SOFT TENNIS PLAYERS

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Background and objectives: Dehydration by the perspiration during the long hours of training causes the rise of body temperature, and not only induces the fall of exercise performance but also causes heatstroke. Appropriate hydration is important for prevention of dehydration. In order to find out a proper condition of hydration for players, the present study has investigated the fluid intake by athletes.

Methods: The 11 male junior high school soft tennis players participated in the study. They were asked for drink water as

much as they liked. Then, the amount of hydration was measured. In addition, rehydration rate and amount of perspiration were calculated based on the sum of the values of both weight loss and fluid intake. The investigation of the values in the physiological index was performed before and after the exercise. Measurement items were body weight, blood glucose concentration, blood lactate concentration, body temperature, physical activities, and heart rate.

Results: Body weight was decreasing during the exercise, and rehydration of about 70 percent of the players was insufficient. The more blood lactate concentration was observed 120 minutes after the exercise than immediately after the exercise. A particularly high value of blood lactate concentration was observed among the players who did not have enough hydration. The degree of fatigue of the players tended to increase as time passed since immediately after the exercise.

Conclusions: These results suggested that in the free fluid intake by thirst of mouth, hydration cannot be carried out fully to the degree with which the amount of perspiration is compensated. We would like to further find out the most appropriate quantity and timing of fluid intake per person and to specify the most appropriate rehydration method which eventually would lead to mitigation of players' fatigue.

Key words: hydration, soft tennis players, blood lactate concentration

PO683

DEVELOPING ELDERLY ANTHROPOMETRIC CHAIR (BODY MASS INDEX METER) BASED ON ARM SPAN, KNEE HEIGHT, AND SITTING HEIGHT

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Background and objectives: Height in elderly is difficult to be measured due to osteoporosis, scoliosis, kyphosis, etc. Arm span, knee height, and sitting height can be used to predict the height. However, some anthropometric measurements with different positions are not effective because of discomfort. Three predictors of height in one tool like a chair can overcome the problems. The study aimed to develop Body Mass Index/BMI Meter for elder's nutritional status assessment with an easy and practical measurement.

Methods: The study design was cross sectional using anthropometric measurement toward 300 healthy older, aged over 60 years, able-bodied, stand still, and resided in Jakarta and Depok. Upper leg length, lower leg length, pelvic width, shoulder width, elbow height, shoulder height and patellar height were measured to design the chair. Validity test for the chair conducted on 100 elderly whom resided in West Jakarta.

Results: Mean age of respondents was 61.6 years with 87 years age as the highest and 48 years age as the lowest. Men had greater results than women related to the upper and lower legs length, shoulder width and height, and patellar and elbow height. Mean of anthropometric parameters measured in men had a value greater than the women, unless the width of the pelvis. Male posture was higher and larger than female. Since body dimensions was took into account, male generally larger than women, except for several particular parts such as hip, etc . The. validity of anthropometric chair from the sensitivity (85-100%), specificity (70-80%), positive predictive value (80-90%) and negative predictive value (80-100%).

Conclusions: BMI Meter is practical tool to measure the nutritional status of the elderly at once without the need to change the measurement in varying position, as it merely done while sitting.

Key words: anthropometric chair; elders'; arm span; knee height; sitting height

PO684

GLUTATHIONE INTAKE IMPROVES MUSCLE FATIGUE INDUCED BY EXERCISE ASSOCIATED WITH INCREASING PGC-1α IN MICE

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Background and objectives: Glutathione is a major redox couple in animal cells and plays important roles in antioxidant defense. Redox balance of glutathione is used as a marker of antioxidant status during exercise. However, it is unclear about relationship between intake of glutathione and exercise. The present study investigated the effect of glutathione intake on muscle fatigue induced by exercise in mice.

Methods: ICR mice (8 weeks old) were divided into four different groups: sedentary, sedentary treated with glutathione (5 μl/g body weight), exercise, and exercise treated with glutathione. After 2 weeks of treatment, exercise groups performed treadmill running at 25 m/min for 30 min. Immediately after running, intermuscular pH was measured, and soleus muscle and blood were collected for the measurements. Proteins were extracted from the muscle samples and peroxisome proliferator-activated receptor-g coactivator-1α (PGC-1α) was

measured by western-blotting. Using DNA extracted from the muscle, g-action and cytochrome c oxidase subunit ‡U were amplified by polymerase chain reaction. Mitochondrial DNA (mtDNA) was determined using ratio of both copy numbers.

Results: Plasma non-esterified fatty acids after exercise was significantly decreased in the mice fed diet with glutathione compared with those fed normal diet (p=0.023). Blood lactate and glucose were not significantly changed between groups. Intermuscular pH was decreased by exercise (p<0.001), while this reduction was inhibited by addition of glutathione to the diet (p=0.030). The level of PGC-1α protein was significantly elevated in glutathione diet compared with normal diet (p=0.049). mtDNA was significantly higher in glutathione treatment than in normal control (p=0.007).

Conclusions: Glutathione improved lipid metabolism during exercise via PGC-1α activation, which inhibited the decrease of intermusculer pH.

Key words: glutathione, PGC-1α, lipid metabolism, skeletal muscle

PO685

IDENTIFYING OBESOGENIC DIETARY FACTORS AMONG EGYPTIAN OBESE ADOLESCENTS

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Background and objectives: The growth of the fast-food industry has led to an increased consumption of food prepared away from home that is high in total and saturated fat, but low in dietary fiber, calcium and iron. The present study aims to identify specific obesogenic dietary factors among Egyptian obese youth.

Methods: The study was conducted on 300 (150 males and 150 females) obese adolescents and 200 lean subjects.They were participated in the project entitled "Obesity among Youth: Lifestyle and Genetic Factors" funded by the Science and Technology Development Fund, Egypt. Dietary intakes were assessed by 24 h dietary recall and Food frequency Quantitative questionnaire [FFQ]. The average months for the Quartiles of intake were computed for the common food groups. The "Youth Healthy Eating Index" (YHEI), which focuses on healthy and unhealthy eating behaviors, was measured to assess the overall diet quality.

Results: Estimate of energy intake by the 24 h dietary recall reveals low reporters relative to expected based on weight maintenance energy requirement. FFQ denotes higher estimated daily energy intakes among the obese subject compared with the respective estimated 24–h dietary recall. The diet quality showed lower estimated intakes of specific micronutrients among the lean and obese. Estimated quintiles of consumption of bread, rice; fried chicken, cheeses, eggs and drinks was positively correlated with obesity in both sexes. Estimated daily intakes of total vegetables and fruits were significantly higher among lean males compared with the respective intakes among the obese males.

Conclusions: The present results support earlier findings that low intake of vegetables and fruits are among the obesogenic dietary factors. The application of YHEI has the potential to assess the diet quality and distinguish between lean and obese groups.

Key words: obese adolescents; youth healthy eating index; Quartiles of food intakes.

PO686

DIET QUALITY SCORES AND COGNITIVE FUNCTION IN OLDER ADULTS

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Background and objectives: Diet quality has received growing attention in relation to many diseases because it better reflects the complexity of the diet. We examined the association between diet quality and cognitive function in Korean older adults.

Methods: The subjects were 808 older adults participating in the Yangpyeong Cohort Study between July 2009 and August 2010. Diet quality was evaluated by alternate Mediterranean Diet Score (aMDS) and the Recommended Food Score (RFS). aMDS and RFS were calculated by using a food frequency questionnaire. Cognitive function was assessed by Korean version Mini-Mental State Examination (MMSE-KC).

Results: Thirty-six percent of the subjects were classified into cognitive impairment group. aMDS was inversely related to the risk of cognitive impairment after adjusting for exercise and supplement (5th vs 1st quintile, OR 0.44, 95% CI 0.26-0.73, p for trend=0.0149). RFS was also inversely associated with the risk of cognitive impairment after adjusting for exercise and supplement (5th vs 1st quintile, OR 0.44, 95% CI 0.27-0.72,

p for trend=0.0005). After stratified analyses by sex, in male subjects, aMDS was negatively related to the risk of cognitive impairment. RFS was inversely associated with the risk of cognitive impairment in female subjects.

Conclusions: These results suggest that good quality of diet may help preventing or postponing cognitive impairment. Further studies are warranted to confirm the findings in different research settings.

Key words: diet quality, cognitive function, older adults

PO687

ADHERENCE TO A NEW NORDIC DIET IN PREGNANCY IS ASSOCIATED WITH REDUCED RISK OF EXCESSIVE GESTATIONAL WEIGHT GAIN

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Background and objectives: The health properties of the New Nordic Diet (NND) are increasingly being investigated in response to awareness of sustainability and public interest in eating local and traditional foods. The purpose of the present study was to investigate the association of NND adherence with risk of excessive gestational weight gain (EGWG) in the Norwegian Mother and Child Cohort Study (MoBa).

Methods: A diet score was constructed from relevant items of the food frequency questionnaire (FFQ) completed by pregnant women in the MoBa study in week 22 of pregnancy. The score comprises ten subscales summarizing meal pattern, intake of fruits, root vegetables, kale, potatoes, oatmeal porridge, whole grain bread versus white bread, foods from the wilderness (fish, game and berries), milk versus juice, and water versus soft drinks. Each subscale was dichotomized by the median and assigned a value of "0" or "1". Adding the subscales yielded a score from 0 to 10 with increasing score indicating higher adherence to the NND. EGWG was defined as gestational weight gain in excess of the range considered optimal and recommended by the Institute of Medicine (2009) according to pre pregnancy BMI. For analysis participants were grouped into "low", "medium" and "high" NND-adherence, and the relative risk of EGWG across groups was analyzed with multi-nominal logistic regression.

Results: 56771 pregnant women were included in the study. Moving from low to high NND-adherence was associated with reduced odds of experiencing EGWG in the crude model (OR: 0.837; 95%CI: 0.795, 0.882) and after adjusting for energy intake, pre pregnancy BMI, length of gestation and physical activity level (OR: 0.875; 95%CI: 0.825, 0.928).

Conclusions: Higher adherence to this a priori defined New Nordic Diet was associated with reduced risk of experiencing EGWG.

Key words: New Nordic Diet, excessive gestational weight gain,diet score

PO688

BREAST MILK ADIPONECTIN IS ASSOCIATED WITH MATERNAL DIETARY INTAKE AND INFANT GROWTH

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Background and objectives: Adiponectin, a circulating anti-inflammatory adipocyte protein, is associated with lower adiposity and is also present in human milk. Nutrients from human milk have been shown to play a significant role in affecting infant growth and development. However, the possible factor related to adiponectin in breast milk and its effect on early growth of infants is not extensively studied. This study aimed to determine the associations of adiponectin concentration in breast milk with maternal dietary intake and infant growth at 2 months of lactation.

Methods: A total of 138 pairs of healthy mother-infant were enrolled from the University Sains Malaysia Birth Cohort Study between 2009 and 2011. All participants were healthy and term infants breastfed exclusively at least 2 months. Breast milk adiponectin at 2 months of lactation were measured by enzyme-linked immunosorbent assay. Maternal anthropometry data were obtained by standard measuring protocol, while dietary data were collected by 24-hour dietary recall method. Infant growth was assessed by using the World Health Organization standards.

Results: Breast milk adiponectin was ranged from 2.81 to 37.13 ng/ml. Among all the maternal dietary factors at 2 months of lactation, only maternal vitamin C intake showed positive correlation (r=0.19, p=0.031) with breast milk adiponectin concentration. Low adiponectin in breast milk was associated with higher weight-for-age Z score (r=-0.24, p=0.005) and higher body mass index-for-age Z score (r=-0.20, p=0.017) among infants at 2 months of age, adjusted for confounders.

Conclusions: Breast milk adiponectin was influenced by maternal vitamin C intake and it is associated with infant body size.

Key words: adiponectin, human milk, infant growth, nutrition, pregnancy

PO689

RELATIONSHIP BETWEEN DIETARY ENERGY DENSITY AND 5-YEAR AGING IN HEALTHY FREE-LIVING JAPANESE ELDERLY

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Background and objectives: Recently, it is known that the dietary energy density is associated with the gender, age and race because their dietary habits are different. However, the reports on the dietary energy density of elderly people have been limited, particularly about Asian race including Japanese. In the present study therefore, we examined whether dietary energy density changes with increasing of age in healthy free-living people over the age of 75 in Japan.

Methods: The subjects were 225 (113 men and 112 women) free-living Japanese elderly over the age of 75, and were randomly selected from a longitudinal interdisciplinary study of aging. Dietary habits during the preceding month were assessed using a brief-type self-administered comprehensive diet history questionnaire (BDHQ) for Japanese. Estimates of dietary intakes for 58 food items, energy, and the dietary energy density were calculated based on foods only. All statistical analyses were carried out with SPSS version 17.0.

Results: As for energy intakes in both genders, there were no significant differences between age of 75 and age of 80. Energy intakes at the age of 80 were 2.258 kcal/d (men), and 1.942 kcal/d (women). Dietary energy density significantly increased from 1.24 ±0.14 kcal/g to 1.29 ±0.18 kcal/g in women ($p \leq 0.01$) but did not change in men (from 1.29 ±0.18 kcal/g to 1.30 ±0.19 kcal/g). At the age of 75, dietary energy density in men was higher than that in women ($p \leq 0.05$). However, the sex differences on dietary energy density were not found at the age of 80.

Conclusions: Findings indicate that dietary energy density was higher with increasing in age in healthy free-living older Japanese women.

Key words: free-living elderly, dietary energy density, aging

PO690

MEDITERRANEAN DIETARY PATTERNS IMPROVE MINERAL INTAKE AND BIOAVAILABILITY IN ADOLESCENTS

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Background and objectives: Adolescence constitutes a period of nutritional risk due to increased dietary requirements for growth and development and the special adolescent's dietary habits. Minerals are essential in this period of life, as they are involved in numerous structural and physiological functions such as skeleton mineralization or sexual maturation. The aim of this study was to evaluate the effects of consuming a varied diet based on Mediterranean patterns on mineral intake and bioavailability in adolescents.

Methods: 20 male adolescents aged 12.9±1.14 years were involved. The study had a longitudinal design, divided into two periods: a 3-day basal period, during which the subjects consumed their usual diet (UD), and a 28-day nutritional intervention period, in which an intervention Mediterranean-type diet was provided (MD). Dietary mineral utilization was assessed by means of mineral intake in food and mineral output in feces and urine, as measured by flame absorption spectrophotometry (Ca, Mg, Fe, Zn, Na and K) or colorimetrically by the vanadomolibdate procedure (P).

Results: Adherence to Mediterranean diet was greatly improved during the intervention period. Dietary intake of some minerals, like Ca or Fe, did not change between diets, but significant differences were found in others (P, Mg, Zn, Na and K). Bioavailability of the most minerals (calculated as percentage of retained from ingested) was enhanced during the MD consumption, even those with similar intakes (Ca 23.9% and 39.4%; Fe 8.3% and 21.1%, for UD and MD, respectively).

Conclusions: A varied diet based on Mediterranean patterns during adolescence greatly improves bioavailability of minerals, wich may have healthy effects and help to prevent related diseased in the adult age.

Key words: Mediterranean diet, adolescence, minerals, bioavailability.

PO691

COMBATING CHILD MALNUTRITION IN SRI LANKA: USE OF EVIDENCE-BASED NUTRITIONAL INTERVENTIONS

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Background and objectives: Child under-nutrition remains a significant public health problem in Sri Lanka despite its good mortality and morbidity indicators. According to the Demographic and Health Survey (DHS) 2006-07, prevalence of stunting, wasting and underweight among children under 5 years was17.3%, 14.7% and 21.1% respectively in 2006-7. Approximately 25% of children aged 6-59 months were anaemic. This paper aims to review the implementation of evidence-based interventions to tackle childhood under-nutrition in Sri Lanka.

Methods: Reports of nutrition surveys, intervention studies, programme evaluations, and reviews were studied through a desk-review. Unpublished data in reports, presentations and dissemination seminars were obtained from the relevant investigators and/or organizations. Secondary data analyses were performed using the DHS 2006-7 data.

Results: Promotion of breastfeeding was satisfactory as exclusive breastfeeding rate was 76% according to the DHS. However the minimum acceptable diet was only 50% among children 6-11 months age. Many other evidence-based interventions to reduce child malnutrition are existent in Sri Lanka, such as food supplementation; supplementation of Vitamin A and multiple micronutrients; iron, folic acid and calcium supplementation in pregnancy, and universal promotion of iodized salt. The micronutrient supplementation reaches more than 80% of the target population, however the coverage of food supplementation was low. The issues identified as requiring further improvement include ineffective targeting, equity, quality, coverage of low performing areas such as complementary feeding and food supplementation, and participation of non-health sectors.

Conclusions: Sri Lanka has already given high priority to many of the evidence-based interventions, but should ensure their effective implementation with high coverage and quality. There should be effective targeting of food assistance and supplementation programmes, with due attention to food insecure populations.

Key words: undernutrition; infant feeding; breastfeeding; nutrition interventions; supplementation; Sri Lanka

PO692

DETERMINANTS OF STUNTING AMONG CHILDREN AGED 6-23 MONTHS IN SRI LANKA

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Background and objectives: The trend of childhood stunting indicates a slow decline in Sri Lanka, despite improvement of many health indicators. This study aimed to determine the immediate, underlying and basic 'factors' associated with stunting in children 6-23 months age.

Methods: Sri Lanka Demographic and Health Survey 2006-07 was a cross-sectional household survey and interviewed ever-married women aged 15-49 years, and measured heights and weights of their children under 5 years of age. Our analysis was restricted to 1991 children aged 6-23 months. Prevalence of stunting (height-for-age Z score <-2) was cross-tabulated against independent variables, with 95% confidence intervals. Multiple logistic regression model was used to calculate adjusted Odds Ratio (OR).

Results: Prevalence of stunting was 18.5% (95% CI;16.3, 20.9) among children aged 6-23 months. Neither complementary feeding practices (minimum dietary diversity, meal frequency and acceptable diet) nor childhood illnesses (acute respiratory illness, diarrhoeal disease) were significantly associated with stunting. An increasing trend in stunting was observed with increasing age of child. Male sex (OR=1.33), low birth weight (OR=3.33) and lower maternal height (OR for height <150cm=2.54) were also significant predictors of stunting. Underlying factors of stunting include: poorest wealth quintile (OR=1.85), having 3 or more children in family (OR=1.64) and poor paternal education (fathers with primary or no schooling, OR=1.49). Lesser antenatal clinic visits during pregnancy was associated with higher risk of stunting (OR=1.37). Residential sector (tea estate sector, OR=1.95) and maternal employment (working mothers, OR=1.39) were among significant basic determinants.

Conclusions: Since maternal short stature and low birth weight were found to be strong predictors, an integrated action through lifecycle approach would be required to break this

viscous cycle. Socio-economic factors have a large impact on stunting which requires effective inter-sectoral coordination to tackle this issue.

Key words: stunting; chronic undernutrition, protein-energy malnutrition; risk factors; Sri Lanka

PO693

EFFECT OF AN EXERCISE PROGRAMME AND A POST-EXERCISE PROTEIN SUPPLEMENTATION ON INFLAMMATORY BIOMARKERS: PRELIMINARY RESULTS

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Background and objectives: Exercise and nutritional supplementation programs designed to result in a long-lasting metabolic improvement should consider the status of muscle, body composition and inflammatory markers. Protein intake constitutes a fundamental element to obtain an increase in the muscular mass. The objective of this study was to evaluate the effect of a combined routine that included strength and endurance exercises and a post-exercise supplementation with leucine-enriched milk whey protein on muscular mass, muscular strength and inflammatory markers in healthy and DM2 sedentary subjects.

Methods: We performed a clinical, randomized, double-blind study with 35 healthy volunteers (n=17) and DM2 volunteers (n=18) that underwent a 16 weeks training program. A subgroup of healthy volunteers received a supplement or a placebo 30 minutes after performing exercises. Each individual was clinically assessed at the beginning and at the end of the study, including muscular strength, body composition, diet and biochemical serum parameters.

Results: All the groups slightly increased their muscular mass (between 0.3% and 2.1%) and the leg muscular strength measured with a 1RM test increased ($p<0.05$) in subjects that received the protein supplement (41.7%), placebo (44.5%) and controls (13.7%). Plasma TNF-α concentration decreased in all of them (-13.1% supplement, -19.6% control and -26.1% placebo). Adiponectine plasma concentration increased in control (16%) and supplement (2.7%) groups, and slightly decreased in the placebo group (-8%). IGF-1 plasma levels increased in the supplement (3.8%) and control (1.8%), and decreased in the placebo group (-1.7%). However, at this moment, all these changes in plasma cytokines are not statistically significant.

Conclusions: There have been positive changes in terms of muscle strength and in some plasma cytokines levels but protein supplementation showed no statistically significant effects.

Key words: exercise, protein supplementation, inflammatory biomarkers, muscle

PO694

SURVEY OF DIETARY PATTERN AMONG ADOLESCENT GIRLS OF AHMEDABAD CITY, GUJARAT, INDIA

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Background and objectives: Adolescence, one of the nutritional stress periods of life with profound growth, comes with increased demands for energy, protein, minerals and vitamins. India is facing dual problem of under-nutrition and obesity among adolescents. So it was decided to assess nutritional status and current dietary pattern among adolescent girls.

Methods: A cross-sectional study was carried out among 520 adolescent girls during August, 2011-July, 2012. A stratified, 2-stage, random, cluster sampling was done, first schools were randomly selected and then frame was stratified by sex and socioeconomic class(SEC). Dietary survey was done using 24hr recall method. Nutritive value tables(ICMR) for Indian foods were used for calculating nutrient intakes.

Results: Mean age of the girls was 14.72+2.5 years. Undernutrition was observed in 27.7% girls while overnutrition in 8.9% girls according to CDC criteria for BMI, a significant difference was observed between nutritional status of girls and SEC ($\chi^2=20.37$, Df=4, $p<0.0004$). Overall mean calorie intake was 978.07+310.74 kcal, deficient by 50.8% of Recommended Dietary Allowance (RDA) for age, mean protein intake was 27.74±9.34 gms, deficient by 54.3% of RDA for age, mean fat intake was 34.89±15.5 g, excess by 62.9% of RDA for age, mean calcium intake was 469.69 ± 234.61 g, deficient by 11.4% of RDA for age and mean iron intake was 19±7.8 g, deficient by 28.7% of RDA for age. A statistically significant difference($p<0.0001$) was observed in calories, fat, protein, calcium and iron intake with SEC respectively (Kruskal-Wallis). Mean calorie intake

from junk food was 212.6+93.96 kcals, which contributes to 21.7% of total calorie intake.

Conclusions: Overall intake of essential nutrients was below the RDA for age whereas almost 1/3rd of total calorie intake was from junk food. Nutritional status of adolescent girls contributes to nutritional status of community. As a preventive strategy, there is a need to apply health and nutritional education program for inculcating healthy life styles.

Key words: adolescence, nutrients, RDA

PO695

DUTCH INFANTS AT RISK OF EXCESSIVE VITAMIN D INTAKE THROUGH COMBINED INTAKE FROM (FORTIFIED) FOODS, INFANT FORMULA, AND DIETARY SUPPLEMENTS

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Background and objectives: In the Netherlands, the vitamin D fortification policy and supplementation advice recently changed. Supplementary 10-µg/d is advised for infants up till 4 y. Besides infant formula, other foods may be fortified with vitamin D. Addition of vitamin D to margarines is encouraged. The aim of this study was to estimate the risk of excessive vitamin D intake from all sources for the current (2011) fortification practice and supplementation advice.

Methods: Data from the Nutrition Intake Study (2002; N=941 7-19 months) was used. Infants consuming mother's milk were excluded. Consumption data collected on 2 independent days with a diary was combined with food composition data from 2011. Two scenarios for vitamin D content in infant formula, 1) as labeled, 2) legal maximum according to European legislation (overage). All infants were assigned to take a daily 10-µg vitamin D supplement. Habitual vitamin D intake was estimated using SPADE and compared with the UL.

Results: Predicting the 2011 situation, the medium habitual total vitamin D intake was 13-21-µg for infants 7-19 months, decreasing with age. Of infants 7-11 months, 4-12% exceeded the UL (25-µg). Using the legal maximum vitamin D content (3 µg/100 kcal) in infant formula resulted in a medium habitual total vitamin D intake of 13-25-µg for infants 7-19 months, decreasing with age. Of infants 7-11 months, 23-54% exceeded the UL. Infants 12 months and over did not exceed the UL of 50-µg in both scenarios.

Conclusions: In case of combined intake from infant formula, (fortified) foods and supplements, vitamin D intakes above the UL occur among infants; especially infants aged 7-11 months and with an overage of the labeled vitamin D content of infant formula. For long-term intakes above the UL health risks (e.g. hypercalcaemia) cannot be excluded.

Key words: vitamin D, infant, excessive intake

PO696

FOOD HABITS AND DIETARY PATTERNS OF PREGNANT WOMEN IN URBAN AND RURAL AREAS OF DEYANG REGION, SICHUAN PROVINCE OF CHINA

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Background and objectives: Micronutrient deficiencies and low energy intake tend to occur during the reproductive period of women in China. In accordance with traditional Chinese culture, pregnant women are commonly advised to follow a specific set of food habits. To assess dietary intake and identify risk factors for nutritional inadequacy in pregnant women from urban and rural areas of Deyang region, Sichuan province of China.

Methods: Cross-sectional sampling was applied in two urban hospitals and five rural clinics (randomly selected) in Deyang region. Between July and October 2010, a total of 203 pregnant women in the third trimester, aged 19-42 years, were recruited on the basis of informed consent during antenatal clinic sessions. Semi-structured interviews on background information and 24-h dietary recalls were conducted.

Results: In the study area, pregnant women's dietary energy originated excessively from fat (39%), was slightly carbohydrate deficient (49.6%), and reached the lower limits for protein (12.1%). Although cereals such as rice and wheat were still the main staple food in comparison to national statistics, there is a declining share of cereals whilst the proportions of meat, dairy products and vegetable oils are rising. Compared to rural areas, women living in urban areas had significantly higher RNI fulfillment levels for energy (106.1 vs 93.4%), fat (146.6 vs 119.7%), protein (86.9 vs 71.6%), vitamin A (94.3 vs 65.2%), zinc (70.9 vs 61.8%), iron (56.3 vs 48%), calcium (55.1 vs 41%) and riboflavin (74.7 vs 60%). The likelihood that pregnant women follow traditional food recommendations was higher in rural (80%) than urban (65.1%) areas.

Conclusions: In order to reduce the use of cooking oils and improve the consumption of cereals, vegetables and dairy products, pregnant women in Deyang region need access to culturally sensitive nutrition education sessions.

Key words: food habits, 24-hour dietary recall, pregnancy, China

PO697

PROTECTIVE EFFECT OF DAIRY FAT ON BRAIN DHA LEVELS OF YOUNG RATS BORN FROM ALA-DEFICIENT OR ALA-RICH MOTHERS

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Background and objectives: DHA is the major brain FA and omega-3 deficiencies during gestation/lactation could have dramatic impacts on health during adulthood. The aim of the present study was to evaluate: 1/ the impact of dietary deficient or ALA-rich diets during gestation/lactation on the brain DHA levels of post-weaning young males submitted to deficient or ALA rich-diets; 2/ the specific impact of different matrix: butter fat compared to rapeseed oil diets to restore or maintain brain DHA levels in young rats born from deficient or ALA-rich dams.

Methods: Two groups of dams were fed during gestation and lactation with either a deficient ALA-palm diet containing minimal ALA level (0.4%) or a protective ALA-rich (8%) pure rapeseed oil diet. After weaning, 3groups of young males born from deficient and ALA-rich dams received a 10% fat diet for 6 weeks, either (i) as ALA-deficient-palm diet (ALA 0.4%), (ii) ALA-low-butter diet (ALA 0.8%), (iii) ALA-rich-rapeseed diet (ALA 8%).

Results: - New-born and weaning pups from deficient dams showed brain DHA levels 2 times lower than those from ALA-rich-dams. - The brain DHA levels of the post weaning rats were more dependent of the dams status than of their own diet: an ALA-rich diet during gestation and lactation is protecting against ALA deficiency during post-weaning growth, while an ALA-rich diet post-weaning allow a recovery for those born from deficient-dams, but never reach the values of those born from ALA-rich-dams.- Butter fat, despite 10 times less ALA than rapeseed oil (0.8% vs 8%), is as efficient as rapeseed to restore the Brain DHA level in young rats born from deficient-dams and to maintain similar levels for those born from ALA-rich-dams. The same low n6/n3 ratio in these two type of fats (3 while 25 for palm) and the complexity of the composition of dairy fat could be part of their protective effect. Partially granted by Lactalis

Key words: dairy-fat, brain, DHA, ALA.

PO698

NUTRITIONAL EVALUATION AND RECOMMENDATIONS IN A PRIMARY SCHOOL OF VISEU

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Background and objectives: The diet quality is a major factor regarding the healthy growth of children. The prevalence of childhood obesity in the "developed countries" has increased in the past decades. This became an important issue in public health nutrition. This work reflects a nutritional analysis of a 1st /2nd cycle college education throughout the workweek. The aim was to verify whether the school feeding was balanced and provided enough nutrients to allow optimal growth and development of children in these ages (6-15 years).

Methods: The Dietary Guidelines for Americans 2010 was used to choose a healthy eating pattern. In order to access the different nutritional values it was used, as benchmark, the DIAL analysis program.

Results: In terms of cooking methods, it was noted the predominance of techniques that led to higher caloric intake of food, especially frying (shallow and deep). The Wednesday and Thursday days had nutritional values that disrupt the parameters of a healthy diet: overall energy intake and high percentage of lipids. Meals of Monday, Tuesday and Friday were balanced.

Conclusions: Among the analyzed menus, the Monday one was more balanced and adjusted to the physical activity in this age group (considering that children exercise twice a week). An economic estimation of the served menus was also object of study.

Key words: children, cooking methods, nutritional evaluation.

PO699

NUTRITIONAL ASSESSMENT OF SOME MENUS SERVED AT THE AGRARIAN SCHOOL OF VISEU-ESAV

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Background and objectives: The concern for prospective nutritional meals has increased over time. Adolescent's obesity constitutes an important issue to be studied in Portugal. Moreover, recent studies affirm that more than 30% of our adolescents have severe obesity problems. This study was performed in order to evaluate the nutritional quality of the menus served at Agriculture School of Viseu- ESAV, throughout a workweek,

aiming to improve the quality menus as a way to prevent chronic diseases associated with food. The main objectives of this study were to characterize the kind of nutrition offered for students of age 18 to 25 and evaluate if the practiced menus were according to the Dietary Guidelines for Americans 2010, chosen as a healthy eating pattern.

Methods: The program DIAL was used in order to achieve the caloric and the nutritional values. An economic perspective of the menus served was also practiced. School canteens, while educational spaces with food supply, must be concerned with the principles of a balanced diet. The weekly menus were compiled in a coherent and balanced menu, in terms of nutrition, pleasant, appealing and satisfying nutritional needs of young adolescents.

Key words: adolescents, menus, nutritional assessment.

PO700

ENERGY INTAKE AND MACRONUTRIENT DISTRIBUTION OF A GROUP OF ADULT WOMEN IN VALLADOLID (SPAIN)

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Background and objectives: A balanced diet allows completing the basic needs and prevents or reduces the risk of certain disorders or diseases. Energy and nutrients must be present in adequate amounts to achieve it.: The aim of the present study was to establish the energy intake averaged values of macronutrients for women between 40 and 60 years old in the city of Valladolid (Spain).

Methods: A sample of 500 women was selected through random sampling. They were asked to fill a food-consumption frequency questionnaire (Martin Moreno et al 1999). The daily amount of consumed food was obtained. The total daily intake of each nutrient is obtained taken into account the contributions from all foods. The table published by Anta Ortega et al. (2008) was used. The results were compared with the recommendations established by the Spanish Societies Federation of Nutrition, Food and Dietetics (FESNAD 2010).

Results: The amount of consumed energy is a 105.2% of the recommendation for the averages of the age, weight and activity variables. The macronutrients were distributed as follows: proteins: 18.04%. carbohydrates: 40.10%. lipids: 41.90%.

Conclusions: The studied diet provides a higher energy input than the energy intake values cited by the recommendations. The macronutrients contribution to the daily energy intake deviates from the recommendations. The diet provides an excessive amount of proteins, a low quantity of carbohydrates, and a high amount of lipids. That pattern can contribute to the development of overweight and obesity, and to the increase of cardiovascular risk in women in the selected group of age.

Key words: energy, proteins, carbohydrates, lipids, women, health.

PO702

MEDIA INFLUENCE OF TELEVISION IN NUTRITIONAL STATUS OF PRESCHOOL

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Background and objectives: The diversity of industrialized food advertised by television media can influence children's eating habits standards, once the first years of life of a child are claimed to be the phase when the eating habits are established. The excessive and regular consume of these kind of food may harm children's health throughout adulthood. Most industrialized foods are rich in fats and refined carbohydrates, presenting a high energy power what may decrease the consumption of healthy food. The aim of this paper is to identify the television media influence on the nutritional preschool condition, aged between 3 and 5 years of a private institution and to relate the results with the consumptions of candies.

Methods: It was applied a survey about children's eating habits and preferences to the parents. By calculating the BMI/age it was measured the nutritional condition of each child. The data obtained from anthropometric measurements were related to the results of the survey about children's eating habits applied.

Results: It was verified that 81.8% of preschoolers were eutrophic, 15.2% were overweight and 3% were thin. These children had tried candies for the first time when they were between 1 and 3 years old, 88% used to go to the supermarket with their parents and participated in the food buying selection. The first contact with the TV had occurred between the ages of 1 year and 5 months with a daily routine of 1 to 2 hours in front of TV for 79% children and 51% used to have at least one meal in front of TV.

Conclusions: It is believed that the media advertisements are essential elements to encouragement of unhealthy foods consumption and as an intervention for obesity prevention strategy.

Key words: television, preschool, nutritional condition.

PO703

A QUALITATIVE STUDY EXPLORING PARENTS' VIEWS AND PERCEPTIONS OF OVERWEIGHT AND OBESITY IN PRE-SCHOOL CHILDREN IN SCOTLAND

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Background and objectives: The UK Child Health Surveillance Programme (CHSP) reported that 8.6% of children born in 2001 were obese (BMI≥95th centile of the UK 1990 reference data) at 3.5 years of age compared to 7.9% of those born in 1995. There is growing policy maker and health professional interest in preschool weight management interventions to halt or reverse this trend. However, little is known about how UK parents view this issue, and the extent to which they believe it is a problem requiring intervention. This paper presents the results of research which explored these issues with 34 parents in the north-east of Scotland.

Methods: Parents were recruited by invitation through preschool nurseries. Nine focus groups were held with mothers of preschool children. Focus groups lasted between 45-90 mins, were audio-recorded, transcribed verbatim and analysed thematically.

Results: The majority of study participants were native English speakers from higher SES backgrounds. The main emergent themes were: 1. Concern about classifying pre-school children as overweight or obese 2. Parents using a wide range of different information sources to judge their child¡¯s weight status 3. Scepticism about current reference standards and use of BMI scores for children 4.Confusion regarding weaning practice and portion size, and lack of faith in health professionals¡¯ advice about these issues 5.Home cooking being synonymous with healthy eating 6. Competing family perspectives regarding foods and portion sizes for children.

Conclusions: This research indicates significant challenges exist for health professionals in engaging parents in preschool weight management interventions in Scotland. However, many parents are struggling with ¡®getting the balance right¡¯ related to when and how to wean young children and instil good eating habits in a world they perceive as full of food temptation and contradictory advice.

Key words: pre-schoolchildren, overweight, weight management, parents¡¯ views, qualitative research

PO704

SOCIOECONOMIC INEQUALITY IN DIETARY DIVERSITY SCORE AMONG SCHOOL CHILDREN IN A REGION OF SOUTHWESTERN, NIGERIA

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Background and objectives: Dietary diversity has long been recognized as key element of high quality diets. This study aimed to assess socioeconomic variables and the relationship with dietary diversity of school children in a region of southwestern, Nigeria.

Methods: This is a cross-sectional study of 600 school children attending both private and public schools. A standardized FAO-published 24-hour diet recall questionnaire for calculating a dietary diversity score (DDS) was adapted, tested, and used to collect dietary diversity data. A structured interview scheduled was also used to elicit information on availability of household assets which was used as a proxy for wealth status used as socioeconomic indicator. Respondents were classified according to level of dietary diversity and wealth status as low, moderate and high. Logistic regression analysis was used to assess the relationship between dietary diversity and wealth status. Data were disaggregated according to type of school attended by the school children.

Results: Mean age and household size of the respondents was 8.28±1.44 and 6.43±2.26 respectively; both higher in public than private schools. For the wealth status (39.3%) and DDS (30.0%) of private school children were categorized as high compared to 32.0% and 18.3% in public school respectively. DDS was more related to higher socioeconomic status in private school children. High (OR=1.05, CI=0.51-2.18) and moderate (OR = 1.25, CI = 0.05-3.16) wealth categories in private school children had an increased DDS compared with the low wealth status group. While among the public school children, only high wealth status group had a likelihood of increased DDS (OR=1.84, CI=0.37-2.10).

Conclusions: Wealth related inequalities existed for children from both school types. Socioeconomic inequalities determined the dietary diversity score of school children in the region of southwestern Nigeria.

Key words: dietary diversity, wealth status, school children, Nigeria.

PO705

NUTRITIONAL STATUS OF 3-9 YEAR OLD CHILDREN IN THE ISLAND OF BORNHOLM: BASELINE ANTHROPOMETRIC DATA FROM PROJECT SOL-BORNHOLM

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Background and objectives: Since 1947 the prevalence of overweight and obesity in Denmark has increased markedly. The Danish Island Bornholm has an above average prevalence of overweight among adults, but data on children are scarce. The objective of the present study was to determine the prevalence of overweight and obesity of 3-9 y old children from the Regional Municipality of Bornholm.

Methods: The study was based on baseline data collected in the period of September to October 2012 as a part of the multi-setting, multi-component community intervention "Health and local communities" (SoL-Bornholm). Heights and weights of children from day care centres and primary schools from the three participating communities were measured barefooted and in light clothing by research staff. Overweight and obese children were classified using international age- and gender-specific BMI cut-off values.

Results: In total 240 children were measured (52% girls/48% boys). Fifteen percent of the children were overweight and 2% obese. The prevalence of overweight and obesity did not differ between preschool and school children and there were no significant gender differences.

Conclusions: The observed 17% prevalence of overweight or obesity in Bornholm's children is worrisome. It is nearly 10% points higher than the national prevalence in Danish preschool children. The observed prevalence of overweight preschool children makes the SoL-Bornholm intervention study very relevant and calls for effective interventions in the day care setting.

Key words: BMI, overweight, obesity, Denmark, children

PO706

SEAFOOD INTAKE AND POSTPARTUM DEPRESSION

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Background and objectives: It is evident that fish and seafood are part of a healthy balanced diet. The general Norwegian recommendation to pregnant women is to eat fish for dinner 2-3 times a week, and at least half should be oily fish. A low seafood intake in general has been shown to be associated with higher risk of depression. National and international studies have found that about 10-15% of women suffer from depression in the postpartum period. Within a large population of Norwegian mothers and infants we investigate the seafood intake and the possible impact of seafood on postpartum depression.

Methods: The design of the study is a prospective population study with prenatal enrolment of participants from nine different sites in Norway. The seafood intake was assessed in the 32th gestational week using a validated food frequency questionnaire. The participants were screened for postpartum depression using the Edinburgh Postpartum Depression Scale (EPDS) 6 weeks after delivery.

Results: Preliminary results show that the pregnant women (n=839) ate fish for dinner 1.3±0.9 times a week and fish as spread (n=835) 1.0±1.0 times/week. Oily fish for dinner was consumed 0.6±0.6 times/week. The EPDS scores (n=679) ranged from 0 to 22 with a mean of 3.6±3.4, and 9% had a score >8. Using a logistic regression model (n=679) we found that higher oily seafood intake, including supplements, decreased the odds of becoming depressed (EPDS>8, odds: 0.90, CI:0.82-0.99, $p<0.05$).

Conclusions: The women had low seafood intake compared to the Norwegian recommendations. Preliminary results support that higher seafood intake may be one factor that reduce depressive symptoms.

Key words: seafood intake, oily fish, postpartum depression

PO707

DETERMINANTS OF IRON DEFICIENCY ANAEMIA AMONG IN-SCHOOL ADOLESCENT IN FEDERAL CAPITAL TERRITORY (FCT)-ABUJA

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Background and objectives: Iron Deficiency Anaemia (IDA) is a major public health problem especially in developing countries.There is a paucity of data on anaemia in adolescents in Nigeria. The objectives of this study were to elucidate the risk factors of IDA and also determine the iron status among in-school adolescents in Federal Capital Territory (FCT)-Abuja.

Methods: The study was descriptive and cross-sectional in design. One hundred and thirty-three in school adolescents aged 10-19 years were randomly selected using a simple random method from a Government Secondary School in FCT-Abuja. A semi-structured interviewer administered questionnaire was used to elicit information on possible predisposing factors. Anthropometric measurements were obtained using recommended standard procedures. Intravenous blood samples were collected from all respondents to determine haemoglobin concentration, packed cell volume, white blood cell count, blood film test, serum ferritin levels using standard haematological and enzyme-linked immunosorbent assay procedures. IDA was assessed using serum levels and haemoglobin (Hb) levels according to World Health Organization Standards.

Results: A total of 133 respondents, 26.3% were males and 73.7% were females. Among the males, 8.6% were anaemic while 91.4% were not. All the females were none anaemic. Among all predisposing factors only gender had an association with IDA ($p<0.05$). The mean haemoglobin level and serum levels of the blood from respondent were 13.13±1.56 g/dl and 78±66.01 ng/ml respectively.

Conclusions: The study revealed that there is no association between age, level of education, socioeconomic status of caregiver, dietary intake and the prevalence of IDA among in-school adolescent. However, contrary to the general opinion and other research outcomes the male gender seems to be at risk in the study population, hence recommendation is necessary for the study to be further replicated with a larger sample size.

Key words: haemoglobin, iron deficiency anaemia, adolescent

PO708

PROBING THE HEMOGRAM: HEMATOLOGICAL MEASURES AND INDICES ACROSS A SAMPLE OF GUATEMALAN HIGHLAND PRESCHOOL CHILDREN ATTENDING THREE GOVERNMENT-SPONSORED DAYCARE CENTERS

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Background and objectives: Nutritional factors affect the bone marrow. Various micronutrient deficiencies cause anemia, but also by infectious diseases and other conditions. Without the luxury of ancillary biomarkers, diagnostic classification is limited. We sought here to explore the entire battery of information in the automated hemogram as a source of assessment insights.

Methods: Hemograms were obtained from Beckman Coulter AcT Diff Haematology Analyzer (Krefeld, Germany) analysis in 82 preschoolers attending three day-care centers in the Western Highlands region of Quetzaltenango. Information on norms for measurements, cell-counts and red cell indices (mean corpuscular volume {MCV}, mean corpuscular hemoglobin concentration {MCHC}), red cell distribution width {RDW}) were taken from the hemogram references; in the case of hemoglobin (Hb) and hematocrit (Hct), the anemia-criteria were adjusted for the 2333 m altitude above sea-level.

Results: Mean Hb was 13.1±1.9 g/dl. Mean Hct was 39±3%. The average total red cell count was 4.84±0.94 106/mm3; 22% were erythropenic at <4.50 106/mm3, unadjusted for altitude. The mean white cell count was 7866±2541; 1% were leukopenic with <4500/mm3 and 9% leukocytotic at <10,800/mm3. Average platelet count was 314,730±76,020/mm3, with 1% thrombocytopenic at <150,000/mm3. Specifically, with respect to anemia, 13% did not meet the age-altitude-adjusted criteria for Hb and 4% did not meet the comparable criterion for Hct. MCV values outside of the (80-100 fl) range classified rbcs as microcytic in 17% and as macrocytic in 0%. MCHC values <32 g/dl classified hypochromia in 5%. With respect to the RDW normal range of 11.5-15%, 2% had high and 0% low values.

Conclusions: In the context of potential multiple micronutrient deficiencies and interactions -- but when nutrient-status and inflammatory indicators are unavailable -- the full spectrum of data from automated hemograms may provide additional nutritional insights. Financing: Hildegard Grunow Foundation, Munich, Germany

Key words: anemia, haematology, Guatemala

PO709

NUTRITION AND HEALTH QUALITY IN ELDERLY LIVING IN ANKARA, TURKEY

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Background and objectives: The study was conducted to determine nutrition, health status and quality of life levels of elderly people those who living in Ankara, Turkey.

Methods: The study sample consists of 150 voluntary participant who were membership of Family Life Center of Municipality of Ankara. Socio-demographic, life styles, nutritional behavior and health status data was collected with a questionnaire by face to face interview. Anthropometric measurements were done by researchers. Food consumption was measured by the 24 hour dietary recall methods. Quality of life of the participants was measured with EUROHIS-QOL 8-item index.

Results: The mean age of the participants was 67.7±6.77 years, 56% of the participants were male, 81% were married, and 54% had high school or university degree. The mean BMI was 27.9 kg/m^2. Forty two percent of participants were normal, 56% were overweight and obese. Sixty three percent of elderly have at least one chronical disease. The most common chronic diseases were hypertension (30.8%), cardio-vascular diseases (14.3%) and diabetes (13.2%) respectively. Energy consumption was below the recommended level in male. In both gender, while the percentage of energy from carbohydrates was low, protein consumption was recommended level. Vitamin E, folate, potassium and calcium consumption were low in both genders. Sodium consumption was far above to both genders. According to the EUROHIS-QOL 8-item index) the quality of life total score mean was 3.7±0.64. Males had significantly higher QOL scores than females in all domains. While the highest score was "relationship with other persons" (4.0±0.85), the lowest score was having "enough money to meet the needs" (3.4±0.73).

Conclusions: It is necessary to develop interventions targeted together nutrition and healthy life styles to promote health and life quality.

Key words: elderly, nutriton, quality of life, nutrient

PO710

NUTRITIONAL GUIDANCE: PREVENTING MALNUTRITION WITH FOOD INSTEAD OF SUPPLEMENTS FOR ELDERLY IN NURSING HOMES

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Background and objectives: Malnutrition is common amongst the elderly in nursing homes. They often neglect to regularly eat a nutritionally balanced diet throughout the day. Health care workers, working closely with this population, have often expressed a desire for more comprehensive training in the field of general geriatric nutrition instead of giving them supplements. Studies show that the characteristics of the food served is the main reason for lack of appetite and failure to eat properly. Then, as a result the patient may suffer from poor nutrition. The objective of this study is to create a guide on general nutrition for use in geriatric health care. This guide is going to emphasize the importance of eating together, to reduce the feeling of loneliness. Further, the guide will express the joy of eating for better health and how to make fun, good tasting, visually appealing and nutritionally balanced recipes that will inspire patients to want to eat more.

Methods: Development of a practical competence- guide for health care workers, which will increase their awareness of by using food as a alternative method to prevent malnutrition in nursing homes. The guide contains three parts: general nutrition, recipes adapted for individual nutritional needs, and a simple practical nutrition journal.

Results: A practical guide of 80 pages with information on general nutrition and adjusted recipes are presently produced. All workers in nursing homes in Arendal municipality in the South of Norway, will receive this guidance in effort to raise the competency of nutrition for the elderly.

Conclusions: This guide will attempt to educate the health care workers in nursing homes on how to encourage healthy eating for their patients instead of giving energy supplements and drinks typically utilized to prevent geriatric malnutrition.

Key words: Competence, Healthy eating, Elderly, Malnutrition.

PO711

ANTHROPOMETRY, BODY COMPOSITION AND FUNCTIONALITY OF NUTRITIONALLY AT RISK INSTITUTIONALIZED ELDERLY

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Background and objectives: In under nutrition, body dimensions and body composition of elderly change affecting their functionality. The objective of the present study was to assess the body composition and its effect on the functionality of apparently healthy institutionalized elderly.

Methods: A cross sectional study was conducted using 130 elderly individuals with mean age of 75.6±7.9 y. Weight, height, demispan, mid-upper arm circumference, calf circumference, and skin fold thickness of biceps, triceps, subscapular and suprailiac were measured. Body composition was calculated using skin fold thickness (SFT) and bioelectrical impedance analysis (BIA). Functionality of elderly was determined using activities of daily living (ADL) score and time to get up and go test (TGAGT).

Results: Of total, 44% were undernourished with BMI of less than 17.5 Kg/m2 . Except for height, normal individuals showed higher values for all anthropometric measurements compared to those of undernourished. The fat content of normal and undernourished individuals obtained using SFT were 27.4 and 20.0%, respectively. Significant associations were reported between body composition and ADL score. Normal elderly individuals showed a positive association between fat mass index as determined by BIA and ADL score. There were no significant differences in functionality between undernourished and normal institutionalized elderly individuals.

Conclusions: Undernourished showed lower body lean mass and fat mass than those of normal elderly individuals. In addition, undernourished elderly individuals showed higher chances of having low values for indicators that represent the poor body lean status than those of normal. However, effect of favourable body composition on their functionality was not observed in the present study. Future studies are warranted with more number of participants and other methods to assess functionality.

Key words: Body composition, functionality, institutionalized, Sri Lanka

PO712

EATING HABITS AND HEALTH STATUS OF YOUNG AUSTRIAN MEN AGED 17 TO 20 YEARS IN CONTEXT TO THEIR LIFESTYLES

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Background and objectives: Most studies about men´s health focus on adults aged 50 years and older. But it is largely unknown whether and to what extent health behaviour in young men represents risk factors for the incidence of lifestyle-related diseases in later life.

Methods: Within this cross-sectional study 1369 young men in lower Austria aged 17 to 20 years were anthropometrically investigated and interviewed about their lifestyle (nutrition, health-related behaviour and physical activity) at their investigation on the suitability of the Austrian Armed Forces. The health status was determined on the basis of biochemical parameters and compared with those of ten years ago.

Results: Anthropometric data (body weight and hight, waist circumference) and health-relevant characteristics (nutritional habits, physical activity, alcohol consumption and smoking habits) as well as the frequency of cardiovascular risk factors except blood lipid and glucose levels show a clear increase in unhealthy attributes in the period of 10 years among those young men. 29 percent of 17-20 year old men are overweight, 46 percent are smokers, 80 percent consume alcohol and around one third do not participate in sport.

Conclusions: The health-detrimental tendencies increased in the last ten years considerably in the target group of young men. Efficient prevention campaigns are urgently necessary to promote and continually support a health-conscious life-style in young health.

Key words: young men, nutrition, health behaviour , physical activity, life style

PO713

KNOWLEDGE AND PREVALENCE RISKS OF MATERNAL AND CHILD HEALTH FACTORS AMONGST WOMEN ATTENDING RANGO HEALTH CENTER

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Background and objectives: A woman is a heart of family as a traditional belief of Rwandans that woman in a family have to take care to children related issues. Inadequate nutrition amongst breastfeeding women also contributes to a higher than average rate of babies who develop under nutrition among Rural Rwandan children. 52% of children under the age of five are stunted, 16% are underweight, and 5% are wasted, 6% of infants are born with a low birth weight in Rwanda. The objective of the research was to examine knowledge of risk factors and dangerous behaviors on maternal and child nutrition among rural women in Rwanda.

Methods: We conducted a cross-sectional survey at Rango Health center/Rwanda. Interviews were conducted using a cross-ended questionnaire on 180 women attending different health services for themselves or their children at Rango health center between February 2012 and September 2012. The survey examined the knowledge for received and gained skills on maternal and child health while they were pregnant and immediately after pregnancy to monitor the life of mothers and child nutrition and alcohol consumption, prioritizing prenatal care and contraception use.

Results: Overall, 78.1% of the women interviewed received prenatal care at the Rango Health Center; 46.3% drank alcohol while pregnant, 58.6% ate only starches and vegetables while pregnant, 47.7% received education about proper nutrition practices while pregnant, 60.8% received advices on family planning and PMTCT and finally 48.3% were using contraception at the time of survey.

Conclusions: Women attending Rango health center had a high prevalence of behaviors risks for maternal health care. Maternal and child Health education should be strengthened at all levels of the health system: at the health centers by health professionals, at village level by community health workers, NGOs and associations by emphasizing on empowering women.

Key words: women,rural,child,maternal,healthcenter

PO714

VALIDATION OF CALF CIRCUMFERENCE AS A PROXY FOR BMI IN THE SHORT-FORM MINI NUTRITIONAL ASSESSMENT IN CHILEAN OLDER PEOPLE

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Background and objectives: The Mini Nutritional Assessment (MNA) is a widely used tool for assessing nutritional risk and malnutrition in older adults. A short version suitable for large population studies has been proposed in 2 versions, replacing in one of them the Body Mass Index (BMI) cut points by calf circumference when BMI is not available. Our aim is to validate the two versions of short-form of MNA (MNA-SF) in Chilean older adults.

Methods: Cross-sectional study in 1137 community-dwelling subjects (age range: 60-99 years), participating in the Alexandros study. All participants completed a survey measuring socio-demographic, health, nutritional, MNA and anthropometry. The MNA includes 18 questions covering anthropometry, global assessment, dietary parameters and subjective evaluation. MNA-SF includes 6 items and has two versions: one using BMI as anthropometric variable (MNA-SF1) and other using the calf circumference instead of BMI (MNA-SF2). Diagnostic tests were used to validate the MNA-SF score against MNA score. ROC curves (Receiver Operating Characteristic) were performed to validate calf circumference using BMI<19 as gold standard.

Results: The 31 cm cutoff for calf circumference showed high sensibility (90.9%), high specificity (80.8%) and high values for the area under the ROC curve (0.92; 95%CI: 0.84-0.99) when plotted for BMI<19. Both the MNA-SF1 and MNA-SF2 demonstrated high sensibility and specificity with respect to MNA, although overestimate malnutrition (5.2% and 6.6% vs 2.0%) and underestimate the risk of malnutrition (19.1% and

18.1% vs 20.6%). Nevertheless both forms estimate correctly the proportion of normal people (75.7% and 75.3% vs 77.4%).

Conclusions: The MNA-SF is a screening tool simple, valid and quick to apply, very useful for population based studies, which demonstrated good accuracy to identify the group of older adults without malnutrition neither risk of malnutrition.

Key words: anthropometry, Mini Nutritional Assessment (MNA), older people. Funded by Fondecyt 1080589

PO715

SODIUM CONTENT IN BABYFOODS USED ON INFANT FEEDING DURING THE FIRST YEAR OF LIFE

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Background and objectives: Eating habits are crucial determinants of health status of an individual, especially during childhood, as a nutritionally balanced diet will determine the state of health in adulthood. Excessive intake of salt is a risk factor for several diseases and the addition of salt to culinary preparations is not recommended during the first year of life. Most of the sodium comes from salt added to processed foods, part of the usual diet of children. This study aimed to estimate the concentration of sodium in babyfoods meals for babies with less than 12 months, from a major commercial brand available both in Brazil and Portugal, and to compare the results with reference values.

Methods: It was analyzed the amount of sodium present on the babyfoods' labels and it was used the values of minimum, maximum and median for the concentration of sodium and the proportion of compliance with Adequate Intakes (AI) of this nutrient. It was used the Mann-Whitney test with a significance of 5% of the sodium concentration across countries.

Results: Only in Portugal were found babyfoods meals without added salt. As for babyfoods meals with added salt, in Brazil the median of sodium concentration is higher than in Portugal (83.0 mg/100g vs 52.8 mg/100g, $p<0.001$).

Conclusions: Nowadays children often eat babyfoods meals. Though in Portugal there are already some options without added salt, the majority of babyfoods are an huge source of salt and daily sodium intake can easily exceed the reference values, both in Portugal and Brazil. This reinforces the need to ensure no addition of salt to these preparations. Awareness of industry, community and caregivers is crucial to reduce the added sodium on foods and to prevent the occurrence of diseases resulting from excessive intake of salt.

Key words: salt, sodium, babyfoods, infancy

PO716

SERUM VITAMIN CONCENTRATIONS AND DIETARY SUPPLEMENT USE AMONG PREGNANT U.S. WOMEN: DATA FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY, 2003–2006.

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Background and objectives: Contemporary data providing blood vitamin profiles of pregnant women are limited. The goal of this research was to describe the vitamin status and supplement use of adult pregnant women compared to non-pregnant women in the National Health and Nutrition Examination Survey (NHANES), 2003–2006.

Methods: Data were obtained from the NHANES, a complex, multi-stage, probability sample of the civilian, non-institutionalized U.S. population. A propensity score model was developed using logistic regression, with pregnancy status as the dependent variable and age, marital status, household income and body mass index as the independent variables. Each pregnant woman was matched by propensity score with three non-pregnant women, and serum vitamin concentrations were compared using generalized linear models. Odds ratios for vitamin insufficiency, defined using CDC cut-offs for the general population, comparing pregnant and non-pregnant women were computed using logistic regression.

Results: Dietary supplement use was significantly higher in the 576 pregnant than the 1728 non-pregnant women (80% vs 37%, respectively). Pregnant women had significantly higher mean blood concentrations of vitamins B6 (50.3 nmol/L vs 48.7 nmol/L), C (61.7 μmol/L vs 54.4 μmol/L), D (27 ng/mL vs 21 ng/mL), and folate (842.5 nmol/L vs 575.3 nmol/L), but lower concentrations of vitamin A (1.42 μmol/L vs 1.74 μmol/L), than non-pregnant women. Compared to non-Hispanic White pregnant women, pregnant women of other ethnicities had lower mean serum vitamin A, D and E concentrations and significantly increased odds of vitamin D insufficiency.

Conclusions: In this nationally representative sample, pregnant women had higher serum concentrations of several vitamins than non-pregnant women. Of public health concern are the lower vitamin concentrations and increased risk of vitamin D insufficiency in non-White women. This may be explai-

ned, at least in part, by differential dietary supplement use by ethnicity during pregnancy.

Key words: pregnancy, vitamins, dietary supplements, surveys

PO717

IMPROVING COMPLEMENTARY FEEDING PRACTICES THROUGH THE ESSENTIAL NUTRITION ACTIONS (ENA) FRAMEWORK IN SOUTHERN ETHIOPIA

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Background and objectives: The USAID funded Essential Services for Health in Ethiopia (ESHE) project had the goal to reduce under-five mortality and morbidity by implementing an integrated approach within the Ethiopian government health structures, with nutrition as one component. The population covered was about 6 million. At the start of the project, challenges included the assumption that malnutrition was due only to lack of foods.

Methods: The Essential Nutrition Actions (ENA) framework was applied to provide improved nutrition support through advocacy, capacity building, interpersonal communication, and community mobilization. Emphasis is given to the programmatic integration of these nutrition actions to be taken at key contact points in the life cycle, so that they do not operate in isolation from one another and from other child survival programs.

Results: Key inputs were advocacy, partnerships, capacity building of more than 1600 health providers and 20,000 community volunteers, and behavior change with action-oriented messages based on formative research and supported by simple tools. Changes in practices were assessed through a comparison from representative cross-sectional household surveys in 2003 (1789) and in 2006 (1200). Results show that infant and young child feeding and ENA indicators, were significantly improved when compared to baseline figures (as example, 53% of children were eating 3 or more types of foods compared to 33%). The Minimal Acceptable Diet (MAD) could only be assessed by comparing project and non-project areas, respectively 24% and 12%, with 25% consuming animal source foods compared to 8%.

Conclusions: The lessons learned included that the community component with a large number of actors and contacts is critical for success; infant and young child feeding can be improved at scale using the multiple contacts and platforms.

Key words: minimum acceptable diet, Ethiopia

PO718

FOOD INTAKE IN CUBAN CHILDREN ACCORDING TO BODY MASS INDEX

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Background and objectives: High food intake is associated to overweight. The aim of this study was to identify those associations in Cuban scholars.

Methods: The study included 51 overweight and 51 normal children, paired by age, sex, and socioeconomic status. Height and weight were measured and BMI was calculated. Nutrients and food portions intake were estimated using a semiquantitative food frequency questionnaire. Foods were aggregated into 7 groups according to Cuban Food Guide. Statistic analysis was carried out using Mann-Whitney test and Pearson correlation test.

Results: The average age was 8±1.0 years. Overweight children showed a higher energy, protein, fat and carbohydrates intake. Energy (p=0.04), carbohydrates (p=0.035), polysaccharides (p=0.003), vitamin A (p=0.0037), sodium (p=0.013), sausages (p=0.006), refined wheat flour (p=0.008), canned fruits (p=0.02) and cereals and tubers food group portions consumption was higher in overweight children. High associations were found between BMI and a high consumption of sausages (p=0.015), rice (p=0.002) and wheat flour (p=0.004).

Conclusions: Food, energy and nutrients intake was higher in overweight children; mainly based on cereals, tubers and refined wheat flour intake.

Key words: children, food intake, overweight.

PO719

MEASURING OF RESTING ENERGY EXPENDITURE IN YOUNG JAPANESE CHILDREN

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Background and objectives: The accurate assessment of resting energy expenditure is significant when estimating energy requirements. Currently there are very few reports about resting energy expenditure in young Japanese children. We designed a hood method which does not require a mask, and measured resting energy expenditure in Japanese children to collect data, as well as to develop a practical measuring method.

Methods: The subjects were five children aged from 2 to 7 years old. The subjects ate nothing after supper on the day before the experiment. In the morning, the subjects were kept at rest, lying down with a transparent plastic hood covering the head, which was connected to a portable gas monitor (AR-1, Arcosystem Inc., Japan). We also measured energy expenditure in a 1 month-old infant with this method. Energy expenditure was calculated from oxygen consumption and carbon dioxide production, which were sampled at 1 minute intervals for about 20 minutes.

Results: Our measurements taken every three months for more than 2 years revealed that the average resting energy expenditure per weight (kcal/kg/day) was 68.0 (2 year-old boy) and 46.9 (7 year-old boy). It was observed that the values decreased as the subjects age increased. The measured values tended to be higher than the reference values of basal energy expenditure in the Dietary Reference Intakes for Japanese, 2010.

Conclusions: We could confirm the developmental changes of resting energy expenditure in young children. The subjects could maintain a stable condition with little stress, and this hood method would be useful also for elderly or disabled subjects. Further measurements will reveal individual differences of children's resting energy expenditure by gender and race. This project was supported by Grants-in-Aid for Scientific Research of Japan Society for the Promotion of Science.

Key words: resting energy expenditure, young children, the hood method

PO720

METABOLIC SYNDROME PREVALENCE IN CHILEAN CHILDREN ACCORDING TO THREE DIFFERENT CRITERIA AND ITS AGREEMENT WITH INSULIN RESISTANCE

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Background and objectives: There is not a consensus in Metabolic Syndrome (MS) definition for children and adolescents, although its prevalence is increasing. The aim of the present study was to compare the prevalence of MS according to three diagnostic criteria for children and adolescents and to study the agreement with insulin resistance (IR).

Methods: Cross-sectional study (2009-2011) of 3325 students, 10-15 years old, from schools in Puente Alto County, Santiago, Chile. Anthropometry was performed, measuring blood pressure (BP) and in a fast blood sample: glicemia, insulin, blood lipids. We calculated HOMA-IR (Homeostasis Model Assessment index); values >90th percentile of a normal sub-sample were considered as IR. We compared three criteria of MS: International Diabetes Federation (IDF), Cook S. and De Ferranti S. They define different cut-offs for the five components of MS (waist circumference, triglycerides, HDL-Cholesterol, blood pressure and glicemia) having abnormal at least three of them.

Results: Prevalence of MS was 3.82% for IDF, 7.25% for Cook and 20.48% for de Ferranti criterion (Cochran Q-test, $p<0.001$). In total 859 subjects were IR (25.8%). 73.2% and 69.7% of the children diagnosed with MS according the first two criteria had IR in but only 52.7% according to the third one (Predictive Positive Values: PPV). To predict IR, each criterion had ROC-AUC of 0.60, 0.62 and 0.67 respectively (adjusted for sex and puberty). IR predicted the presence of MS according the different criteria with PPV of 10.8%, 19.6% and 41.8% and ROC-AUC for HOMA-IR was: 0.84, 0.82 and 0.76 respectively (adjusted for sex and puberty).

Conclusions: Prevalence of MS varies significantly according to different criteria. IDF and Cook´s criteria are similar predictors for IR (even the former has higher cutoffs for MS

components), better than de Ferranti´s. HOMA-IR was a good predictor of the three MS criteria.

Key words: metabolic syndrome, children, insulin resistance

PO721

EXPLORING THE ASSOCIATION BETWEEN OBESITY AND DEMENTIA.

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Background and objectives: Recent studies have shown that obesity, besides it well known association with excess of mortality and chronic diseases, increase the risk of dementia. The objective of this study is to explore the risk of dementia associated with obesity in community-living Chilean older people.

Methods: Longitudinal study based in the follow up of the participants of the youngest cohort of ALEXANDROS, designed to study disability associated with obesity in Chilean older people. In 2007/2008 home interviews including history of chronic diseases, self-reported disability/functional limitations, screening test for dementia, physical performance, anthropometry, dynamometry and blood pressure were done in 937 people free of dementia, born between 1940 and 1948. In 2010/2011 available participants were 768 (69.8% women), 22 were died and 147 were lost to follow up (15.7%). Dementia was defined with a test validated for Chile consisting in MMSE score<22 and a score >5 in the Pffefer activities questionnaire.

Results: At baseline 36.2% of the participants had IMC >30Kg/m2 (25.1% of men and 40.9% of women). The 4 y cumulative incidence of dementia was10.3% (n=79), higher in women than in men (11.9% vs 6.5%, p=0.023). Obesity at baseline was associated with the incidence of dementia 4 y later (8.3% in non obese vs 14.0% in obese, p<0.014). After logistic regression analysis the adjusted RR of having dementia was higher in the obese than in the non-obese (RR=1.71; 95%CI 1.06-2.76, p<0.028) and increased with age (RR=1.15; 95%CI 1.04-1.28; p=0.0099) but not with gender neither diabetes nor hypertension.

Conclusions: The results allow for considering obesity as an independent risk factor for dementia. Further studies are needed to clarify the mechanisms involved.

Key words: obesity, dementia, ageing Funded by Fondecyt grants 1080589 and 1130947

PO722

FACTORS ASSOCIATED WITH CONSUMPTION OF NUTRITIONAL SUPPLEMENTS FOR PRACTITIONERS OF PHYSICAL EXERCISE IN SÃO LUIS-MA

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Background and objectives: The sports nutrition seeks to establish dietary strategies capable of improving the performance and ergogênese. This study aimed to analyze the factors associated with the consumption of nutritional supplements by frequenting gyms in São Luís, Northeast of Brazil.

Methods: A convenience sample was defined by considering the number of academies operating in São Luís. The dependent variable was the use of supplements and the explanatory variables were time practicing the activity, schooling, weekly attendance at the academy, sex, age, self-perception of weight, smoking, goal of physical exercise, training duration, self-awareness training, self-perception of power. The association of variables were analyzed using Poisson regression, adopting a significance level of 0.05.

Results: The final sample consisted of 723 practitioners of exercise, of which 64.7% reported using some type of supplement. The majority of the sample consisted of men (47.4%). The age group 20 to 39 years was more frequent (74.4%). The professions with higher represented 51% and 41.1% had undergraduate, 24.1% graduate, 30% had completed high school and 2.8% primary school. The smoke was observed in 3.5% of participants. Most respondents (46.1%) were physically active for over a year. Consider your own below the ideal weight (p<0.001), smoking (p<0.001), practicing physical activity 7-12 months (p=0.028) or for more than 1 year (p<0.001), practice activity physics for more than two hours (p=0.053) and consider your own training moderate (p=0.024) were associated with intense or consumption of supplements.

Conclusions: The socioeconomic, demographic and own power do not interfere in the decision regarding the consumption of supplements that are strongly associated with the characteristics of the training and dissatisfaction with body weight.

Key words: nutritional supplement, physical exercise, Poisson regression

PO723

A SYSTEMATIC REVIEW AND META-ANALYSIS OF DIETARY INTERVENTION DURING PREGNANCY ON MATERNAL HYPERTENSIVE DISORDERS AND PRETERM DELIVERY

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Background and objectives: Healthy eating behaviours during pregnancy have been associated with a reduction in complications for the mother and child. Hypertensive disorders are a major cause of maternal and perinatal mortality worldwide; whilst preterm delivery is the leading cause of neonatal death. The objective of this study was to systematically review the literature to determine whether dietary intervention during pregnancy effects maternal hypertensive disorders or preterm delivery.

Methods: Ten electronic databases were searched. Two independent reviewers assessed each article to determine eligibility. Studies of whole diet or dietary components that assessed either maternal hypertensive disorders or preterm delivery were included. Methodological quality was assessed and data were extracted, with results of eligible trials pooled. Meta-analysis was conducted separately for each outcome using a fixed effects model.

Results: Nineteen randomized controlled trials involving 5,947 participants were included in the review. Seventeen were of good methodological quality and two were of acceptable quality. Dietary interventions included individualised dietary counseling (n=11/19), food and fortified food products to complement diet (n=7/19) or a combination of both (n=1/19). Most trials (n=17/19) were conducted in high income countries. Meta-analysis showed no evidence of heterogeneity between trials or dietary interventions, and no evidence of bias for the hypertensive and preterm delivery outcomes. Meta-analysed data demonstrated no significant differences between women who received dietary intervention during pregnancy versus controls for maternal hypertensive disorders (Odds ratio 0.807, 95% confidence interval -0.597 to 1.09), however there was evidence of a decrease in the odds of preterm delivery for those who received dietary intervention (0.807, 0.651 to 1; p=0.05).

Conclusions: Dietary intervention decreases the odds of preterm delivery, but does not reduce maternal hypertensive disorders.

Key words: diet, gestation, hypertension, meta-analysis, randomized controlled trial

PO724

PRELACTEAL FEEDING PRACTICES IN VIETNAM: PROBLEMS AND DETERMINANT FACTORS

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Background and objectives: Despite the importance of early and exclusive breastfeeding, prelacteal feeds continue to pose a barrier in several countries, including Vietnam. This study examined determinants of prelacteal feeding among Vietnamese mothers.

Methods: Data from 6068 mother-child (<6m) dyads were obtained from a cross-sectional survey conducted in 11 provinces in Vietnam in 2011. Multivariate logistic regression analyses were used to examine factors associated with prelacteal feeding.

Results: Three-quarters of infants (73.3%) were fed prelacteals in the first three days after birth. Of all mothers interviewed, 53.5% received formula milk and 44.1% water. The odds of feeding prelacteals declined with increases in breastfeeding knowledge, beliefs that social norms favor exclusive breastfeeding and confidence in the ability to control one's own breastfeeding behaviors. Women who harbored breastfeeding misconceptions had twice the odds of feeding any prelacteals (95% CI: 1.74–2.50). Health care factors increasing the odds of prelacteal feeding included delivery by caesarean section (OR:2.94, 95% CI:2.39–3.61) or episiotomy (OR:1.36, 95% CI:1.17–1.58) and experiencing breastfeeding problems (OR:1.31, 95% CI:1.04–1.66). Health staff support during pregnancy and after birth reduced the odds of feeding formula. However, family support after delivery increased the odds of feeding water to newborns. While the odds of feeding water was inversely related to mothers' education, the odds of feeding formula increased with education, household socioeconomic status and urban residence.

Conclusions: Feeding infants prelacteals is influenced by multiple factors. Significant reduction can be achieved by improving knowledge and confidence of mothers through appropriate counseling during pregnancy and ensuring tailored support by health care providers after birth, particularly in the case of C-sections. Ensuring that health facilities integrate these practices into routine ante-natal care and post-delivery management is critical.

Key words: prelacteal feeding, breastfeeding, behavioral determinants, Vietnam.

PO725

THE RELATIONSHIP BETWEEN MATERNAL PRECONCEPTIONAL ANTHROPOMETRIC MEASUREMENTS AND INFANT BIRTH WEIGHT IN VIETNAM

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Background and objectives: The importance of a woman's preconceptual nutrition on infant and maternal outcomes is gaining recognition. However, major gaps remain and existing data on the impact of poor preconceptual nutrition status have methodological limitations related to data quality and study design. The objective of this study was to assess the relationship of maternal anthropometric measures obtained prior to conception with offspring birth weight.

Methods: We used data from an ongoing study (PRECONCEPT) in which women of reproductive age are being followed up prospectively for pregnancy outcomes in Thai Nguyen province, Vietnam. Anthropometric measurements (weight, height, mid-upper-arm circumference-MUAC, calf circumference, triceps and subscapular skinfold thickness) were obtained prior to conception and body mass index (BMI), mid upper arm muscle (MUMA) and fat area (MUFA) were calculated. The associations of maternal anthropometric measures with infant birth weight (n=354) were examined using multivariate regression modeling that adjusted for potential confounders (gender, gestational age, maternal age, education, socioeconomic status and household food security).

Results: Infant birth weight was positively associated with maternal preconceptional weight (beta = 11.6, p=0.003), height (beta = 13.0, p=0.002), MUAC (beta = 20.7.0, p=0.03), and MUMA (beta = 12.1, p=0.004). However, no significant associations were found for infant birth weight and BMI, calf circumference, triceps and subscapular skinfold thickness and MUFA. In addition, maternal weight gain during pregnancy predicted newborn weight (1 kg weight gain during pregnancy predicted a 22.8 g increase in newborn weight, P<0.001).

Conclusions: Maternal nutrition before pregnancy is an important modifiable risk factor that should be addressed in current efforts to improve birth outcomes.

Key words: anthropometry, birth weight, preconception, Vietnam

PO726

SELENIUM INTAKE AND STATUS OF SUBJECTS LIVING IN WELFARE FACILITY FOR THE ELDERLY

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Background and objectives: It is recognized that the nutritional status of the elderly is often poor due to their low intake of nutrients. This study was performed to evaluate the present nutritional status, that is, the daily intake of key nutrients including selenium and the serum selenium levels in nine elderly residents (aged >80 years) of a welfare facility.

Methods: Duplicate samples of diets and between meals snacks taken at the facility were collected over a 3-day period. There were no restrictions placed on the daily activities of the subjects in the facility. The energy and nutrient intakes were calculated based on standard tables of food composition in Japan. The selenium levels in both serum and diets were assessed by chemical analysis.

Results: In many subjects, intakes of calcium, magnesium, vitamin A, vitamin C and dietary fiber were lower than the RDAs for Japanese. Home residents who tend to eat less should improve their intake of some nutrients. The mean dietary selenium intake was 51 μg/day, which is higher than the RDA for Japanese. Moreover, the selenium intakes expressed in terms of 1,000 kcal energy intake and per kg body weight were also higher than the RDA for Japanese.

Conclusions: the mean levels of serum selenium were 76 ƒÊg/L, lower than the literature values for Japanese.

Key words: selenium, elderly, intake

PO727

IMPACT OF PRE-PREGNANCY PARENTAL OVERWEIGHT AND OBESITY ON OFFSPRING OBESITY: SYSTEMATIC ANALYSIS AND META ANALYSIS

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Background and objectives: The objectives of this study are to determine the prospective association of pre-pregnancy parental overweight and obesity with offspring obesity in short and long-term and also to examine whether maternal-offspring link of overweight and obesity is stronger than the paternal-offspring link.

Methods: A comprehensive literature search on online databases (PubMed, EMBASE, CINAHL, Web of Science, BioSis

and Google Scholar) was conducted. All longitudinal studies reporting on pre-pregnancy parental, paternal and/or maternal BMI and its categories with offspring obesity (infant, child, adolescent and adult) were systematically reviewed. Adult overweight and obesity were defined by using body mass index (weight (kg)/height (m)2) cut-off-points of 25 and 30, respectively; childhood overweight and obesity were defined based on the international standard cut-off of body mass index. Adjusted odds ratios (ORs) from selected studies were extracted, calculated, and a quality adjusted meta-analyses was performed.

Results: A total of 19 articles (n=70,662) were systematically reviewed from a database of 3366 independent articles. All of the articles reported significantly positive association between pre-pregnancy maternal BMI and offspring obesity and one articles found no significant association between pre-pregnancy paternal BMI and offspring obesity. A total of seven publications were performed subgroup meta-analysis. Overall, mother and father who were overweight have a similar risk of having an overweight child (mother-offspring OR 2.42, 95%CI: 1.69, 3.44 and father-offspring OR 2.39, 95%CI: 1.88, 3.05). The odds of having obese children are higher for pre-pregnancy overweight mothers (OR 3.94, 95%CI: 3.15, 4.94) compared to pre-pregnancy overweight fathers (OR 2.56, 95%CI: 2.06, 3.18). The odds of being obese among older offspring are nearly twice than younger offspring. Our meta-analysis showed that pre-pregnancy parental BMI associated with offspring obesity in short and long term.

Conclusions: Findings of this study support the notion of implementing obesity intervention for offspring before their birth.

Key words: pre-pregnancy, BMI, offspring, obesity

PO728

CHILD FEEDING PRACTICES AMONG CAREGIVERS OF CHILDREN AGED 12-23 MONTHS OLD IN URBAN SETTING CENTRAL JAKARTA

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Background and objectives: Undernutrition among young children remains a problem in many countries, mostly happen and fairly concentrated in developing countries. Optimal feeding becomes one of ways to overcome long-term consequences of undernutrition. Most of the previous studies were conducted in rural setting. In the other side, complexity in the urban setting (for instance easier access to information & ready to eat food) might have different influence on the child feeding practices. To assess practice of caregiver on child feeding among children aged 12-23 months old and the associated factors of child feeding.

Methods: This survey was a cross sectional study, simple random sampling was performed to select respondents. Total sample of this study was 83 children aged 12-23 months old in Paseban Village, Senen Sub-district, Central Jakarta. The data was collected via interview, in-depth interview, anthropometric measurement and hemoglobin measurement of children.

Results: Based on WAZ and WHZ, more than 80% children were categorized as well-nourished children. The prevalence of underweight, wasting, and stunting was 18.1%, 13.2%, and 21.7% respectively. The prevalence of anemic children was 62.6% considered as very high public health problem. In this study, 11.98% and 10.3% children have inadequate protein and energy intake respectively. Based on feeding practices, there were more than 50% children who were still breastfeed; 73.5% of caregivers gave solid food to the child, more than half of children have meal >3 times a day; and 42.8% of children have at least 2 times snack a day. There was a significant association between energy and protein inadequacy with anemia prevalence; and a significant association between protein inadequacy with underweight.

Conclusions: The more adequate energy and protein, the better child nutritional status.

Key words: child feeding, urban setting, child nutritional status, undernutrition.

PO729

DOES THE PROVISION OF NORDIC SCHOOL MEALS INFLUENCE GROWTH AND BODY COMPOSITION OF 8-11 YEAR OLD CHILDREN?

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Background and objectives: A large proportion of Danish children are overweight or obese. The provision of healthy school meals may have a positive impact on children's growth and body composition. The aim of the present study was to examine whether provision of school meals served ad libitum influenced changes in height, body weight, BMI and measures of body composition among 8-11 year old children in the 'Optimal well-being, development and health for Danish children through a healthy NND (New Nordic Diet)' (OPUS) School Meal Study, supported by a grant from the Nordea Foundation.

Methods: The study was a cluster-randomized, controlled cross-over study. Each child participated in two three month periods: an intervention period (NND) and a control period.

Six-hundred-and-forty-five children with data from baseline and at least one post-intervention measurement were included. Linear mixed models with adjustment for age, gender-specific pubertal status, household educational level, order of diets and relevant random effects (school, class and individual) were used.

Results: NND increased fat percentage (0.136% points, p=0.045), android fat mass (FM)/total FM (0.0006, p=0.007) and android FM/gynoid FM (0.0024, p=0.049) compared to control across all three BMI categories (underweight, normal weight and overweight/obese). After additional adjustment for changes in physical activity and sleep, body weight (0.47 kg, p=0.009) and BMI (0.199 kg/m2, p=0.018) were also increased by NND in the overweight children, while the effect on fat percentage across all BMI categories disappeared. No differences were seen for height, fat mass index, fat free mass index and gynoid FM/total FM.

Conclusions: The NND school meals in this setting seemed to induce a less favourable body composition. Further investigations are needed to explain these unexpected findings, as the changes in dietary intake during the intervention were regarded as healthy.

Key words: New Nordic Diet, school intervention, child nutrition, obesity, body composition

PO730

COMPLEMENTARY FEEDING PRACTICES AMONG INFANTS AGED 9 – 11 MONTHS OLD IN URBAN SETTING JAKARTA

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Background and objectives: Prevalence of undernutrition among children aged 6-11 months in Indonesia were 17.1% underweight, 15.6% were wasting, while 31.4% were stunting. DKI Jakarta, the most populated province in Indonesia, has prevalence of underweight (11.3%), wasting (11.3%) and stunting (26.6%) among under-five children. Underlying cause of the malnutrition besides the infectious diseases is inappropriate caring practice and sub optimum feeding becomes one of ways to overcome long-term consequences of undernutrition. The aim of the present study was to assess complementary feeding practice among infants aged 9–11 months old in Central Jakarta.

Methods: In this cross sectional study, 66 children aged 9-11 months old and their caregivers were recruited. The data was collected via interview, in-depth interview, anthropometric and hemoglobin measurement.

Results: Nutritional status of infants age 9-11 months old were categorized in medium public health concern for underweight (18%), low public health concern for stunting (10%) and medium public health concern for wasting (6%), however this area had severe public health problem for anemia (82%). More than 50% infants are still continue receiving breastfeeding, 90% of infants have good energy intake, however, 11% at risk of calcium inadequacy, 47% at risk of iron inadequacy and 62% of them also at the risk of zinc inadequacy, 74% have semi solid food, 70% infants have appropriate meal and snack frequencies, and 74% infants have enough food diversity in their meal.

Conclusions: Child feeding practice of infants aged 9–11 months old in this area were not optimal related to low variety of food type, which characterized in cereal based meal.

Key words: feeding practice, infants aged 9-11 months old, urban setting

PO731

ANALYSIS OF FEEDING BEHAVIOR OF CHILDREN UNDER 2 YEARS OLD IN POVERTY AREAS OF CHINA IN 2009

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Background and objectives: Infants and young children require adequate nutrition during rapid growth and development. The study objective is to analysis the feeding situation of feeding behavior among children under 2 years old in the poverty areas of China in 2009.The result will provide scientific reference for developing strategies to improve child feeding and health.

Methods: Through stratified cluster random sampling, 2972 children under 2 years old and their parents were selected from 30 poor counties (cities) of 13 provinces (autonomous regions and municipalities) in China. The parents were interviewed by using questionnaire survey.

Results: The breastfeeding rate of the surveyed children within 6 months of birth was 47.1%, the mixed feeding rate was 44.4%, and the artificial feeding rate was 8.5%. The average time to initiation of breastfeeding was 26.9 hours, the rate of timely initiation of breastfeeding was only 8.3%, and the rate of colostrums feeding was 93.3%. The rate of weaning within 6 months old was 20.8%. The average time to add supplementary food was 4 months old, and the rate of adding supplementary food for infants within 5 months old was 50.8%. The proportion of infants and young children under 2 years old fed with formula milk powder, cereals, meat, eggs, vegetables, fruits, le-

gumes and their products stood at 27.7%, 84.8%, 61.5%, 68.1%, 61.8%, 67.3% and 46.5%, respectively.

Conclusions: The feeding practice for children under 2 years old in poor areas of China remained problematic, for example, low breastfeeding rate, early weaning, premature complementary feeding and poor complementary feeding, etc. We should strengthen feeding knowledge of parents of infants and young children through health education, improve the breastfeeding rate, continue breast-feeding in an appropriate manner, and add various types of supplementary food scientifically and timely.

Key words: poverty; feeding patterns; infants and young children; complementary feeding

PO732

THE EFFECTS ON CHILDREN'S GROWTH, HEMOGLOBIN CONCENTRATION, AND ANEMIA IN 3 NUTRITION INTERVENTIONS IN POOR RURAL, CHINA

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Background and objectives: In developing settings, the incidence of malnutrition rises among these young children and deficits acquired at this age are difficult to compensate for in later life. This suggests a "critical window" for prevention of growth faltering. The present study investigated the effects of three nutritional intervention approaches to improve the nutritional status of children less than 2 years in Guangxi, a poor rural area in China. These approaches consisted of nutrition education (EDUC), nutrients supplementation (SUP) and a combination of education and supplementation (COM), and were hypothesized to be effective in increasing physical growth, hemoglobin concentration, and avoiding anemia as compared to a control condition without any intervention.

Methods: The study is a stratified and cluster random program and 4 counties were randomly assigned to a control group (n=158) or one of the three intervention conditions: EDUC (n=172), SUP (n=149), or COM (n=155). The selected children received a medical examination (anthropometry, hemoglobin test) and their caregivers completed questionnaires. The average follow up time is 6 months; dropout rates varied between 17% and 37%.

Results: As compared to the control group, hemoglobin concentration was increased and the prevalence of anemia was decreased in the SUP and COM group ($p<0.05$). In addition, the COM group showed an increased weight for age Z score (WAZ) and weight for height Z score (WHZ) ($p<0.05$).

Conclusions: Both SUP alone and the COM approaches were effective approaches because of their positive effects on hemoglobin and prevention of anemia in a short duration. The COM approach had also beneficial effects on growth indicators.

Key words: growth; children; nutritional Interventions; anemia

PO733

MATERNAL ZINC STATUS IS ASSOCIATED WITH BREAST MILK ZINC CONCENTRATION AND ZINC STATUS OF 4-6 MONTH OLD INFANTS

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Background and objectives: Breast milk provides adequate nutrients during the first 6 months of life. However, there were some reports of zinc (Zn) deficiency in breastfed infants. This study was conducted to determine the prevalence of Zn deficiency (ZD) in infants aged 4-6 months and factors associated with ZD in those infants.

Methods: Healthy infants aged 4 - 6 months and their mothers were enrolled in this study. Exclusion criteria were prematurity, illness, and receiving vitamin and/or mineral supplementation. Subjects were divided into 3 groups: breastfed, formula-fed, and mixed groups. Data collection included demographic data, perinatal data, given diets, and anthropometric measurement (weight and length). Data from mothers of breastfed infants included weight, height, and dietary intake

using a 24-hour dietary recall. Blood of infants and lactating mothers were collected to assess plasma Zn concentration. Breast milk was collected to analyze Zn concentration.

Results: From 176 infants and mothers, the prevalence of ZD (defined as plasma Zn concentration less than 10.7 mmol/L) was higher in the breastfed group (14.9%) than that in the formula-fed group (5.3%) and the mixed group (2.9%). Among breastfed infants, those with ZD had significantly low maternal Zn concentration compared to those without ZD. There was a higher proportion of maternal ZD in infants with ZD than that in those without ZD (67% vs 18%, p=0.027). There was a positive correlation between plasma Zn concentrations in infants and breast milk (R=0.62, p=0.01) and between plasma Zn concentrations in lactating mothers and their breast milk (R=0.56, p=0.016).

Conclusions: The results of this study suggests that breastfed infants aged 4-6 months may have a risk for ZD with regard to maternal Zn status and Zn concentration in breast milk.

Acknowledgement: Development potential of Thai people project.

Key words: zinc, breastfeeding, infant, zinc concentration in breast milk

PO734

NUTRITIONAL STATUS OF CHILDREN AND THEIR MOTHERS, AND ITS DETERMINANTS IN URBAN CAPITAL AND RURAL HIGHLAND IN PAPUA NEW GUINEA

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Background and objectives: In Papua New Guinea (PNG), under-five mortality rate still remains high (75 per 1,000 live birth), and infectious diseases (e.g. malaria, ARI, diarrhea) contribute to 38% of deaths among under-five children. The situation is especially serious in rural highland, where access to health service is extremely limited and food insecurity consistently exists. On the other hand, obesity has also been increasingly significant problem in urban area, leading to double burden of malnutrition. Under this circumstance, this study was undertaken with the aim to assess nutritional status of children and their mothers in the urban capital (Port Moresby (POM)) and rural highland (Nuku district, Sandaun Province (NUKU)), as well as to investigate the association with the possible determinants.

Methods: Fieldwork was carried out in October 2010 in POM and in September 2011 in NUKU. In total 211 pairs (89 in POM and 122 in NUKU) of children aged 6-59 months and their mothers were measured for anthropometry following the standard method. Data on household characteristic, dietary intake, infant feeding practice, child's disease history and mother's lifestyle habit were obtained by interviews with mothers.

Results: Prevalence of stunting and underweight was higher in NUKU than POM ($p<0.05$). Whilst food insecurity was apparently more serious in NUKU, a great economic disparity might have affected the living environment in POM, leading to severe undernutition and high morbidity. Distribution of mothers' BMI was quite different between two sites, with higher proportion of overweight and obesity in POM (47.6%) and underweight in NUKU (20.8%). Characteristics of infant feeding practice were quite different between two study sites, which could have possibly affected the nutritional status of children.

Conclusions: Area-specific approach should be enhanced, considering differential regional characteristics affecting the nutritional status of children and mothers in PNG.

Key words: PNG, food security, double burden of malnutrition

PO735

FACTORS ASSOCIATED WITH BREASTFEEDING PRACTICES AMONG MOTHERS IN CENTRAL COAST OF VIETNAM

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Background and objectives: Promoting breastfeeding is a priority public health nutrition issue in Vietnam. Although breastfeeding has been well-studied, there is limited information on breastfeeding practices and their determinants among mothers living in Vietnam, especially at sub-national level. Exclusive breastfeeding rates, when mothers feed their infants breastmilk only in the first six months, was previously reported to be 0% in the Central Coast region of Vietnam. This study investigated the determinants influencing the practices of breastfeeding initiation and of exclusive breastfeeding among mothers living in this area.

Methods: A cross-sectional survey was conducted in two provinces in the Central Coast region of Vietnam (Quang Nam and Khanh Hoa). Interviews using a structured questionnaire involved 234 mothers having children aged less than 36 months. The questionnaire explored mothers' demographic, socio-environmental, pregnancy and maternal characteristics and breastfeeding practices. Descriptive analyses, logistic regression and survival analyses were applied to determine factors associated with the breastfeeding practices.

Results: Forty-five percent of women initiated breastfeeding within an hour after birth. Exclusive breastfeeding among infants aged six months or less was 2%. Median duration of breastfeeding was 18 months. Risks factors of not initiating breastfeeding included: having a Caesarean section, and having low birthweight infant (<2500 g). Interestingly, having support from the family was also negatively associated with breastfeeding initiation. Other fluids or food were commonly introduced to the child before he or she reached six months of age, with water being the most frequent fluid introduced (90.5%).

Conclusions: Our findings confirm the low rates of initiation and exclusive breastfeeding in the Central Coast region of Vietnam. Efforts to promote breastfeeding should consider factors such as increased rate of Caesarean sections in Viet Nam related to socio-economic changes, and the supporting roles of the mothers' relatives.

Key words: breastfeeding, determinants, Vietnam.

PO736

CLINICALLY FEASIBLE APPROACH TO EVALUATE THE QUALITY OF DIETARY CARBOHYDRATES IN SMALL CHILDREN

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Background and objectives: The quality of the carbohydrates and especially the amount of sucrose and fibre has been shown to reflect a health promoting diet. In this study, a set of simple dietary questions was developed and validated to describe the quality of carbohydrates in diet of small children, focusing on the total intake of sucrose and fibre.

Methods: Questionnaire (10 questions) regarding the intake of foods that are known to be the key sources of sucrose and dietary fibre was formulated and evaluated against seven-day food records. Finnish children (n=400) aged between 2 to 6 years completed the study. Key questions best reflecting the quality of the carbohydrates, i.e. low sucrose and high fiber intake, were identified by correlation and ROC analysis in comparison to calculated nutrient intakes from food records.

Results: Based on ROC analysis, 4 questions were identified to best describe the recommended intake of sucrose and fibre and able to differentiate children in 3 groups consuming different levels (high, moderate and low) of these nutrient (ROC-values ranging between: sensitivity 0.55-0.71 and specificity 0.31-0.48). The questions related to the frequency of consumption of 1) sugar-containing yoghurts and juices, 2) fruit, vegetables and berries, and 3) porridge and gruel. Questions related to the use of e.g. bread or candies did not differentiate between the high and low consumers.

Conclusion: These simple questions identified could provide a feasible method to obtain information about small children's dietary quality and could be used as a tool in clinical practice without the need of complicated calculations or laborious food records.

Key words: sucrose, dietary fibre, Intake, questionnaire

PO737

THE SCHOOL FOOD ENVIRONMENT IN ULAANBAATAR, MONGOLIA

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Background and objectives: WHO School Policy Framework suggests taking measures to create a supportive environment in the area around schools, by limiting the availability of unhealthy foods and drinks in these vicinities. The aim of this study was to identify the foods sold and promoted in schools.

Methods: Thirty public and private schools from six districts in Ulaanbaatar were randomly selected for the survey. Information on food and drinks sold and promoted within schools was collected, including in canteens or shops inside schools. Data were collected by trained observers using a purpose-designed tool in May 2012. Food and drinks were classified as core/healthy or non-core/unhealthy. Descriptive analyses were conducted to determine the types of food and drinks sold and promoted within schools.

Results: Of all individual products that were sold within schools, 33% were core food and 67% were non-core. The most frequently available product types included non-core snacks (34%), followed by core meals and non-core drinks. Together, core drinks and snacks compromised only 12% of all products. The most frequently available foods and drinks in schools were chocolate, candies, ice cream, fruit juice, sweetened coffee, tea powders and soft drinks.

Conclusions: Children in Ulaanbaatar are exposed to a wide range of unhealthy food and drinks in the school environment and healthier food and drink choices are very limited in these settings. The high availability of different varieties of unhealthy food and drinks is likely to make these products attractive choices for children. There is a need to introduce policies to guide the availability and promotion of foods within schools; including limiting the availability of unhealthy foods and drinks and promoting healthier food choices. Acknowledgement: This work was supported by the Western Pacific Regional Office of the World Health Organization.

Key words: public health, health promotion, school canteens, food environments.

PO738

CHILDREN'S STRESS INFLUENCES THEIR DIET AND EATING BEHAVIOUR.

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Background and objectives: Psychological stress has been suggested to change dietary pattern towards more unhealthy choices and as such to contribute to overweight. Research on this topic in children is pivotal as the foundations of dietary habits are established starting from childhood and may track into adulthood. Therefore, we aim to study the longitudinal relation between stress and diet (both consumption frequency and psychological driven eating behaviour).

Methods: In about 300 Belgian children (5-12 y) of the ChiBS study, the longitudinal relation between stress and lifestyle was examined over two years. Stress was examined by questionnaires concerning negative life events (Coddington life events), problem behaviour (strengths and difficulties questionnaire) and emotions (happiness, anger, anxiety, sadness). Food consumption (sweet food, fatty food, snacks and fruit and vegetables) and eating behaviour (emotional, external and restrained eating) were measured. Cross-lagged analyses with Mplus were used to examine bidirectional relations with a total stress score and with separate stress aspects corrected for age, sex, parental education and BMI.

Results: Children with a high overall stress score reported more external eating longitudinally. Concerning the separate stress aspects, positive longitudinal associations were found with sweet food consumption, emotional eating, external eating and restrained eating. Some relations were sex dependent: a stress (problem behaviour) effect on restrained eating and sweet food consumption only in boys and a stress (emotions and events) effect with more emotional and external eating only in girls. Moreover, reversed causation was found only in girls: negative emotions could longitudinally be predicted by more restrained eating.

Conclusions: Children's stress deteriorates their dietary behaviour with increased sweet food consumption, external, emotional and restrained eating. Moreover, reacting on stress with increased restrained eating could create a viscous circle since restrained eating also favours stress.

Key words: stress, diet, emotional eating, external eating, restrained eating

PO739

GLUTEN INTAKE IN 4- TO 19-YEAR-OLD DANISH CHILDREN AND ADOLESCENTS BASED ON A NATIONAL SURVEY

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Background and objectives: Coeliac disease (CD) affects around 1% of the Western population. Variation in gluten intake may be an independent risk factor in the CD pathogenesis, and information regarding gluten intake in the general population is scarce.

Methods: We determined the intake of gluten from wheat, barley, rye as well as oats in a cross-sectional Danish National Survey of Dietary Habits and Physical Activity 2005-2008. The study population comprised a representative sample of 537 4-19-year-old children and adolescents, recruited from the National Danish Civil Registry. The protein contents from wheat, rye, barley and oats were ascertained in the National Danish Food Composition Tables, and multiplied with amounts in recipes. The amounts of gluten were calculated as the amount of cereal protein x0.80 for wheat and oats, x0.65 for rye, and x0.50 for barley. Dietary intake was recorded every day for seven consecutive days in pre-coded food records supplemented with open-answer possibilities.

Results: Total gluten intake increased with age from 4-14 y from 8,783 mg/d to 11.,184mg/d (p<0.001), and then stabilized (10.756 mg/d, p=0.99) in the oldest age group (15-19 y). Gluten from wheat contributed most to the gluten intake (69%), then rye (18%), oats (13%) and barley (0.12%) from 4-14 y. However, intake of gluten from rye decreased throughout childhood and adolescence from 2.042 mg/d to 1.645 mg/d (p=0.002), and among the oldest adolescents, the intake of gluten from oats (16%) exceeded that of rye (14%). Boys had higher intakes of all gluten types (p<0.001), except barley (P=0.270).

Conclusion: This study presents representative population-based data on gluten intake in Danish children and adolescents.

Acknowledgements: This study was supported by the Danish Strategic Research Council (project no. 09-06-5149), and Danish National Survey of Dietary Habits and Physical Activity was financed by the Ministry of Food, Agriculture and Fisheries.

Key words: gluten, celiac disease, Diet, children, adolescents

PO740

SCHOOL MEALS BASED ON THE NEW NORDIC DIET IMPROVE CARDIOVASCULAR RISK MARKERS IN DANISH 8-11-YEAR-OLD CHILDREN-THE OPUS STUDY

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Background and objectives: Good eating practices during childhood may help prevent cardiovascular diseases. Increasing numbers of children and adolescents are diagnosed with the metabolic syndrome, which is a cluster of risk factors for cardiovascular disease and mortality. The New Nordic Diet (NND) is rich in health-promoting foods such as fish, whole grain, fruits, vegetables and nuts. The Optimal well-being, development and health for Danish children through a healthy New Nordic Diet (OPUS) study was supported by a grant from the Nordea Foundation. The aim of the present study was to investigate the effect of school meals based on the NND on early cardiovascular risk markers in 677 mainly normal-weight Danish 8-11-year-old children.

Methods: The OPUS School Meal Study was a cluster-randomized controlled cross-over study. Children from 3rd and 4th grade at 9 Danish schools received school meals based on the NND and their usual packed lunch (control) for 3 months each. At baseline and at the end of each period (month 3 and 6), we performed a background interview, measured anthropometry, blood pressure, heart rate, and physical activity and took a fasting blood sample, which was analyzed for serum insulin and plasma glucose, cholesterols, and triacylglycerol. The statistical analysis was performed by linear mixed models.

Results: NND reduced heart rate 0.8 (95%CI 0.2;1.5) beats/min, insulin 2.9 (1.3;4.5) pmol/L, homeostatic model assessment-insulin resistance 0.09 (0.04;0.15), and triacylglycerol 0.02 (0.01;0.04) mmol/L, as compared to control (all p<0.05). However, NND evoked a 0.5 (0.3;0.6) cm increase in waist circumference (p<0.001). Total and LDL cholesterol were reduced in boys only (p<0.01). Adjustment for physical activity did not change the overall results.

Conclusions: School meals based on Nordic foods improved early cardiovascular risk markers in 8-11-year-old children, despite an increase in waist circumference. The impact of weight status and gender warrants further investigation.

Key words: insulin; syndrome X; cardiovascular risk.

PO741

EFFECTS OF DOCOSAHEXAENOIC ACID SUPPLEMENTATION DURING PREGNANCY IN MATERNAL AND FETAL BRAIN COMPOSITION

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Background and objectives: Epidemiological studies have shown the importance of prenatal docosahexaenoic acid (DHA) intake to improve visual and cognitive development of infants. Besides, low maternal DHA status has been associated with higher risk of postpartum depressive symptoms in the mothers. The aim of this study was to investigate brain plasticity to dietary DHA incorporation during pregnancy in both fetus and mothers.

Methods: Two groups of ten pregnant rats were fed during gestation with two experimental diets differing in their DHA content (2.5% DHA of total fat vs 9% DHA). On day 20 of gestation the animals were sacrificed. We determined fatty acids in placenta, maternal plasma as well as in liver, adipose tissue and brain of both mother and fetus. Fatty acids were extracted according to Folch et al. (1957) and quantified by gas chromatography.

Results: Pregnant rats fed the 9% DHA diet had significantly higher DHA percentage in maternal plasma than those fed the 2.5% DHA diet (22.75±0.92% DHA vs 10.96±0.40%

DHA, p<0.001); similar results were found in maternal liver, maternal adipose tissue, placenta and total fetus. Fetal brain also reached significantly higher DHA content with the 9% DHA diet with respect to those of 2.5% DHA (17.52±0.41% DHA vs 12.41±0.88% DHA, p<0.001). Nevertheless, the DHA composition in brain of pregnant rats did not show any variation between both experimental groups (20.08±0.24% DHA vs 20.06±0.17% DHA, p=0.957).

Conclusions: The consumption of DHA supplements during pregnancy enhances DHA incorporation in fetal brain, but it is not suitable to improve DHA content in the adult brain of the mother that is strongly regulated.

Key words: docosahexaenoic acid, brain, pregnancy, postpartum depression.

Acknowledgements: this work was supported by a Séneca Foundation grant, Murcia, Spain.

PO742

INFLUENCE OF MODERATE-VIGOROUS PHYSICAL ACTIVITY AND EXTRA VIRGIN OLIVE OIL IN CHILDREN CATALASE ACTIVITY

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Background and objectives: Physical activity and Mediterranean diet have been widely accepted as the best strategies to prevent children obesity and chronic diseases. The aim was to study the effects of physical activity and extra virgin olive oil (EVOO) intake in children catalase activity.

Methods: Forty four healthy children, aged 11-12 years, were randomly divided into three groups: (i) Control group (CTL) continued with their dietary and physical activity habits (n=15); (ii) Physical activity group (PA) continued with their dietary habits and practiced moderate-vigorous physical activity 2 days/week (n=15); (iii) Olive oil group (OO) continued with their dietary habits and physical activity habits but consumed a selected EVOO during the last 4 weeks (n=14). The whole study lasted 6 months. Phenolic EVOO composition was analyzed by HPLC-DAD-MS. Activity of erythrocyte catalase (CAT) was measured at baseline and at the end of the intervention period. All data were analyzed by the SPSS 20.0 statistical package (SPSS, Inc.) by one-way ANOVA followed by Bonferroni post-hoc test.

Results: CAT activity significantly increased in OO group versus CTL (p<0.01) and PA (p<0.05) groups after the intervention. CAT activity was significantly higher (p<0.05) in PA group after the intervention, when compared with CTL and OO groups at the beginning. After the interventions, CAT activity resulted to be significantly higher in OO group than in PA and OO groups at the beginning (p<0.01). Studies have proposed that intense physical exercise increases oxidative stress, usually related to reduced levels of catalase. However, polyphenols from EVOO could counteract this effect.

Conclusions: Our results show that a long term moderate-vigorous physical activity and the consumption of EVOO with suitable composition of polyphenols promote antioxidant catalase activity in healthy children.

Key words: extra virgin olive oil; physical activity; catalase enzyme; children; healthy

PO743

SNACKING HABITS AMONG MENOPAUSAL WOMEN

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Background and objectives: Healthy snacking may help menopausal women meet nutrient requirements and manage their body weight. This cross-sectional study was to assess the snacking habits and perceptions of menopausal women of snacking on their body weight.

Methods: This study was conducted in 3 different Christian denominations, in Accra, among 200 menopausal women aged between 45 and 70 who volunteered to participate. Anthropometric measurements were performed by standard procedure and converted to body mass index (BMI), waist to hip ratio (WHR) and Low or High waist circumference indices (LWC or HWC). Snacking habits and perceptions were determined using structured questionnaire and compared with the anthropometric indices. Logistic regression was used to predict snacking on the occurrence of obesity.

Results: About 80.7% perceived all snacks are harmful to health (p=0.02) and type of fat consumed affects waist circumference (WC). Obesity risk increased as the frequency of snacking exceeded three times in a day (p=0.04). Most of the women snacked 3-4 times daily and fruit snacking does influence BMI (p=0.05) and WC (p= 0.02). Those who consumed snack after supper were more obese (p=0.04). There was a decreased risk in WC among women who consumed fruit as snack (OR:0.14; CI:0.01-2.41). The risk of obesity was reduced

among those who consumed mixed vegetables daily (OR:1.39; CI:023-8.54). Conclusion Snacks are perceived to be bad for health outcomes. Type of snack and the frequency of consumption does predicts obesity and high waist circumference. Fruit based snacks does reduce the chance of obesity development.

Key words: menopausal women, snacking, Low waist circumference, high waist circumference

PO744

THE EFFECT OF NORDIC SCHOOL MEALS ON ILLNESS, ASTHMA, ALLERGIES, AND SCHOOL ATTENDANCE IN DANISH CHILDREN-THE OPUS STUDY

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Background and objectives: A nutritionally adequate diet in childhood is important for health and resistance of allergies and infections. This study investigates the effects of school meals based on The New Nordic Diet (NND) on asthma, allergies, illness symptoms, and school attendance in 797 Danish school children aged 8-11 years. The OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet) study was supported by a grant from the Nordea Foundation.

Methods: OPUS School Meal Study was a cluster-randomized cross-over trial. Children from 3rd and 4th grade at 9 Danish schools received school meals or control (usual packed lunch) for two 3-month periods. Absence from school, occurrence and duration of illness, asthma, and allergies within a 14-day period was recorded by parental questionnaires at baseline, and after each dietary period. n-3 long-chain PUFA (LC-PUFA) status was measured in whole-blood.

Results: Less than 5% of the children experienced asthma/allergy symptoms during the study. No difference was seen in occurrence of asthma/allergy symptoms, but NND slightly reduced duration of asthma symptoms ($p<0.001$), use of asthma medicine ($p=0.04$), and slightly increased duration of eczema symptoms ($p<0.001$) and use of hay fever medicine ($p=0.001$). n-3 LCPUFA status was negatively associated with duration of eczema and asthma symptoms. A slightly increased duration, but no difference in occurrence, of cold-like symptoms was found among children eating NND in common dining areas; but not among those eating in the classroom. No difference was seen in school attendance or other illness symptoms.

Conclusions: NND-based school meals reduced asthma symptoms, likely through increased intake of fish, which also seemed to improve eczema. Small increases in eczema with NND may be due to increased variety of nuts, fruits and vegetables. The physical eating conditions seem to influence cold-like symptoms.

Key words: School meals, allergies, illness

PO745

QUANTITIES AND TYPES OF FOODS REPORTED FOR COMPLEMENTARY FEEDING IN A PERI-URBAN AREA OF SOUTH AFRICA.

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Background and objectives: Complementary foods are essential for optimal growth, health and cognitive development. Much information is required on changing feeding practices/patterns over time. This study preceded a randomized-controlled-efficacy trial and aimed to assess the types and amounts of complementary foods given to infants aged 6-12 months in a peri-urban community in the North-West Province (South Africa).

Methods: An observational cross-sectional survey was done involving 102 mothers/caregivers. Information on food items given to infants was obtained using a structured questionnaire. Volumes of maize-rice were used as reference amounts to estimate the serving sizes of foods provided by converting the equivalent volumes to weights. The contribution of the estimated average serving sizes to the Dietary Reference Intakes (DRIs) of selected micronutrients was determined.

Results: Eighty-three percent of mothers/caregivers reported being unemployed. The top four food items recorded were commercial pureed food (62.9%), carrots (52.9%), pumpkin (49%) and commercial infant cereal (42.2%). The average estimated serving sizes on the top four foods reported varied from 66.7±45.82 g for commercial pureed food to 43.2±33.95 g for pumpkin. Regarding iron intake, the carrot estimated average serving size contributed 3.25% and 3.26% of DRIs for age groups 6-8 months and 9-12 months, respectively, while pumpkin contributed 1.15% and 1.43%, respectively. For vitamin A, the estimated average serving size of carrots contributed 327.97% and 340.82% of DRIs for age groups 6-8 months and 9-12 months, respectively, while pumpkin contributed 18% and 22% of DRIs, respectively.

Conclusions: Commercial food items were frequently reported despite the high unemployment rate. The use of infant foods from animal sources are lacking in this community. The

feeding practices for infants aged 6-12 months were different from results of other South African studies. Regular monitoring is necessary to inform nutrition education/programme activities at community level.

Key words: complementary feeding, micronutrients, community nutrition

PO746

RELATIONSHIP BETWEEN MATERNAL NUTRITIONAL STATUS AND PERCEIVED INSUFFICIENT MILK IN KLATEN DISTRICT, CENTRAL JAVA, INDONESIA

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Background and objectives: Perceived Insufficient Milk (PIM) is recognized as one of main causes of exclusive breastfeeding (EBF) failure in the world. PIM is a condition where mother feels her breast milk is insufficient to fulfill infant's needs. One possible cause of PIM is inability of pregnant women to achieve recommended weight gain thus increases risk of low fat reserves to produce milk. Low production of breast milk will negatively affect mothers' confidence to breastfeed. This study aimed at understanding relationship between maternal nutritional status and PIM. Study was conducted in Klaten District, Indonesia from May to June 2012.

Methods: Data were obtained from 14 sub-district level Community Health Centers. Enumerators were breastfeeding counselor who conducted interview and observed 133 mothers having infant less than 6 months old and had stopped EBF.

Results: Mothers whose weight gain during pregnancy did not achieve recommendation have the risk of PIM twice as higher as those who achieved the recommendation (OR=2.3). Risk of PIM also higher among working mothers (OR=3.0), mothers who did not conduct early initiation of breastfeeding (OR=3.6) and mothers who did not get support from their mother-in-laws (OR=17.3). Multivariate analysis shows that pregnancy weight gain is the most dominant factor related to PIM after controlled by other related variables.

Conclusions: The study contributes answer to important yet unresolved question about the relationship between PIM and maternal nutritional status and provides input for policy makers to pay more attention to the nutritional status of pregnancy and breastfeeding mothers. It is recognized that breastfeeding promotion to mother in law is very important and needs to be initiated.

Key words: maternal nutritional status, EBF, PIM

PO747

NUTRIENT INTAKES AND PREGNANCY OUTCOMES AMONG VEGETARIAN MOTHER IN JAKARTA, INDONESIA

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Background and objectives: Vegetarian diet undoubtedly has many advantages; however, when body metabolism is high such as in pregnancy and lactation, vegetarian diet increases the risk of nutritional deficiency. Studies provide special attention to the intakes of carbohydrates, protein, vitamin B12, Fe, Zn and folate which are important during pregnancy and lactation but not consumed adequately by vegetarian mothers. Significant relationship between maternal nutrient intake and pregnancy weight gain as well as relationships between pregnancy weight gain and birth weight have consistently been proven. However, the relationship between maternal nutrient intake and birth weight babies is not clear because of limited data. This study aimed to examine nutrient intake of vegetarian pregnant mothers in Indonesia in the relation to the outcome of pregnancy.

Methods: The study was conducted in Jakarta among vegetarian mothers who have children aged 1 month to 5 years. Total sample was 85 people selected conveniently from Indonesia Vegetarian Society database.

Results: The results showed that macronutrients intake among vegetarian mothers were higher than RDA, but the intakes of micronutrients were lower than the RDA. Intake of these nutrients (except vitamin B12 intake) was associated significantly with pregnancy weight gain. In contrast, only intake of vitamin B12 significantly associated with infant birth weight.

Conclusions: This finding suggests that vitamin B12 was utilized mainly for fetal development rather than maternal tissue development. Furthermore, based on low intake of vitamin B12 among vegetarian mothers as found in this study and considering negative impact of vitamin B12 deficiency on fetus, vegetarian mothers are expected to consume vitamin B12 supplement during pregnancy.

Key words: vegetarian, pregnancy mother, nutrient intake

PO748

BLOOD FOLATE, VITAMIN B6, VITAMIN B12, AND CREATININE AMONG THAI ELDERLY

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Background and objectives: It has been well established that plasma homocysteine (Hcy) rises and cognitive function declines with age. The hyperhomocysteinemia in the elderly has many causes, in particular, inadequate nutrition of folate, vitamin B6, vitamin B12, and age-related renal insufficiency. The aim of the present study was to determine in Thai elderly (1) Blood folate, vitamin B6, vitamin B12, and creatinine (2) Correlations among the B-vitamins, creatinine, plasma homocysteine, and cognitive function (from a separate study of the same population)

Methods: 94 Thai elderly, 25 males, 69 females, 60-80 years old, lived in 5 homes for the elderly. Major exclusion criteria included dementia and depression. Blood were determined for folate, vitamin B6, vitamin B12, and creatinine with standard methods.

Results: Abnormal values were found in the elderly as follow: plasma B6< 20 nM 9.57%, serum B12< 203 pg/mL 4.25%, serum folate < 3.09 ng/mL 0%, RBC folate< 140 ng/mL 0%, serum creatinine >1.5 mg/dL 5.35%, and plasma Hcy >15 μM 34%. Elderly with Hcy >15 μM compared with elderly with Hcy < 15 μM had significantly lower values of B6 ($p<.008$), B12 ($p<.001$), serum folate ($p<0.001$), RBC folate ($p<.001$) and plasma methylmalonic acid ($p<0.001$). Female elderly with creatinine >1 mg/dL compared with creatinine < 1 mg/dL had significantly higher Hcy ($p< .01$), while male elderly with creatinine >1.5 mg/dL compared with creatinine < 1.5 mg/dL also had significantly higher Hcy ($p=.03$).

Conclusions: The present study showed that one third of Thai elderly had hyperhomocysteinemia which correlated with inadequate nutrition of folate, vitamin B6, vitamin B12, and impaired renal function. A separate study of the same group of elderly did not show correlation between plasma Hcy and cognitive function.

Key words: homocysteine, folate, vitamin B6, vitamin B12, elderly

PO749

NUTRITIONAL STATUS AND ANTHROPOLOGICAL MEASUREMENTS IN ELDERLY PEOPLE OVER 100 YEARS OF AGE.THE CUBAN 'CENTENARIO' STUDY

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Background and objetives: In Cuba the index of population aging is the 17.5%. Individuals 100 years old has also experienced a significant increase ,but there is no bio-functional and nutritional assessments in this regard. To improve this situation ,the Cuban Government in their National State plans has promoted a nationwide study on the entire Cuban population with 100 years of age. The basic objective is to ascertain and assessing the quality of life of the elderly and implement comprehensive improvements with multidisciplinary teams. The present study deals with the knowledge and difficulty of the assessment of the nutritional status in centenarians.

Methods: The population studied is composed by 1488 individuals that in 2008 had 100 or more. The 60.3% of centenary were women. More 95% live in their homes or with their families. Somatic anthropometric assessment (IBP) and blood analysis was made. Also the mini nutritional assessment was study .

Results: When applying the formulas and common breakpoints in the older population has been revealed that it as not indicatives in these very old ages of vital cycle with different somatic and physiological situation. Two-thirds of population is categorized as malnourished, instead being a survivor population group. The values of functionality reinforce this situation which should be reviewed in future studies.

Conclusions: The authors propose the use of percentiles emanating from the characteristic somatic and physiological of this specific age, as well as determining which are the real energy needs and establish reference values for the variable hemato1quimicas in the evaluation of the nutritional status.

Key words: elderly, nutritional status,cuban population

PO750

NON-INSTITUTIONALIZED NONAGENARIANS HEALTH-RELATED QUALITY OF LIFE AND NUTRITIONAL STATUS: IS THERE A LINK BETWEEN THEM?

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Background and objectives: Nonagenarian population, clearly increasing, shows different characteristics from the rest of elderly people. Health-related quality of life (HRQoL) is a way to study population health in physical, psychological and social dimensions. The aim of this study is to examine the relationship between nutritional status and HRQoL in free-living nonagenarians. The differences with younger elders (80-90 years) are also studied.

Methods: Within The Villanueva Older Health Study, 20 people (92.50±3.50 years; 80% women) make the nonagenarian subsample (whole sample: 83 non-institutionalised inhabitants >80 years, 53 women). HRQoL was assessed by EuroQoL-5D (EQ-5D) questionnaire, nutritional risk by Mininutritional Assessment (MNA) questionnaire and dietary intake by a 24-h dietary recall.Statistical significance was evaluated at 95% confidence level ($p<0.05$).

Results: No significant gender differences were seen in nutritional status (MNA) or HRQoL (EQ-5D) for nonagenarians. Problems in mobility dimension were more frequently reported (80%) and showed differences with the younger elderly (52.4%; $p<0.05$). Nonagenarians reported less anxiety/depression problems than the younger elders. According to MNA, 40% nonagenarians were at risk of malnutrition. Dietary assessment showed zinc, magnesium, potassium, folic acid, vitamin D and vitamin E deficiencies. In nonagenarians, EQ-5Dindex was associated with MNA ($p=0.012$). Self-care dimension was associated with calcium ($p=0.043$), niacin ($p=0.022$), retinol ($p=0.005$) and cholesterol ($p=0.003$) intake. Usual activities dimension was associated with niacin ($p=0.002$) and cholesterol ($p=0.042$). Pain/discomfort EQ-5D dimension was associated with protein ($p=0.009$), energy ($p=0.05$), selenium ($p=0.032$) and niacin ($p=0.012$) intake. Anxiety/depression was associated with protein ($p=0.004$) and selenium ($p=0.017$) intake.

Conclusions: Risk of malnutrition is a factor associated to HRQoL in nonagenarians. Results suggest that when energy and some nutrients intake increase, a better HRQoL is promoted although it does not seem to have a strong direct weight over it.

Key words: free-living nonagenarians, Health-related quality of life (HRQoL), EuroQol-5D (EQ-5D), Mininutritional Assessment (MNA), dietary intake.

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PO751

PREGNANCY WEIGHT GAIN AND THE DETERMINANTS OF POSTPARTUM WEIGHT CHANGE AMONG GHANAIAN WOMEN

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Background and objectives: The inability to return to pre-pregnancy weight after delivery contributes to obesity in women. This study sought to determine pregnancy weight gain and the predictors of postpartum weight change among Ghanaian women.

Methods: It involved 125 women aged 19-39 years who participated in the International Lipid-based Nutrient Supplements Project in the Manya and Yilo Krobo districts of Ghana. Weight was measured at recruitment (≤20 gestational weeks) and 36 gestational weeks. In addition to baseline weight and weight gain during pregnancy, data were also collected on other factors hypothesized or previously shown to be associated with weight retention, including age, parity, a proxy for socio-economic status, birth weight, energy intake, recall of activity and sleep, and breastfeeding practices. Multiple regression analysis was used to estimate factors significantly associated with maternal weight change from 1 to 6 months postpartum.

Results: In all, 116 women completed the study. Mean weight gain from enrolment to 36 gestational weeks was 6.7±3.4 kg (median 6.9 kg). Between 1 and 6 months, postpartum mean weight gain was 1.0±3.6 kg (median 0.7 kg). Weight gain was higher among women who were overweight at baseline, were unmarried, or had higher socio-economic status ($p<0.05$). There was a tendency for obese women to gain more ($p=0.08$) and for exclusively or predominantly breastfeeding women to gain less ($p=0.07$).

Conclusions: Postpartum weight retention and weight gain merit public health attention in Ghana, with special focus on women who enter pregnancy overweight or obese.

Key words: pregnancy weight gain, postpartum weight change, Ghanaian women. Funded by the Bill & Melinda Gates Foundation

PO752

FOOD FOR PRESCHOOLERS

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Background and objectives: In Norway 11-16% of preschool children are overweight or obese. Diet in childhood is important for current and later weight development and health. To prevent obesity, literature reviews suggest that interventions should start early in life. The study Food for preschoolers aim to develop and implement an intervention directed towards preschool children, parents and kindergarten personnel, with the aim to improve children's food intake, prevent food neophobia and increase food joy and prevent development of obesity. The aim of this presentation is to describe the planned intervention.

Methods: Food for preschoolers includes a baseline study assessing selected dietary behaviors of preschool children, prevalence food neophobia and what is served in kindergartens. In total ten randomly selected kindergartens will be recruited for the intervention study, five in the intervention arm and five in the control group. Both parents and kindergarten personnel fill in questionnaires at baseline and after the intervention.

Results: The intervention is multi strategic. Children will be offered healthy Nordic food, experience food enjoyment, participate in food preparation and will be repeatedly exposed to specific food to promote acceptance. There will be a focus on children's empowerment in relation to appropriate portion sizes. Parents will be given information about responsive feeding, how to prevent food neophobia, the development of taste and importance of food enjoyment. The kindergarten personnel will make guidelines of how meals should be a central part of pedagogical work. They will also be educated in the Sapere method on how to introduce children to varied diets and healthy eating in a hands-on way and make food a fun experience.

Conclusions: An intervention on obesity prevention in young age is developed with a focus on health through taste and food enjoyment. The intervention will be implemented in kindergartens autumn 2014

Key words: preschoolers, diet, neophobia

PO753

THE CONTRIBUTION OF NUTRITIONAL SUPPLEMENTS TO MICRONUTRIENT INTAKES IN IRISH PRE-SCHOOL CHILDREN AGED 1-4 YEARS.

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Background and objectives: There are currently no data available on nutritional supplement use in Irish pre-school children. The objective of the study was to investigate the intakes of micronutrients from all sources and contribution of nutritional supplements to micronutrient intakes in Irish pre-school children aged 1-4 years.

Methods: Analysis was based on the National Pre-School Nutrition Survey (NPNS) (2010-2011), which was carried out to establish a database of habitual food and drink consumption in a representative sample of 1-4 year old Irish pre-school children (n=500). A 4 day weighed food record was used to collect food intake data and analysis was carried out using WISP© (Tinuviel Software, Anglesey, UK), which is based on McCance and Widdowson's The Composition of Foods, Sixth Edition and the Irish Food Composition Database. The database was updated to include all nutritional supplements recorded by participants in the food diary. A supplement user was defined as respondent who consumed a nutrient containing supplement over the 4-day recording period.

Results: One fifth (20.2%) of those surveyed reported use of a nutritional supplement and of the 60 nutritional supplements consumed by pre-school children, 40% were multi-vitamins and mineral preparations, 28% were multivitamins, 12% were fish/cod liver oils, 12% were single vitamins, 5% were single minerals and 3% were multi-minerals. Nutritional supplements made a significant contribution to the intake of a range of micronutrients especially iron (18%), zinc (15%), retinol (46%), vitamin D (58%), biotin (33%), pantothenate (33%), vitamin B6 (32%), vitamins A and C (31%).

Conclusions: Nutritional supplements are consumed by one fifth of Irish pre-school children and made an important contribution to micronutrient intakes.

Key words: pre-school children, supplement use, dietary intake data The project was funded by the Irish Government under the Food for Health Research Initiative 2007-2012

PO754

FREQUENCY AND DETERMINANTS OF BREASTFEEDING IN A NATIONWIDE SAMPLE IN GERMANY

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Background and objectives: Breastfeeding is recognized as best nutrition in the first months of life. In Germany exclusive breastfeeding is recommended for at least 4 months. Major aim was to describe breastfeeding rates and determinants in a nationwide survey of mothers in Germany.

Methods: The survey was nested in the randomized controlled trial PINGU on fatty acid status optimization in infancy. Data derived from an existing panel for consumer surveys (Kantar Health GmbH). Thereof, mothers with children up to 36 months of age were selected for an online interview on mother's and children's dietary behaviour (field period: December 2010). Data of 985 mothers were weighted to ensure representativeness for mothers in Germany.

Results: In Germany, 78.3% of mothers initiated breastfeeding, 55.6% of all children were still exclusively breastfed at the age of 4 months. Both, the rates of breastfeeding initiation and exclusive breastfeeding at 4 months were significantly higher in high social classes compared with low social classes (initiation: 85.7% vs. 66.0%, p=0.0001; 4 month: 69.0% vs 35.7%, p=0.0001). Breastfeeding was initiated more frequently in first children than in later children (82.8% vs 74.2%, p=0.001), but exclusive breastfeeding at 4 months did not differ. In contrast, there were no differences in breastfeeding initiation according to mother's age, but a lower percentage of exclusive breastfeeding in younger compared with older mothers (50.7% vs 61.4%, p=0.001).

Conclusions: Rates of breastfeeding initiation is relatively high in Germany. However, only half of the mothers still exclusively breastfeed their children at the age of 4 months. Although rates of exclusive breastfeeding seem to have slightly improved since the last nationwide survey in 2005, mothers in lower social classes and also younger mothers still need support in breastfeeding.

Key words: breastfeeding, initiation, duration, determinants. Funded by the German Federal Ministry of Education and Research

PO755

UNDERWEIGHT, OBESITY AND DISABILITY IN ELDERLY COMMUNITY DWELLERS IN FRANCE: THE FRENCH NATIONAL DISABILITY AND HEALTH SURVEY, 2008

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Background and objectives: Underweight and obesity may constitute an important risk factor of disability in elderly. In France, epidemiological data on body mass index (BMI) among elderly are scarce at the national level. Objectives of this study were to describe the prevalence of underweight and obesity in free-living elderly in France and to investigate the association between disability and BMI categories, using data from the French Health and Disability Survey, a national interview survey, carried out in 2008.

Methods: Based on BMI (weight/height^2, self-reported data), the prevalence of underweight (BMI<21) and obesity (BMI≥30) were estimated in people aged 75 years or more. The association between disability (at least one restriction in activity of daily living, basic ADL or instrumental, IADL) and BMI categories, was analyzed separately by sex, using a multivariate logistic regression and taking into account the sampling design and the calibration process.

Results: Of the 4,296 participants included in the analyses (63.4% women), 14.9% [13.3-16.7] were underweight, including 5.5% [4.5-6.7] with severe underweight (BMI<19), the risk being higher in women than in men (p<10-3). In addition, 14.6% [13.1-16.2] of elderly were obese, including 2.8% with severe obesity (BMI≥35), without gender difference. After adjustment for socioeconomic characteristics, a J-shape association was found between disability and BMI categories in men (ORa=2.7; p=0.007 for underweight and ORa=1.9; p=0.005 for obesity compared to the normal category). In women, the risk of disability increased with BMI categories (ORa=1.7; p=<10-3 for overweight and ORa=2.9, p<10-3 for obesity).

Conclusions: Underweight and obesity are frequent among free-living elderly and associated with disability. Since populations of industrialized countries are rapidly ageing, these findings highlight the importance of maintaining a healthy nutritional status, at all ages for long-term survival and quality of life.

Key words: underweight, obesity, disability, free-living elderly, national

PO756

DIET AND NUTRITIONAL STATUS OF BREASTFEEDING WOMEN IN POLAND

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Background and objectives: Human milk is the first choice for newborns and infants. The World Health Organization recommends that infants should be exclusively breastfed for the first six months of life and than for up to two years of age or beyond, while infants receive nutritionally adequate and safe complementary foods. Although the effect of the breastfeeding mother diet on human milk composition has not been still well documented, a rational lacting women daily diet should provide right energy supply and contain all the necessary nutrients. The aim of our study was to estimate the composition of breastfeeding women diet and to compare the nutrients intake to the recommended food requirement.

Methods: The study involved 31 exclusively breastfeeding women from Warsaw, Poland in first six months of lactation. Energy and nutrients intake was estimated using 3-d dietary recall. To evaluate the quantity of nutrients in mother's diet the DIETA FAO 5.0 program was used which includes data for 1067 typical Polish dishes and foodstuffs.

Results: Mean energy content in breastfeeding women diet amounted 1942 kcal/person/day (range from 765 to 2871 kcal/person/day). Protein, fat, carbohydrates supplied accordingly 16.4% E, 33.2% E and 50.3% E. The average content of DHA+EPA reached 300 mg/person/day and covered the minimum DHA+EPA requirements during lactation. Compare to recommendations breastfeeding women diet characterized too high intake of fat, saturated fatty acids, sodium, phosphorus, iron, vitamin A and vitamin B2. Too low intake of calcium, potassium, foliate and vitamins E, B6 and C was observed.

Conclusions: Paediatricians and dieticians should give more attention to breastfeeding mothers diet to improve covering of recommended food requirements. The survey shows the necessity of a systematic education, which would be adapted to women`s individual needs during lactation.

Key words: breastfeeding women, diet, nutrients

PO757

ESTIMATION OF INTAKES AND FOOD SOURCES OF SALT IN IRISH PRE-SCHOOL CHILDREN AGED 1-4 YEARS.

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Background and objectives: High salt intakes in different population groups in Ireland have been previously reported. The objectives were to estimate mean daily salt intake and food sources in Irish pre-school children.

Methods: Analysis was based on the National Pre-School Nutrition Survey (2010/2011) which was carried out to establish a database of habitual food and drink consumption in a representative sample of Irish pre-school children (n=500) aged 1-4 years. A 4-day weighed food record was used to collect food intake data and analysis was carried out using WISP© (Tinuviel Software, Anglesey, UK) which is based on McCance and Widdowson's The Compostion of Foods 6th edition and the Irish food composition database. The most up-to-date compositional data for sodium in foods available at the time of analysis were used. Under-reporters were excluded from the analysis.

Results: Salt intakes from food only (excluding discretionary salt) increased with age and mean daily intakes in 1, 2, 3 and 4 year olds were 2.4 g, 3.2 g, 3.4 g and 3.8 g respectively. Meat was the main contributor to salt intake accounting for 23-25% of total intake in 1-4 year olds. The contribution of cured/processed meats to salt intake increased with age from 12% in 1 year olds to 19% in 4 year olds, while the contribution of fresh meat/meat dishes decreased with age (10-6%). The contribution of bread to salt intake increased from 9% in 1 year olds to 13-14% in 3-4 year olds, while the contribution of milk decreased with age (19-7%).

Conclusions: Even when discretionary salt intake is excluded, salt intakes of Irish pre-school children exceed current target levels i.e. 2g/day for 1-3 year olds and 3g/day for 4-year olds.

Key words: salt, pre-school children, food sources The project was funded by the Irish Government under the Food for Health Research Initiative 2007-2012

PO758

ANEMIA AMONG FEMALE ADOLESCENT IN RELATIONSHIP WITH MALARIA, FOOD CONSUMPTION PATTERN AND SOCIO-ECONOMIC STATUS (SES) IN MAMUJU DISTRICT, INDONESIA

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Background and objectives: Anemia among adolescent especially female adolescent is one of the main nutrition problems in developing country. The aims of this study was to know factors contributing to anemia among female adolescent in malaria endemic area.

Methods: This study was a cross-sectional designed in household survey. This survey was conducted in a scope of District with 14 subdistricts. In each subdistrict was choosen one or more village which was done in cluster setting. There were 314 samples of female adolescent involved in this study. Data collection used questionnaire for demographic and socioeconomic data, anamneses was used to obtain the clinical symptoms of malaria, and sample blood for hemoglobin assessment was measured using Hb analyzer (Hemocue). Data analysis used SPSS version 16 and Food processor (Nutri Survey for windows). Bivariate analysis by chi-square test and multivariate by logistic regression.

Results: The study result showed the anemia prevalence was 29.9%. Anemia more prevalent in female adolescent with lack of food variation (33.6%) compared to enough of food variation (10.2%) (p=0.001). Respondent who had habit of breakfast had lower anemia (26.5%) than the unbreakfast (44.3%) (p=0.006). And the respondent who had clinical symptoms of malaria in the one last month almost twice higher had anemia (45.1%) than who had no clinical symptoms (27.0%) (p=0.010). Anemia also more prevalent in the respondent with low family income (32.5%) compared to the high family income (24.8%) (p=0.156). The multivariate analysis showed that factor with major contribution to anemia among female adolescent was food consumption pattern.

Conclusions: The food consumption pattern, breakfast, and clinical symptoms of malaria had association with anemia among female adolescent in endemic malaria area

Key words: anemia, female adolescent, malaria.

PO759

THE CONTRIBUTION OF FORTIFIED FOODS TO MICRONUTRIENT INTAKES IN IRISH PRE-SCHOOL CHILDREN AGED 1 TO 4 YEARS.

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Background and objectives: Optimum micronutrient intakes are essential at all stages of life, particularly during early childhood. The addition of micronutrients to foods is a useful tool to improve nutrient intakes and reduce nutrient inadequacy in a population. The objective of the study was to investigate the contribution of fortified foods to micronutrient intakes in Irish pre-school children aged 1-4 years.

Methods: Analysis was based on the National Pre-School Nutrition Survey (NPNS), which was carried out between 2010 and 2011 to establish a database of habitual food and drink consumption in Irish pre-school children (n=500). A 4-day weighed food record was used to collect food intake data. Analysis of dietary intake data was carried out using WISP (Tinuviel Software, Anglesey, UK) which is based on McCance and Widdowson's The Composition of Foods, Fifth and Sixth editions and the Irish Food Composition Database. The database was updated to identify all fortified foods recorded (12.7% of the 1652 foods consumed) by participants in the food diary. For the purpose of this research, a fortified food is one in which one or more micronutrients were added to enhance the nutritive value of the food.

Results: Among the participants of the NPNS, 97% reported consuming a fortified food at least once during the recording period. In the total population, fortified foods were found to contribute significantly to intakes of micronutrients relative to their contribution to energy intake (17%), particularly for iron (39%), vitamin D (39%), folate (35%), thiamin (33%), riboflavin (32%), total niacin (24%) and calcium (23%).

Conclusions: Fortified foods are widely consumed by Irish pre-school children and make a significant contribution to micronutrient intakes in this population group.

Key words: fortified foods, pre-school children, micronutrient intakes. The project was funded by the Irish Government under the Food for Health Research Initiative 2007-2012.

PO760

GLUTEN FREE DIET HAS LOW IMPACT IN ANTI-GLIADIN ANTIBODY LEVELS IN BREAST MILK OF NURSING MOTHERS

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Background and objectives: To study antigliadin antibodies (AGA) in breastmilk (BM) and to analyse their relationship with maternal diet, and the potential relationship with the development of celiac disease(CD) in their offspring.

Methods: Samples of mature milk were obtained at different months of lactation(1-32 m) from 23 mothers: 12 on a normal diet (ND) and 11 on a gluten-free diet (GFD) (coeliac mothers). We analyzed Secretory AGA-IgA(S-AGA) and AGA-IgA by indirect homemade ELISA. Total IgA (g/L) was measured in BM using Bethyl Laboratories ELISA kit.

Results: AGA levels vary from one mother to another, however in each mother,from the first month of lactation onwards, results show scarce variability. S-AGA and AGA-IgA were detected in BM, both in mothers on a GFD and mothers on a ND. The comparison of the estimated kernel density curves for S-AGA showed a difference between both groups, with slightly lower values for mothers on GFD. Similar results were obtained for AGA-IgA. However differences between the 2 groups of mothers did not reach statistical significance (repeated measures ANOVA, S-AGA p=0.12, AGA-IgA p=0.16); these results suggests however this was related to the low sample size: 106 observations of 23 individuals. Total IgA values varied between 0 and 1 g/L in most individuals(median 0.66 g/L and interquartile range [0.44; 0.94]). We observed a great variability among mothers, some cases showing unusually high values. To assess the relationship between IgA and the other variables, a linear mixed model approach was used. The model including S-AGA instead of AGA-IgA had a considerably higher AICC (229.2 vs 235.7), indicating that a positive association exists between levels of AGA and total IgA.

Conclusions: AGA was present in all BM samples, independently of mother's diet. Thus breastfeeding is a way of transferring antibodies to the baby, so this practice could be relevant for CD prevention in breastfed infants.

Key words: breastmilk,antigliadin antibodies,gluten-free diet.

PO761

PREVENTING ACUTE MALNUTRITION AMONG CHILDREN AGED 6 TO 23 MONTHS IN NIGER: EFFECT OF SUPPLEMENTATION AND CASH TRANSFER

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Background and objectives: Choosing the most appropriate strategy for the prevention of childhood acute malnutrition is essential in countries like Niger that face annual hunger gaps. Although fortified-blended foods and ready-to-use supplementary foods (RUSF) are effective options for large-scale preventive distributions, the role of cash transfers as a direct nutritional intervention in these contexts requires further investigation. Here, we compare different preventive strategies on the incidence of acute malnutrition and mortality among children between 6-23 months.

Methods: Exhaustive open observational cohorts including all children 60cm to 80cm, resident in 18 villages of Madarounfa, Niger over two years. Three different strategies of monthly distributions were assessed: 1) RUSF (500 kcal/d during the hunger gaps and 250 kcal/d in-between); 2) Super Cereal Plus (SC+) (800 kcal/d during the hunger gaps and 400 kcal/d in-between) and 3) cash transfer to all households with a child in the target group (43 €/month) during the first hunger gap. All children had access to the same primary health care package. Anthropometric and clinical data were collected monthly. Endpoints included wasting (WLZ<-2) and mortality.

Results: A total of 1,591 children were included in August 2011. At 5-months of follow-up, there was no difference in the incidence of wasting between cash transfer and RUSF (ref) groups (HR=1.09, 95%CI:0.89-1.33); as well as between cash

transfer and SC+ (ref) groups (HR=1.08, 95%CI:0.86-1.36). Over 15 months, incidence of wasting was similar between SC+ and RUSF (ref) groups (HR=1.09, 95%CI:0.98-1.22), as well as mortality (HR=1.04, 95%CI:0.63-1.72).

Conclusions: In a region with high acute malnutrition, 15-month supplementation with SC+ or RUSF has a similar effect on severe wasting and mortality prevention among young children. When the primary aim is to prevent malnutrition among this population, special nutritious foods may be more cost-effective than cash transfer.

Key words: Malnutrition prevention, fortified-blended food, ready-to-use-supplementary food, cash transfer, Niger

PO762

THE PROPOSAL OF A FOOD RATION FOR SOLDIERS SERVING IN POLISH SPECIAL OPERATION FORCES

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Background and objectives: Training and combat activities carried out by soldiers of Polish Army Special Operation Forces in various climate and terrain conditions, at different times of a day are huge and sometimes even extreme physical exertion. The aim of the work was to work out a proposal of food ration for soldiers serving in the Polish Special Operation Forces. Total of 22 soldiers from the exclusive special military unit "GROM", taking part in the half-year preparatory training course to carry out combat operations, underwent the examination. The average age of the subjects was 30.1 years old.

Methods: Assessment of energy expenditure was based on measurements by the Polar Sport Tester 810 heart rate monitor.

Results: It was found that during 7 hours of combat training energy expenditure amounted to 1672 kcal, what was the base to determine the minimum energy value of a food ration. Based on the obtained results the food rations for soldiers serving in the special operations units and performing tasks in situations when there is lack of access to food of energy value of 1600, while protein should provide 15-25% of the energy value, carbohydrates 45-65%, and fat not more than 35% of the total energy. Based on the above assumptions, a model food ration was worked out. It consists of tinned meat and vegetable, dried beef, biscuits, a mixture of freeze-dried fruit, grain-fruit bar, coated peanuts, bitter chocolate, candy with natural coffee extract, caramels, chewing gum with xylitol and accessories necessary to prepare and eat the meal.

Conclusions: In this set of products 15% of energy value comes from protein, 34% from fat, and 51% are provided by carbohydrates.

Key words: special forces, energy expenditure, combat rations

PO763

INFLUENCE OF GESTATIONAL DIABETES ON CHILDREN'S CIRCADIAN RHYTHMS AND THEIR ASSOCIATION WITH BOTH FETAL ADIPOSITY AND N-3 FATTY ACIDS

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Background and objectives: To analyze the circadian rhythm maturation of temperature, activity and sleep during the first year of life in offspring of diabetic mothers (ODM) and their relationship with fatty acid profile and obesity markers.

Methods: A prospective analysis of the children of 63 pregnant women (23 controls, 21 gestational diabetes mellitus (GDM) controlled with diet and 19 GDM with insulin). Fetal abdominal circumference was evaluated ecographycally during gestation. Blood samples from the mother during the 3rd trimester and cord blood were collected for fatty acid analyses. Skin temperature and rest-activity rhythms were monitored for 3 consecutive days in children at 3 and 6 months of age. Anthropometrical parameters of the children were evaluated during the first year of life.

Results: Children from the GDM groups tended to higher fetal abdominal circumference z-score than controls at the beginning of the last trimester (p=0.077) and delivery (p=0.078). Mean skin temperature, activity and sleep were not different among the groups. However, some of the parameters that define temperature maturation and also the circadian function index (CFI) from sleep, were significantly lower at 6 months in the GDM+insulin group. Fetal abdominal circumference z-score, as a predictor of fetal adiposity, correlated negatively with the circadian/ultradian temperature rhythm (P1/Pult ratio) and CFI of sleep at 6 months (r=-0.277, p=0.037). Maternal docosahexaenoic acid (DHA) at both recruitment and at delivery was positive correlated with the circadian periodicity

of temperature at 3 months (P1/Pult) and with sleep rhythm maturation (CFI) at 6 months (r=0.3, p=0.038).

Conclusions: Fetal adiposity correlated with a worse circadian rhythm regulation in ODM while maternal DHA levels were associated with higher sleep rhythm maturation in the children. In addition, ODM insulin-treated showed a disturbed pattern of the CFI of temperature-activity at 6 months of age.

Acknowledgements: Global Technology Centre, Hero Group, Murcia, Spain.

PO764

COMPARATIVE ASSESSMENT OF CHILDCARE PRACTICES, NUTRITIONAL AND DEVELOPMENTAL STATUS OF UNDER-FIVE ORPHANS AND NON-ORPHANS IN IBADAN SOUTH-WEST, NIGERIA

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Background and objectives: Some under-five children are more vulnerable than others due to loss of their parents, thus are deprived of basic childcare practices. This study evaluated the childcare practices, nutritional and developmental status of under-five orphans and non-orphans in Ibadan, Nigeria.

Methods: The cross sectional study was carried out using multistage sampling technique (two stages) to select 30 orphans and 60 non-orphans. Pretested, interviewer-administered questionnaire was used to collect information on the socio-demographic characteristics of the caregivers/mothers/index child and childcare practices. Nutritional status was assessed using anthropometric indices and developmental status was assessed using Developmental Assessment of Young Children (DAYC) questionnaire. Data were analyzed using descriptive statistics; chi square was used to test for association between variables.

Results: Mean age of the orphans and non-orphans was 51±23 months and 50±23 months respectively. High proportion (93.3%) of the orphans and (96.7%) non-orphans had adequate childcare practices. More (10.0%) orphans were wasted, 9.0% stunted and 4.0% underweight than 6.7% non-orphans that were wasted, 6.7% stunted and none was underweight. More than half (56.7%) of the orphans had average while 3.3%, 26.7%, 10.0% had, very poor, poor and below average developmental quotient remarks respectively. Majority(60.0%) of the non-orphans scored above average, 15.0% scored superior remarks while none of the non-orphans scored very poor, poor or below average developmental quotient remarks. No significant relationship was observed between the childcare practices and nutritional status of the orphans and non-orphans ($p>0.05$). However, significant relationship was observed between their nutritional and developmental status ($p<0.05$).

Conclusions: The childcare practices given to the orphans was adequate, majority had good nutritional and developmental status. However, the non-orphans received more adequate childcare practices and also had better nutritional and developmental status than the orphans.

Key words: childcare practices, nutritional status, developmental status, under-five orphans and non-orphans, Nigeria

PO765

INFLUENCE OF GLUTEN-FREE AND NORMAL DIET ON GLUTEN CONTENT IN BREAST MILK.

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Background and objectives: Breastfeeding has several beneficial effects both for the child and the mother, including a potential positive effect in celiac disease, diminishing the incidence or delaying onset of symptoms. Gluten intake through breast milk might contribute to these effects modulating the immune system and promoting an oral tolerance against gluten in the new-born. Therefore the aim of this study is to quantify gluten content in human milk and to compare the influence of diet on it in celiac and non-celiac mothers.

Methods: Mature human milk samples were analyzed in healthy mothers following a non-restricted gluten diet and celiac mothers on gluten-free diet, using the immunoassays Sandwich and Competitive R5 ELISA. These assays were optimized to achieve a complete gluten extraction avoiding antibodies and other interference components present in the milk.

Results: We observed a wide variability in results mainly when using the Competitive R5 ELISA. Most of the analyzed samples had a quantifiable content, ranging from 83 to 508 ng/mL of gliadins in celiac mothers and 60 to 386 ng/mL of gliadins in non-celiac mothers but without any statistically significant differences between the two groups. Using the Sandwich R5 ELISA, we found values ranging from 19 to 37 and 6 to 21 ng/mL of gliadins in the celiac and non-celiac group respectively. The differences found between the two assays are the expected ones as the Competitive system leads to quantify not only intact gliadins but also fragmented and small proteins.

Conclusions: These results demonstrate that there are quantifiable amounts of gluten in human milk samples but very

near to the limit of sensitivity of the techniques used, therefore, the precision of the values might not be accurate enough and further research is needed to optimize the analysis.

Key words: breastfeeding, gluten, human milk, celiac disease

PO766

COMPLEMENTARY FEEDING PRACTICES OF A PERI-URBAN SOUTH AFRICAN COMMUNITY: A SNAP SURVEY USING THE WHO-2010 QUESTIONNAIRE

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Background and objectives: Poor and sub-optimal feeding practices contribute to Infant and young child malnutrition in developing countries. In the context of the Scaling-Up-Nutrition movement quick and cost effective methods to monitor/evaluate complementary feeding practice trends over time are needed to inform programme activities. The aim was to conduct a cross-sectional survey of complementary feeding practices in a peri-urban South African community to provide a snapshot of current complementary feeding practices to inform a community intervention study.

Methods: It was an observational study using the WHO-2010 breastfeeding and complementary feeding practices questionnaire. Mothers/caregivers (n=102) of infants 6-12 months were recruited on growth monitoring days at all five clinics serving the community.

Results: Eighty three percent of mothers (n=96) reported being unemployed. Although some positive feeding practices were observed many were not ideal. 57 and 53% of infants were reported breastfed the previous day for 6-8 (n=53) and 9-12 (n=49) month old infants, respectively. Sugar water was given to 52 and 35% of infants 6-8 and 9-12 month olds, respectively. The number of times specific food items were reported given was also not ideal. Rooibos tea was given at least once the previous day for 40% of all infants (30% of 6-8 and 51% of 9-12 month olds, respectively).

Conclusions: Low nutrient dense drinks were offered to a large proportion of the infants. Such snap surveys can provide useful information on complementary feeding practices to inform interventions and/or monitor trends at community level.

Key words: complementary feeding, community nutrition, community nutrition evaluation

PO767

NUTRITIONAL STATUS ASSOCIATION WITH MOBILITY OF NON-INSTITUTIONALIZED ELDERLY PEOPLE

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Background and objectives: Vulnerability to adverse outcomes evaluation is very relevant in the elderly to be able to prevent them. The aim of this study is to explore associations between nutritional status, risk of falls and mobility amongst free-living elderly.

Methods: Within The Villanueva Older Health Study, 73 (85.5±4.4 years; 44 women) non-institutionalised elders (>80 years) could achieve physical performance tests. Geriatric assessment tools used were: occurrence of falls in previous 6 months, physical performance (Usual gait speed (UGS-4m) and Timed Up-and-Go test (TUG)), nutritional risk (Mininutritional Assessment questionnaire, MNA) and dietary intake (24-h dietary recall). Statistical significance was evaluated at 95% confidence level ($p<0.05$).

Results: 19 participants (26%) fell in previous 6 months with no significant gender differences. TUG test (11.8±4.9 men and 15.9±7.3 women; $p=0.007$) classified 37% as normal mobility (<10 s), 46.6% frailty (10-11 s), 13.7% risk of fall (20-30 s) and 2.7% high risk of falls (>30 s). UGS test (0.7±0.4 men and 1.3±1.2 women; $p=0.007$) pointed out a slow UGS, <0.8 m/s, in 42.5% sample. MNA (27.1±2.0 men and 24.7±3.2 women; $p<0.001$) showed malnutrition in 2.3% women, and risk of malnutrition in 9.1% men and 40.0% women. Total sample showed folic acid, zinc, magnesium, vitamin A, D and E dietary deficiencies. MNA was associated with occurrence of falls ($p=0.001$), TUG test ($p=0.007$) and UGS test ($p=0.048$). Occurrence of falls in previous 6 months showed no association with TUG or UGS. TUG was negatively associated with vitamin B1 ($p=0.018$) and AGM intake ($p=0.048$) (oleic acid, $p=0.049$).

Conclusions: Being at risk of malnutrition, measured by the MNA, is associated with higher frequency of falls and impaired mobility in elderly people (>80 years). Nutrients intake little influence on TUG is observed.

Key words: risk of falls, timed up and go test (TUG), usual gait speed (UGS), mininutritional Assessment (MNA), dietary intake.

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PO768

PROPOSAL FOR INTERNATIONAL NUTRIENT GUIDELINES FOR MEALS FOR ELDERLY IN INSTITUTIONS

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Background and objectives: Under-nutrition, often featured by underweight and/or involuntary weight loss, is a frequent and serious problem in institutionalized elderly. Providing more nutritious meals in elderly institutions can help to prevent under-nutrition. The objective of this research was to develop science-based globally applicable nutrient guidelines for meals for institutionalized elderly.

Methods: FAO/WHO recommendations for total daily diets for people over 60 years were translated into nutrient guidelines for meals. Specific guidelines were developed for energy, protein, carbohydrate and fat (quality), of which energy and protein are most critical in elderly. Fibre is also included as constipation is a very prevalent problem in elderly. For the micronutrients it was decided to focus on vitamin B12, vitamin D and calcium, which are the most critical micronutrients because of inadequate intake and/or decreased absorption. Sodium is also included as sodium intake in many populations worldwide, including the elderly, is much higher than recommended.

Results: In line with available recommendations, it was assumed that a meal should provide 30% of the total daily energy intake. Energy requirements were calculated using the appropriate basic metabolic rate equations and an average physical activity ratio of 1.5. Subsequently, guidelines for macronutrients were deduced from the energy guidelines. For micronutrients, the guidelines were set at 30% of total daily recommendation, in line with the energy guidelines.

Conclusions: The nutrient guidelines for meals can be used basic guidelines to prevent under-nutrition in elderly living in institutions. Specific disease states that may influence nutrient requirements are out of scope of these guidelines. Although guidelines were developed for global application, feasibility and implementation may depend on differences between countries with respect to dietary habits, affordability and local food composition. This needs to be further explored.

Key words: under-nutrition, elderly, guidelines

PO769

EFFECT OF TIMED AND TARGETED COUNSELING (TTC) IN CHANGING INFANT AND YOUNG CHILD FEEDING PRACTICES IN SOUTHERN ETHIOPIA

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Background and objectives: Peer Mothers were trained to counsel pregnant women and mothers of children under 2. The objective of the study was to evaluate changes in infant and young child feeding (IYCF) practices resulting from their counseling visits delivering age-appropriate messages on breast feeding and complementary feeding to mothers of children 0 to 18 months after two years of project implementation.

Methods: The evaluation used a quasi-experimental study design in four intervention and four control districts. The sample size included 1600 children with 800 mothers interviewed from each of the intervention and control districts i.e. 400 for 0 to 5.9 months and 400 for 6 to 23.9 months group. Individual interviews and focus groups discussions were also conducted.

Results: Initiation of breast feeding within one hour of birth increased from 65.5% to 75.2% ($p<0.05$); colostrum feeding increased from 71.2% to 83.0% ($p<0.0001$); exclusive breast feeding increased from 57.9% to 82.8% ($p<0.05$) in the intervention areas after adjusting for women's education, age, religion, number of children ever born, and economic status. Minimum dietary diversity (MDD) increased from 7.2% to 10.0% ($p<0.0001$); minimum acceptable diet (MAD) increased from 5.0% to 7.5% ($p<0.0001$); Both MDD and MAD significantly improved compared with the control area at end line. Stunting decreased from 32.3% to 29.0% ($p>0.05$) but was not statistically significant.

Conclusions: Age–appropriate counseling is an effective way of improving IYCF practices in rural Ethiopia. Dietary diversity remains a challenge and the changes in stunting are gradual and need longer intervention period than 2 years.

Key words: peer counseling, breastfeeding, complementary feeding

PO770

DIETARY INTAKE OF ANTIOXIDANTS AND INADEQUACIES IN DIET IN PREGNANT WOMEN IN SPAIN: INMA-ENVIRONMENT AND CHILDHOOD COHORT

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Background and objectives: There is increasing evidence that optimal intakes of antioxidants could promote health benefits during pregnancy and lactation and in newborn infants. Therefore dietary guidelines for pregnant women gather nutritional requirements for the consumption of antioxidant rich foods such as fruits, vegetables and nuts which are frequent in the Mediterranean areas. However, there is little evidence on the degree of compliance with such recommendations in Spain.

Methods: Population of study was the Spanish "INMA-Environment and Childhood Cohort" which recruited 2585 from two Mediterranean regions (Sabadell and Valencia) and two Northern regions (Gipuzkoa and Asturias) between 2004-2008. We assessed intake from foods during the first trimester of pregnancy through a Food Frequency Questionnaire (FFQ). Vitamin A, vitamin C, vitamin E and carotenoids were calculated from specific Food Composition Tables (FCT). All estimated intake were adjusted using the energy residual method. For compliance we used the pregnancy-specific recommendations of the Spanish guidelines.

Results: Percentage of women that did not reach the minimum recommendation for fruit intake (2-3 servings/day) was 39.2% and a 47.3% for vegetables (2-4 servings/day). Their intake increased with age, physical activity and with educational degree ($p<0.05$). Percentage of pregnant women that did not fulfil the requirements of Spanish guidelines (Dietary Recommended Intake, DRI) was 13.2 % for vitamin A (700 µg/day) and 16.2 % for vitamin C (80 mg/day), nevertheless more than 80% of the women had inadequacy of vitamin E (15 mg/day).

Conclusions: Age, education and physical activity as well as country of origin are factors significantly related to dietary intake. Young, more sedentary women and those with a low education are at risk for insufficient antioxidant-rich foods intake and non-optimal food choices during pregnancy.

Key words: Pregnancy, antioxidants, compliance

PO771

SCHOOL MEALS BASED ON NEW NORDIC DIET IMPROVE READING PERFORMANCE IN DANISH 4TH GRADE CHILDREN –THE OPUS SCHOOL MEAL STUDY

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Background and objectives: Diet is hypothesised to influence cognitive function and school performance, but few studies have investigated the effect of healthy school meals. New Nordic Diet (NND) is rich in foods such as fish, whole grain, fruits, vegetables and nuts. The OPUS project"Optimal well-being, development and health for Danish children through a healthy New Nordic Diet" was supported by a grant from the Nordea Foundation. This study investigates if school meals based on NND improved concentration, math and reading skills in 8-11-year-old children.

Methods: OPUS School Meal Study was a cluster-randomized controlled cross-over study. 3rd and 4th grade children from 9 Danish schools received school meals based on NND and their usual packed lunch (control) for 3 months each. At baseline and at the end of each period children completed the D2-test of attention and age-appropriate tests of math and reading. Six-hundred-and-sixty-eight children with data from baseline and at least one post-intervention measurement were included. Linear mixed models with adjustment for age, gender, grade, month, household educational level, order of diets and relevant random effects (school, class and individual) were used.

Results: At baseline concentration performance was 130.5±22.7 [54-204] (mean±SD [range]) and the number of correct answers in math and reading tests were 32.1±11.2 [0-62] and 51.9±17.5 [9-106], respectively. The school meals improved reading performance with 3.3 correct sentences ($p<0.001$) in 4th grade, but there was no effect in 3rd grade ($p=0.422$). NND had no effect on concentration performance ($p=0.609$) or math performance ($p=0.966$).

Conclusions: School meals based on the New Nordic Diet improved 4th grade reading performance, which is a fundamental skill and a prerequisite for learning in most subjects. The difference between 3rd and 4th grade, may be caused by differences in compliance to school meals.

Key words: New Nordic Diet, school meals, child, cognition

PO772

INFANT AND YOUNG CHILD FEEDING PRACTICES IN VULNERABLE COMMUNITIES IN THE BREEDE VALLEY, WESTERN CAPE PROVINCE, SOUTH AFRICA

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Background and objectives: The UNICEF Programming Guide (2011) recommends that the revised Indicators for Assessing Infant and Young Child Feeding (IYCF) practices (2008) be used for situation assessments in the development, planning and implementation of a comprehensive approach to improving IYCF. The Community Nutrition Security Project (CNSP) investigated the food security situation in two vulnerable communities in the Breede Valley. This project provided an opportunity to assess IYCF practices at household level. The aim of the present study was to describe the feeding practices of infants and young children aged 0-36 months based on WHO validated indicators in two vulnerable communities.

Methods: A descriptive cross-sectional baseline assessment was conducted on a representative population sample. A simple random selection of households resulted in the inclusion of 400 mother/infant pairs. Data on IYCF practices was gathered with an interviewer-administered questionnaire including 10 questions based on the WHO indicators.

Results: Mothers reported initiating breastfeeding early, i.e. putting the baby to the breast within one hour after birth, in 74% (n=242/327) of children 0-23 months of age. Fifty four percent (n=66/122) of the infants were recorded as being exclusively breastfed (EBF) between the ages of 0 and 6 months. However, cross-checking this data against the CNSP dataset, suggests significant over-reporting of EBF. This figure probably better reflects predominant and partial breastfeeding. Breastfeeding was continued in 32.5% (n=13/40) of babies (12-15 months). Eighty four percent (n=36/43) of infants (6–8 months) received solid, semi-solid or soft foods. Fifty three percent (n=108/205) of children (6–23 months) received foods from 4 or more food groups (minimum acceptable diet).

Conclusions: This IYCF profile suggests sub-optimal IYCF practices. While further validation of the data is required, the assessment can serve to inform stakeholders about IYCF problems and engage them in a multi-stakeholder process to jointly plan scaling up actions for improved IYCF.

Key words: children, feeding, indicators

PO773

FLUID CONSUMPTION OF YOUNG ELITE BASKETBALL PLAYERS

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Background and objectives: Lack of adequate intake of adequate fluid, as a consequence, can have weakening and reduction of sport performance. It is necessary, during physical activity, to get enough quantity of liquid because of: body temperature regulation, heart work and maintaining of blood pressure and circulation, muscle function, functioning of the gastrointestinal system, maintaining of the mental reasoning, maintaining motivation for training and sport success, preventing of subjective feeling of tiredness and fatigue.

Methods: Within the scope of the large research FIBA Europe Under 20 European Championship B division, we analyzed drinks consumed by 96 basketball players from 8 national teams. We analyzed composition of each drink they have been used during the games. Also, the quantity of liquid that was taken in was measured together with the Urine specific gravity (Usg) at the end of the game.

Results: Players age was 19±0.79 years. Total fluid intake was: 1868±816 ml (range 435–3987), sweat rate 2.7±0.9 L/h (range 5.54-1.16), Usg after the game 1026±6, average intake of water 1226 ml and average intake of sport drinks 273 ml. Sport drinks had an elevated composition of sodium and carbohydrates. One of the team due to an incorrect solution used 10% of the values suggested by the producer. We found out that players did not consume sufficient fluid to match sweat losses and 80% of all players who participated in this study were dehydrated.

Conclusions: The total quantity of liquid intake is insufficient. Undoubtedly, it is necessary to use a greater quantity of sports drinks with an adequate composition to accomplish proper rehydration. It is necessary to introduce coaches, team doctors and athletes through adequate education with the importance of proper hydration and use of sports drinks as a means of rehydration.

Key words: sport drinks, water, hydration

PO774

A CRITICAL ANALYSIS OF THE LABELS OF PROCESSED COMPLEMENTARY FOODS IN SOUTH AFRICA AGAINST INTERNATIONAL MARKETING GUIDANCE

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Background and objectives: Complementary food labels should protect and promote optimal infant and young child feeding practices and provide information regarding appropriate use. Objective: To describe the extent to which the labelling practices of processed complementary food sold in South Africa comply with international guidance on the marketing of complementary foods that is aligned with the principles of the International Code of Marketing of Breast-milk Substitutes (the Draft Guide for Marketing Complementary Foods).

Methods: Employing a cross-sectional study design, a comprehensive database of labels was created of products sold from June to August 2011. Label information was captured, then blinded and the order of products randomised. The Draft Guide was used to create a checklist against which the captured labelling practices were analysed.

Results: One hundred and sixty product labels of 35 manufacturers were analysed, none of which complied with all checklist criteria. Fifty-six (35%) labels did not provide an appropriate age of introduction, while 37 (23%) used images of infants appearing younger than six months. Eight (5%) labels recommended feeding the product in a bottle. Nineteen (12%) labels suggested a daily ration too large for a breastfed child, and 32 (20%) potentially promoted the manufacturer's infant formula. One hundred and two (64%) labels were not easy to read. A small number (4% and 6%) of labels failed to provide instructions for safe and appropriate preparation/use and storage respectively.

Conclusions: The labelling practices of processed complementary food labels in South Africa do not fully comply with international guidance. Such guidance must be refined and formalised by normative bodies and adopted into national legislation to contribute towards safe and appropriate use of processed complementary foods.

Key words: complementary food, food labelling, breastfeeding, infants, young children.

PO775

OXIDATIVE STRESS DURING PREGNANCY AND LOW BIRTH WEIGHT

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Background and objectives: High iron levels during pregnancy could induce oxidative stress that can negatively influence the development of the foetus. Our objective was to analyse the relationship between iron levels and oxidative stress during pregnancy and low birth weight (LBW).

Methods: Case-control study nested in a longitudinal study conducted on 208 healthy pregnant women taking moderate iron supplementation and their newborns. Women were classified according their infant birth weight as Low Birth Weight (LBW) (<2500 g) or Normal Birth Weight (>2500g). General clinical and obstetric histories were collected as well as the lifestyle habits. Iron biochemical parameters (Haemoglobin (Hb), Serum Ferritin (SF) and Transferrin Saturation (TS)) were recorded at 1st, 2nd and 3rd trimester and at delivery. We used several biomarkers to establish a score (SOS) relating to oxidative stress status (glutathione S-transferase, superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, reduced and oxidized glutathione, thiobarbituric acid reactive substances and hemolysis test). Oxidative stress was determined at the end of the 2nd trimester and the total antioxidant capacity of plasma was also determined (ORAC).

Results: The average dose of iron supplementation was 43.9 mg/d (geometric mean, 95%CI: 43.6-44.1). Women in the LBW group (6.7%) had significantly higher levels of SF and TS during pregnancy and exhibit lower enzymatic antioxidant activity (glutathione S-transferase, superoxide dismutase, catalase) than women in the Normal Birth Weight group. In addition, ORAC had higher values in LBW group, probably to offset the harmful effects of free radicals.

Conclusions: We observed an association between high iron levels and oxidative stress during pregnancy and LBW.

Key words: pregnancy, iron status, oxidative stress, low birth weight

PO776

MALNUTRITION AMONG ELDERLY: A STUDY IN A SELECTED RURAL AREA IN BANGLADESH.

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Background and objectives: Combating malnutrition is a core issue in MDGs and Vision 2021. The present cross-sectional study was to assess the food habits and nutritional status of elderly people in rural Bangladesh.

Methods: A simple random sampling method was used to select the study population from a pre-publicized medical camp for elderly population in a purposively selected village in Bangladesh. A total of 423 respondents (186 male and 237 female) were interviewed face to face using a semi-structured questionnaire and anthropometric data (measurement of hip, waist, height, weight) and blood pressure (BP) were collected. Associations between dietary intake and World Health Organization (WHO) referred Body Mass Index (BMI) range was done using cross tabulation.

Results: The nutritional status was found to be significantly associated with education, marital status, gender, number of child, and type of living. Only 10.2% male and 13.5% female elderly were found to have protein rich food more than five days in a week; the similar findings in taking fatty food, vegetable and fruits in a week. Associations between dietary intake and WHO referred BMI range revealed that no significant association is existed between BMI and food intake ($p \geq 0.05$).

Conclusions: The present study identified malnutrition as a common problem among elderly people living in rural Bangladesh and socio-demographic and socio-economic background is highly associated with the nutritional status, not the dietary pattern. Hence, management requires social forms of intervention and further study with higher sample size is needed to explore dietary influence.

PO778

NUTRITION AND DIET IN CUBAN ELDERLY WITH ALZHEIMER'S DISEASE OR MILD COGNITIVE IMPAIRMENT

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Background and objectives: Dementia is a public health problem with non reproducible association to nutritional deficiencies.The aim of the present study was to assess this association in Cuban elderly.

Methods: Cross sectional study in 428 subjects older than 65 years; 47 with Alzheimer's disease (AD), 131 with Mild Cognitive Impairment (MCI) and 250 healthy subjects from Havana city. Dementia was diagnosed using the 10/66 Dementia and DSM-IV criteria and MCI with the Hughes Clinical Dementia Rating. Hemoglobin, hematocrit, MCV, total cholesterol, HDL-C, LDL-C, triglycerides, thiamine, folic acid, cyanocobalamin and vitamin C were measured by standardized methods. Diet was evaluated using a weekly food-frequency questionnaire. ANOVA, Pearson's Chi square and prevalence ratios were used for data analysis.

Results: AD patients showed lower haemoglobin, hematocrit, MCV, total cholesterol, LDL-C, thiamine and vitamin C levels than healthy individuals ($p<0.05$); while in MCI patients, only haemoglobin, hematocrit and total cholesterol decreased ($p<0.05$). Lower haemoglobin and hematocrit levels were associated with higher MCI and AD prevalence. Additionally, low thiamine, folic acid, B12 and C vitamin levels were associated to higher prevalence of AD. High total cholesterol and LDL-C were associated to lower AD prevalence. Food intake was not different between groups, but fish, grains+fruits and vegetables intake was inadequate in 80%, 60% and 50%, respectively, in all subjects.

Conclusions: Those nutritional indicators are associated to MCI and AD, without identifying if they are cause or consequence of disease.

Key words: nutrition, alzheimer's disease, mild cognitive impairment

PO779

NUTRITION ASSISTANCE PROGRAM PARTICIPATION INFLUENCES HOUSEHOLD FOOD SUPPLIES AND CHILDREN'S DIETARY INTAKE AMONG MEXICAN-ORIGIN FAMILIES IN TEXAS BORDER COLONIAS

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Background and objectives: Few studies have focused on determinants of household food supplies and children's dietary intake. This study examined factors associated with nutrients available in household food supplies and dietary intake among 50 Mexican-origin children residing in Texas border colonias.

Methods: Spanish-language data were collected by trained promotora-researchers in the home March to June 2010. Data included survey data, two household food inventories (HFI) of the presence and amount of food items in the home, and three 24-hour dietary recalls reported by children participants. Nutrition Data Systems for Research was used to calculate HFI and dietary intake nutrients. Adult equivalent adjustment constants (AE), based on age and gender calorie needs, were calculated based on the age-and gender composition of each household and used to adjust HFI nutrients for household composition. Data were analyzed using bivariate analysis and linear regression models to determine the association of independent variables with the availability of each AE-adjusted nutrient.

Results: Analyses showed that households in which the child participated in the National School Lunch Program (NSLP) had foods and beverages with lower amounts of total energy, protein, dietary fiber, calcium, sodium, vitamin D, potassium, vitamin C, and total fat. Participation in other nutrition assistance programs was not associated with household nutrient availability. Participation in the National School Lunch Program (NSLP) was associated with lower dietary intakes of total energy, protein, total sugar, added sugar, and total fat; increased HFI availability of sodium was associated with greater sodium intake.

Conclusions: These findings suggest that participation in NSLP and not in other nutrition assistance programs significantly influences household food purchases and dietary intake. The next step will be to examine influences on household food supplies and dietary intakes during summer months, when NSLP is not offered.

Key words: household food supplies, nutrition assistance

PO780

POST-INFANCY GROWTH IN RELATION TO COGNITIVE ACHIEVEMENT AT AGE 8 YEARS: OBSERVATIONAL COHORT STUDY IN ETHIOPIA, INDIA, PERU AND VIETNAM

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Background and objectives: Nutritional programs often assume their effectiveness lessens sharply after age 2 years. However, early interventions may not prevent all growth failure, and potential for growth changes after this period and subsequent cognitive and schooling impacts are not well understood. We used cohort data from four countries to estimate the association of changes in growth post-infancy with cognition and schooling.

Methods: Using data from Young Lives, a study of 8062 children, we characterized growth between ages 1 and 8 y as recovered (stunted at 1, not at 8 y); faltered (not stunted at 1, stunted at 8 y); persistently stunted (stunted at 1 and 8 y); or never stunted (not stunted at 1 and 8 y). We also represented growth in terms of height-for-age z-score at 1 y (HAZ[1]) and height at 8 y not predicted by HAZ(1) (ucHAZ[1:8]). Measures included 1) quantitative achievement, 2) reading comprehension, 3) receptive vocabulary, and 4) whether child was overage for grade at 8y.

Results: HAZ(1) was positively associated with quantitative achievement (effect size range across countries 0.05-0.15); reading comprehension (0.06-0.14); and receptive vocabulary (0.04-0.11) and inversely with over-age for grade (OR range 0.83-0.92). Children who recovered in stature had better outcomes than those who remained stunted and were not significantly different in many cases from those who were never stunted. ucHAZ(1:8) was positively associated with quantitative achievement (effect size range across countries 0.05-0.09); reading comprehension: (0.02-0.10); and receptive vocabulary (0.04-0.08) and was inversely associated with over-age for grade (OR range 0.81-0.85). Conclusions Improvements in child growth following early faltering might have significant cognitive achievement and schooling benefits. Hence, while early interventions are critical, improving nutrition of pre-primary and early primary school-age children also merits consideration.

Key words: post-infancy growth, schooling, cognitive development

PO781

ORAL LEPTIN SUPPLEMENTATION THROUGHOUT LACTATION AMELIORATES NEUROANATOMIC CONSEQUENCES IN THE OFFSPRING CAUSED BY MATERNAL MODERATE CALORIC RESTRICTION DURING GESTATION

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Background and objectives: In the present study, we used an experimental rat model of moderate (20%) maternal caloric restriction during pregnancy, which is known to be associated with alterations in hypothalamic circuitry that program a higher propensity to develop obesity in the offspring, to investigate whether oral supplementation with physiological doses of leptin throughout lactation may ameliorate the developmental malprogramming effects exerted in offspring hypothalamus structure and function.

Methods: Male and female rats belonging to 3 groups were studied: the offspring of ad libitum fed dams (controls), the offspring of 20% calorie restricted dams during the first part of pregnancy (CR), and CR rats supplemented with physiological doses of leptin throughout lactation (CR-Leptin). Animals were sacrificed on postnatal day 25. Morphometric and immunohistochemical studies on arcuate (ARC) and paraventicular (PVN) nucleus were performed and hypothalamic expression levels of selected genes were determined.

Results: In CR males, leptin treatment restored, at least in part, the number of immunoreactive NPY (NPY+) cells in ARC, the total number of cells in PVN, hypothalamic NPY, CART and SOCS-3 mRNA levels, and plasma leptin levels, which were decreased in CR animals. CR-Leptin males showed higher hypothalamic ObRb mRNA levels, compared to control and CR animals. In CR females, leptin treatment reverted the increased number of cells in ARC and of cell density in ARC and PVN, and reduced hypothalamic SOCS-3 mRNA expression to levels similar to controls. Leptin treatment also reverted the increased relative area of NPY+ fibers in the PVN occurring in CR animals.

Conclusions: Results suggest that leptin supplementation throughout lactation is able to ameliorate adverse developmental effects on hypothalamic structure and function, making the metabolic malprogramming induced by maternal caloric restriction during gestation reversible to some extent.

Key words: leptin, hypothalamus, metabolic-programming

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PO782

COMPARISON IN THE DEVELOPMENT OF THE MICROBIOTA ALONG THE GASTROINTESTINAL TRACT OF INFANT MICE AFTER BREAST-AND FORMULA FEEDING.

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Background and objectives: The development of the human microbiome is a complex process, which may begin during the perinatal period when the infant is exposed to the mother's microbiota. Feeding practices (breast milk or formula) influence the establishment of microbiota, which is known to play an essential role for the maturation of the immune system and gastrointestinal mucosa. The aim of this study was to

compare the microbiota colonization patterns throughout the gastrointestinal tract of mice after breast- and formula feeding.

Methods: Twenty four specific pathogen free BALB/cOlaHsd mice pups (age 14 days) were randomly allocated in 2 different experimental groups (normal lactation and manufactured infant formula) for 4 days. Samples of the oral cavity, stomach, small intestine and large intestine were collected, and thereafter the main composition of intestinal microbiota was characterized by qPCR.

Results: Formula fed mice showed different microbial composition in the oral cavity and stomach compared to breastfed pups. In stomach, significantly higher levels of total bacteria (p=0.0001), Lactobacillus group (p=0.001) and Streptococcus group (p=0.008) were found in the breastfed group. Higher levels of total bacteria (p=0.005), Bifidobacterium (p=0.060), Lactobacillus (p=0.005), Bacteroides-Prevotella (p=0.007), Streptococcus (p=0.001) and Akkermansia muciniphila (p=0.005) were found in the small intestine of breastfed mice. Moreover, the prevalence of Enterococcus group was found to be higher in formula fed group (p=0.005). In the large intestine, higher levels of Enterococcus (p=0.0001) and Enterobacteriaceae (p=0.0001) groups were found in the formula-fed mice.

Conclusions: Significant differences in the microbial colonization patterns were detected along the whole gastrointestinal tract of the infant mice depending on whether the pups were breast- or formula fed, even for a short period of time, suggesting that two feeding types have a considerably different impact on the development of the gut microbiota in suckling mice.

Key words: microbiota, infant formula, lactation, animal model.

PO783

EFFECTS OF MATERNAL PALMITOLEIC-ACID SUPPLEMENTATION DURING PERINATAL LIFE IN THE OFFSPRING METABOLIC HEALTH IN RATS

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Background and objectives: Maternal dietary fat source, more than the absolute amount, may affect offspring susceptibility to obesity and related-metabolic alterations. Palmitoleic-acid (C16:1 n-7) has been proposed in animal studies to act as a lipokine, i.e. an adipose tissue-derived lipid hormone, that stimulates muscle insulin action and suppresses hepatosteatosis; however, in humans, plasma palmitoleic-acid concentration has been positively associated with increased risk of obesity. Here, we aimed to assess whether palmitoleic-acid-supplementation during pregnancy and lactation to rat dams could affect future offspring metabolic health.

Methods: Dams were daily supplemented with palmitoleic-acid (38.5mg) or the vehicle (skimmed-milk) during late pregnancy and lactation. At day-21, offspring of control and palmitoleic-acid-supplemented dams (C and PO, respectively) were weaned and fed with standard-diet until 5-months of age, and then exposed to high-fat-diet for two-months. Blood samples were collected and animals were sacrificed to obtain liver and WAT at 7-months of age.

Results: Despite no differences in body-weight, PO-animals showed greater fat accumulation than C, particularly males. PO-animals displayed higher levels of fasted glucose and insulin (females) and HOMA-index than C. PO-males, but not females, also showed higher leptinemia. Interestingly, PO-animals, particularly females, showed lower hepatic lipid content. Hepatic mRNA levels of SREBP1c, FASN, GPAT, STAT3 and SOCS-3 showed a sex-dependent pattern, with a tendency to increase in males and to decrease in females. IRS1 and InsR were decreased in PO-animals, particularly females. In retroperitoneal-WAT, PO-animals showed higher mRNA levels of STAT3 and SOCS-3 and of ObRb and InsR (only females) than C.

Conclusions: Results suggest that maternal palmitoleic-acid-supplementation during perinatal life may affect offspring metabolic capacity, leading to protective effects against hepatic lipid accumulation under high-fat-diet; however more studies need to be done to further clarify the observed effects on insulin, leptin and glycemia.

Key words: dietary fat, perinatal life, hepatoesteatosis.

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PO784

DIFFERENTIAL FERRITIN INTERPRETATION STRATEGIES TO ACCOUNT FOR INFLAMMATION RESULT IN DESCREPANCIES IN IRON DEFICIENCY PREVALENCE IN MALNOURISHED SOUTH AFRICAN INFANTS

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Background and objectives: China as the biggest developing country continue to experience a large burden among children in rural area. Poor fetal growth continues to be high and with subsequent growth faltering in the first two years

childhood malnutrition. The primary aim of this study was to assess the relationship between fetal growth restriction and childhood malnutrition at 24 months.

Methods: A longitudinal follow-up of a subset of newborns (n=1032) whose mothers were randomly assigned to receive the supplements of folic acid, iron–folic acid or multi-micronutrients daily during pregnancy in the original trial was conducted. Children's weight and length were measured at 24 months of age. Anthropometric indices weight-for-age Z-score, length-for-age Z-score and weight-for-length Z-score were calculated with WHO Anthro 2005 (WHO, 2006) and WHO Child Growth Standards 2006. Relative risk (RR) and 95% confidence intervals (CI) were estimated by Logistic regression model compared with reference category.

Results: Small-for gestational age (SGA) of newborns were significantly associated with their stunting (RR 2.57, 95%CI 1.74 - 3.78), wasting (RR 6.16, 95%CI 1.37 - 27.78) and underweight (RR 8.41, 95%CI 3.78 -18.69) at 24 months of age compared with adequate-for-gestational age (AGA). Low birth weight (<2.5kg) of newborns also increased the risk of stunting (RR 2.20, 95%CI 1.04 - 4.62), wasting (RR 21.21, 95%CI 4.57 - 98.41) and underweight (RR 11.00, 95%CI 4.33 - 27.93) at their 24 months of age compared with those newborns with birth weight ≥2.5kg.

Conclusions: Fetal growth restriction increased the risk of childhood under-nutrition at 24 months in northwestern rural China, with implications for programs and policy focusing on pregnant women and more broadly maternal nutrition.

Key words: stunting, birth weight, small for gestational age

PO786

NUTRITIONAL STATUS, SEVERITY OF SENSORY SENSITIVITIES AND FEEDING PROBLEMS IN CHILDREN (3-10 YEARS) WITH PERVASIVE DEVELOPMENTAL DISORDERS.

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Background and objectives: Nutritional status, severity of sensory sensitivities and feeding problems were assessed among 30 children (3-10 years) with Pervasive Developmental Disorders (PDD), attending two special schools in New Delhi, India.

Methods: The mothers of children were interviewed to elicit information on sensory sensitivities, dietary intake pattern, mealtime behavior and feeding problems of the children. This information was collected using interview schedules, Short Sensory Profile (SSP) questionnaire, 24-hour dietary recall, semi-quantitative food frequency questionnaire (SQ-FFQ) and Brief Autism Mealtime Behavior Inventory (BAMBI). Anthropometric status of these children was assessed by measurement of weight and height. The severity of sensory sensitivities was assessed based on the SSP scores.

Results: The children were categorized as having definite difference (17), probable difference (8) and typical performance (5) which was in the order of decreasing severity. Based on z-score classification of BAZ, HAZ and WAZ, 6 children were identified as overweight or obese, 2 were severely stunted and 2 children were severely underweight respectively. A high proportion of children (1/3rd) were stunted in the definite difference category of SSP as compared to the children (1/5th) in the typical performance category. Percent adequacy of food groups ranged from 45 to 145% when compared with the balanced diet recommendations (ICMR, 2010). Percent adequacy of various nutrients as compared with RDA ranged from 51 to 304 %. The severity of sensory sensitivities were significantly correlated with mealtime behaviour problems ($r=-0.46$; $p<0.05$).

Conclusions: Thus, children with PDD having severe form of sensory sensitivities who may have more mealtime behavior problems would require individualized dietary interventions to improve the acceptability and nutritional quality of their diets.

Key words: pervasive developmental disorders, sensory sensitivities, nutritional status, dietary intake and mealtime behavior problems.

PO787

THE ROLE OF LAY COMMUNITY HEALTH WORKERS IN PROMOTING EXCLUSIVE BREASTFEEDING PRACTICES AMONG HIV POSITIVE MOTHERS IN THE RURAL MALAWI

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Background and objectives: Women in Malawi with constrained access to infant formula are encouraged to breastfeed exclusively (EBF) for 6 months as a pre-requisite to achieve MDG 4. Despite high rates of HIV and infant mortality, mixed feeding remains dominant and EBF is estimate at 74.4%. Other studies in the country have reported lower EBF rates of 4% and under-five malnutrition remain persistent. Determinants of EBF include cultural and lack of hospital and community support. Previous interventions focused on supporting breastfeeding in the maternity which significantly improved early initiation but not EBF for 6 months. Recently, interventions have been directed to promote EBF at community level using

peer counsellors. MaiMwana tested the intervention in rural Malawi.

Methods: We purposively selected and conducted 39 qualitative in-depth interviews between January-August 2012 with women, peer counsellors, key informants to explore experiences with the programme in the context of HIV following ethics approval from Malawi and City University. Data was analyzed using framework analysis.

Results: HIV positive and negative women were happy with the intervention for continuity of counselling on infant feeding. Volunteers spent more time and observed the real infant feeding modality at home. HIV positive women could tell their story to someone who was there for them. Women appreciated the importance of home counselling because they could control the type of food given to the baby unlike in the past when they go to the field and leave the child with other care takers without knowing what was given to the child increasing chances of transmitting HIV or diseases. Volunteers also gained knowledge on the importance of EBF and care for their own children or grandchildren.

Conclusion: Scaling-up community based interventions in poor communities with shortage of medical personnel is paramount to promote EBF and child survival.

Key words: EBF, peer counsellors, HIV, Malawi

PO788

FATTY ACID METABOLISM: CHANGES IN LIVER MRNA EXPRESSION IN MICE FED WITH TWO DIFFERENT BRANDS OF HOMEGENIZED BABY FOOD

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Background and objectives: For the correct development of infants during growth a balance fatty acid profile is required, being established at 1:2:1 (saturated:monounsaturated:polyunsaturated). Diets without this proportion could produce harmful effects related to overweight and obesity. The aim of our study was to characterize the impact of two different types of homogenized baby foods on the fatty acid metabolism in liver.

Methods: Thirty-six weaned C57BL/6J mice were randomly separated in three different experimental groups for a 12-week intervention groups. The groups were divided into A group fed on baby food containing 67 kcal for 100 g of food, 2.7% fat and a balanced fatty acids profile which proportion of S/M/P was 1:2:1; B group fed on baby food containing 87 kcal for 100 g of food, 2.9 % fat and a unbalanced fatty acids profile which proportion of S/M/P was 1:2:0.5; and a control group fed on rodent chow. All groups had free access to rodent chow to avoid deficiencies in micronutrients. A and B group developed overweight compared with control. At the end of the study, samples of liver were collected and expression of genes related with fatty acid metabolism was analyzed by qPCR.

Results: We found 14 genes overexpressed in B group compared with control group ($p<0.03$). None gene was overexpressed in A group. These overexpressed genes in B group, related with PPARα activation, are involved in the catabolism of fatty acids, fatty acids transport through mitochondria, and triacylglicerol catabolism.

Conclusion: Our results suggest that the intake of homogenized baby food with unbalance fatty acids profile might produce up-regulation of PPARα target genes in mice, altering the lipid metabolism compared to a balance fatty acids intake in overweight.

Key words: fatty acid metabolism, baby food, animal model.

PO789

INTERGENERATIONAL TRANSMISSION AND CHILD FEEDING PRACTICES IN DETERMINING GROWTH DURING INFANCY AND CHILDHOOD

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Background and objectives: This paper makes an attempt to examine the growth of children according to their birth outcomes. The key research question is; whether low birth weight (LBW) babies will be able to achieve their normal growth during childhood; and if they do, what will be the role of feeding practices, and genetic component in determining normal growth in LBW babies?

Methods: The study is based on the data from Indian National Family Health Survey covering the period from 1992-2006. Our study focuses on two groups of children; children with LBW and normal growth at age two, and children with normal birth weight but below average growth at age two. We examine the association of different household level variables and birth outcomes with growth during childhood with the help of regression analysis. In addition, Infant and Young Child Feeding (IYCF) indicators have been calculated for both the groups in order to monitor their growth pattern. Further, we apply discriminant function analysis to examine the most probable combi-

nation of variables in compensating the lagged growth.

Results: Regression results suggest that exclusive breastfeeding, timely initiation of complementary feeding with a diverse diet play an important role as growth promoting factor even for LBW babies. We also observe that genetic factors have a significant association with restrictive growth. Further, the study suggests that proper child feeding practices may help to overcome the genetic deficiencies even though there is a variation in strength of intergenerational transmission across different subgroups of the population.

Conclusions: On the basis of the study, we may say that growth during infancy and childhood is not confined solely to birth outcomes, but some external factors may also contribute significantly to compensate the birth deficits.

Key words: feeding practices, genetic component, lagged growth, discriminant function, birth deficit

PO790

FOOD INTAKE IN CUBAN INFANTS ACCORDING TO NUTRITIONAL AND SOCIOECONOMIC STATUS

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Background and objectives: Nutritional status is associated to many factors such as socioeconomic status and feeding habits. The aim of this study was to identify those associations in a group of Cuban infants.

Methods: This descriptive study included 22 infants between 6 and 24 months of age and was carried out in Arroyo Naranjo municipality, Havana. Weight and length were measured to determine nutritional status. Nutrients and food portions intake were estimated using a semiquantitative food frequency questionnaire. Foods were aggregated into 7 groups according to Cuban Food Guide. Descriptive statistics and Spearman correlation test were used.

Results: 13% of the group was underweight, 64% was normal, 23 % was overweight. There was a strong association between nutritional status and gender (p=0.002). Vegetable, fruits, dairy products and fats portions consumption was low, while cereals, tubers, meats, poultry products and sugar portions consumption was high. High associations were found between mother´s age and infant´s length (p=0.015), family incomes and energy intake (p=0.004), family incomes and sugar portions consumption (p=0.019).

Conclusions: Nutritional status is strongly associated to gender, food intake and family incomes.

Key words: infants, food intake, feeding habits.

PO791

PROPAN (PROCESS FOR THE PROMOTION OF CHILD FEEDING): A TOOL FOR INFANT AND YOUNG CHILD FEEDING PROGRAMMING

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Background and objectives: Setting-specific program guidance on infant and young child feeding (IYCF), particularly complementary feeding, continues to be a challenge. To address this, we developed ProPAN, a step-by-step tool aimed at ministries of health, NGOs and international organizations.

Methods: Developed by a multi-disciplinary team of nutritionists, social scientists, epidemiologists and computer programmers and by building on field experiences in Africa, Asia, Latin America and the Caribbean.

Results: ProPAN consists of a field manual and software based on Epi Info™ for data entry and analysis. Its features include 1) Forms and guides for collection of quantitative and qualitative data; 2) Methods for integrating quantitative and qualitative data; 3) Methods for formulating, ranking, and selecting dietary and feeding practice recommendations, based on practicality, feasibility, and acceptability; 4) Software for standardized input and output of nutrition, feeding and diet information; and 5) Guidance on how to convert the resulting data into an intervention or program and to design a monitoring and evaluation strategy. The 2nd edition of ProPAN incorporates the WHO Child Growth Standards, WHO/UNICEF IYCF Indicators, a method to measure responsive feeding, questions on HIV and infant feeding, MUAC for use in emergency settings, and outputs to use with WHO's Optifood program.

Conclusions: ProPAN provides a systematic and complete tool for programming in infant and young child nutrition. It is flexible in that the modules can be used individually or as one comprehensive exercise, depending on the needs of the user. It can also be used to train nutritionists in quantitative and qualitative research methods.

Key words: breastfeeding, complementary feeding, child nutrition ProPAN was developed by PAHO/WHO and UNICEF with support from the US CDC and Emory University. ProPAN is freely available in English, French and Spanish at www.paho.org/ProPAN. The 2nd edition was funded, in part, by GAIN.

PO792

BREAST FEEDING PRACTICE IN BANGLADESH: ADDRESSING THE BOTTLENECKS WITH COMMUNITY HEALTH WORKERS IN A COMMUNITY BASED INTERVENTION OF BRAC

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Background and objectives: In Bangladesh 85% children were exclusively breast fed in first month of life which dropped to 35.1% just at 4th month and further at 6th month (7.3%). Only half of the babies are initiated breast feeding within first hour of life. The impact has been reflected over the prevalence of malnutrition among under five children (41% stunting and 51% anaemia) (Bangladesh Demographic Health Survey 2011). To address this issue BRAC developed comprehensive nutrition promotion activities at community level covering around 1 million under two children in rural and urban slum areas.

Methods: BRAC trained 58,000 community health workers (CHW) in diversified skills of breast feeding counseling and management of breast feeding complications. They follow children since birth till age below five years. CHWs attend home births and initiate breast feeding at first hour. During the subsequent home visits they ensure exclusive breast feeding (EBF) by counseling the parents and grandparents and manage minor problems around breast feeding. Between 181-187 days (seventh month) they demonstrate complementary food preparation using family food and emphasize on adequate quantity, proper composition and hand washing. At the same time breast feeding also continued for two years.

Results: According to MIS report, in 2012 among 405,951 born alive babies, 366,127 were breast feed at first hour and 182,322 infant continued exclusive EBF for six months. CHWs collected monthly information of child feeding and based on six months data report on EBF, not single survey. CHWs demonstrated 290,800 complementary feeding at the same time encouraged mothers to continue breast feeding.

Conclusions: CHWs can influence in early initiation when attend births. Regular household visits encouraged mothers and motivates family members' support for continuation of breast feeding, still there remains challenge in continuation for six months.

Key words: BRAC, CHW, breast feeding

PO793

DIET QUALITY OF MOROCCAN PERIMENOPAUSAL WOMEN INTEGRATED IN A MULTIDISCIPLINARY INTERVENTION STUDY

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Background and objectives: Northern Morocco and southern Spain are areas geographically close but with large socioeconomic and cultural differences. The aim of this study was to determine the quality of the diet of a group of perimenopausal women in southern Morocco.

Methods: The study comprised 151 women from the North of Morocco with an age ranged 45-65 years. It was carried out an assessment of the quality of the diet by a validated food survey, designed by Mataix et al. (2000) for the assessment of nutritional status of Andalusia. The data have been entered into the nutrition program AYS44, designed at the Institute of Nutrition and Food Technology of the University of Granada.

Results: Energy and fiber intake are adequate are adequate to cover the recommendations of women in this stage of life. The energy profile shows that the women's diet is normoproteic (15%) hypoglucidic (47%) and hyperlipidic (41%). The quality of dietary fatty acids according to the ratio of unsaturated / saturated fatty acids is less (2.5) than those found in Spanish women of similar characteristics (3.0) probably due to the use of argan oil and sunflower oil instead of olive oil. The average intake of vitamins is adequate, except for vitamin A which covers only 85% of the recommended intakes (RI). Mineral intake is insufficient for calcium (87% RI), zinc (92% RI) and iodine (61% IR). Statistical analysis of the data collected for this study was carried out using SPSS version 20.0.

Conclusions: Moroccan women have a worse lipid and caloric profile than Spanish women, presenting a deficit in some vitamins and minerals which are essential to prevent diseases associated with perimenopause. Nutrition education policies are mandatory for this group of women who could be health workers in their environment.

Key words: perimenopausal, Morocco, survey, Diet quality.

PO794

IN VITRO IRON AVAILABILITY FROM SIX DIFFERENT INFANTS CEREALS RECONSTITUTED WITH GROWING-UP MILK OR WATER

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Background and objectives: Iron deficiency is the most prevalent nutritional disorder in developing countries. In industrialized countries, the prevalence of iron deficiency also remains the most common nutritional deficiency in the early childhood. Food fortification is an effective strategy to reduce iron deficiency.

Methods: In this study, six different commercial infant cereals (Gluten-Free Cereal, 8 Cereals, Multicereals, Cereals with Mixed Fruits, 8 Cereals with Honey, Cereals with Cacao) reconstituted with water or growing-up milk were analyzed to study possible differences in iron bioavailability. An in vitro method to simulate the gastrointestinal digestion process of infants, was applied to study the iron bioavailability from infant cereals for that enzymatic treatment was carried out in two stages involving pepsin at pH 2.0 followed by pancreatin and bile salts at pH 6.5 . The incubation period was of 2 hours to mimic the transit of meal in the gastrointestinal tract of infants . Iron content was determined using a flame atomic absorption spectrometer. Solubility and dialysis of iron recosntituted with water o growing-up milk, were compared by anova one way values of $p<0.05$ were considered significant.

Results: Infants cereals recosntituted with growing-up milk showed the highest amount of iron. However when, infants cereals were mixed with water, increase in the Fe didyzebility percentage was observed compared with the same cereals mixed with growing-up milk (3±0.2%) and (1.9±0.1%), respectively.

Conclusions: The nutritional status of iron in infants depends, mainly, on the stores at birth, the requirements of iron for growth and bioavailability of dietary iron from fortified infants cereals. Mixing infants cereals with water seems to be and adequated strategy to improve Fe availability to prevent iron deficiency in these population such as prematurity, low birth weight, etc.

Key words: iron, bioavailability, growing-up milk, fortification

PO795

DIETARY IRON INTAKE AND IRON STATUS AMONG LACTATING WOMEN IN BHAKTAPUR, NEPAL

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Background and objectives: The main objective was to describe the dietary iron intake and dietary predictors of iron status and hemoglobin concentration among lactating women in Bhaktapur, Nepal

Methods: In 2008 and 2009 we included 500 randomly selected lactating women in a cross sectional survey. Dietary information was obtained by three 24-h recall interviews including personal recipes. Plasma concentrations of hemoglobin (Hb), serum ferritin and transferrin receptors were measured.

Results: The median iron intake from food was 26.4 mg and the main contributors of dietary iron were mustard leaves (25%) and beaten rice (18%). Around 90% of women had taken iron supplements during pregnancy and the mean duration of iron supplementation was 4.8 months. The prevalence of anemia was 20% (Hb<12.3 g/dl) and the prevalence of iron deficiency was 5 % (plasma ferritin <15µg/l). Higher serum ferritin levels were associated with greater intake of dietary iron intake (x (95% CI) 0.01 (0.004, 0.01). A significant negative association between dietary iron intake and transferrin receptor was found (x (95% CI): -0.002 (0.003, 0.00). In addition, for the women with children<6 months, iron supplementation was positively associated with plasma ferritin concentrations (P interaction<0.001) and negatively associated with plasma TfR (P interaction=0.07).

Conclusions: Due to a high dietary intake of non-hem iron combined with low bioavailability, a high proportion of the women in this study were at high risk of inadequate intake of iron. Our analysis showed that higher intakes of dietary iron were associated with better plasma ferritin and transferrin receptor status and iron supplementation for at least 6 months during pregnancy was associated with better hemoglobin concentration during the lactation period.

Key words: dietary iron, bioavailability, iron supplements

PO796

DIET QUALITY IN A GROUP OF PERIMENOPAUSAL WOMEN FROM SOUTH SPAIN BASED ON FOOD FREQUENCY QUESTIONARY AND MEDITERRANEAN DIET SCORE.

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Background and objectives: Nowadays, women between 45-65 years present different lifestyles to those of their previous generations which can modify the eating habits of the whole family. Our aim is to determine the quality of the diet of a group of perimenopausal women in Southern Spain, using a Food Frequency Questionnaire and the adherence to the Mediterranean Diet.

Methods: The study comprised 143 women from the South of Spain with an age ranged 45-65 years. Food frequency habits was assessed by a food frequency questionnaire developed by Mataix et al, 2000 which has been widely validated in the nutritional assessment of the Andalusian population studies. Adherence to the Mediterranean Diet was determined by using the Mediterranean Diet Score(SDM) developed by Panagiotakos et al, 2005.

Results: From the food frequency questionnaire the results were as follows: cereal (pasta, rice, bread, and non-refine cereals) (3.5 servings/day), fruit (2 s/d), nut (0.3 s/d) and water group (5.6 s/d) are relatively under the recommendations. Dairy products (2.9 s/d) and pulses group (0.5 s/d) are within the recommendations. Fish (0.9 s/d) and egg (0.3 s/d) groups slightly exceed the recommendations. Vegetables (3.9 s/d), meat and meat products (1.4s/d), sweets (1.1s/d) and dietary fat group (2.9 s/d) greatly exceed the recommendations. The women studied have occasional and moderate alcohol consumption (0.4 s/d). SDM ranges from 0-55 points, in which our women presented an average score, equal to 33.03±4.19. Statistical analysis of the data collected for this study was carried out using SPSS version 20.0

Conclusions: In general, diet in our study group is in accordance to healthy dietary habits. However there are some food groups whose consumption should be modified. Those data indicate that our results beside others from different studies are key to the development of nutritional education campaigns aimed at perimenopausal women.

Key words: perimenopausal, mediterranean diet score, food frequency, south spain women.

PO797

CAFFEINE CONTENT AND EXERCISE-PSYCHOSTIMULANT EFFECTS OF VIA® INSTANT COFFEE

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Background and objectives: The purposes of this study were to objectively determine the caffeine content of VIA® instant coffee (VIA) and to elucidate its psychostimulant effects during exercise. There is little commercial information about the caffeine content of VIA. We hypothesized that VIA would increase ($p<0.05$) subjective reports of energy, alertness, and focus during exercise in resistance-trained university students, compared to themselves in a decaffeinated (DCF) condition.

Methods: Caffeine Content: VIA and DCF individual packets were analyzed in triplicate by high performance liquid chromatography (HPLC) to determine caffeine content. The samples were constituted in deionized water, further diluted, and syringe-filtered prior to analysis. Caffeine concentrations were determined from a six-point calibration curve of caffeine standards. Exercise-Psychostimulant Effects: After 24 hours of dietary control and caffeine abstinence, fasted subjects performed resistance exercise under two conditions (VIA, DCF) separated by 48-72 hours. Immediately after exercise, subjects rated feelings of energy, alertness and focus on a five-point scale.

Results: VIA was found to contain 164±3 mg (mean +SD) per serving. For DCF, caffeine was below the calibration range (<9 mg per serving). Regarding psychostimulant effects, there was a significant increase in alertness (VIA 4.17±0.94 vs DCF 3.17±0.83; $p=0.00013$); energy (VIA 4.50±0.67 vs DCF 3.17±0.72; $p=0.00002$); and focus (VIA 4.33±0.78 vs DCF 3.33±0.0394; $p=0.00394$).

Conclusions: These preliminary data reveal caffeine content for VIA substantially above reported values for regular instant coffee (164 vs 64 mg) and support the hypothesis that VIA increases exercise related perceptions of energy, alertness, and focus.

Key words: caffeine, coffee, resistance exercise, psychomotor

PO798

CALCIUM INTAKE, MAJOR DIETARY SOURCES AND ITS ASSOCIATION WITH SOCIOECONOMIC STATUS IN PRIMARY SCHOOL CHILDREN IN TEHRAN

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Background and objectives: Calcium is the most limiting nutrients in the Iranian household diet. Sufficient calcium intake is crucial to support growth spurt during preteen and teenage years. This study aimed to assess daily calcium intake, its major dietary sources and the association with socioeconomic atatus (SES) in primary school children in the city of Tehran.

Methods: In a cross-sectional study, 501 students (244 girls and 257 boys) from grades 4 and 5 of elementary schools were selected through systematic random sampling from all districts of the city of Tehran. Demographics and SES was assessed using a questionnaire through face-to-face interviews. Ca intake was assessed using a validated 60-item semi-quantitative food frequency questionnaire, specifically designed for dietary sources of Ca. One way-ANOVA test was used to compare within-group total calcium intake in each gender and in total participants, followed by post hoc Tukey HSD test.

Results: Mean calcium intake of the children was 917.5±440.8 mg/day (girls: 901.2±447.7 mg/day; boys: 932.8±434.4 mg/day). While only 17.8% met the daily recommended intake of Ca (>1300mg/day), the intake in 59.9% was below 75% of RDA. Main contributors of Ca in the children's diet were milk and dairy products (69.3% of total calcium intake). Only 29.8% met the food-based dietary guidelines for dairy intake (>3 serving/day). No significant difference was observed between boys and girls in the intake of calcium and dairy products; however, calcium intake of girls in the middle SES district was significantly lower than boys in the same district (780.3±44.3mg/day vs 964.5± 48.5 mg/day; $p<0.05$) and girls in both low and high SES districts. No significant association was observed between Calcium intake of children and other socioeconomic variables.

Conclusions: Planning useful nutrition strategies for overcoming this problem seems inevitable.

Key words: calcium intake, primary school children, Tehran.

PO799

IMPACT OF DAILY CONSUMPTION OF A MICRONUTRIENT-FORTIFIED, LIPID-BASED NUTRIENT SUPPLEMENT (LNS) ON BREAST MILK INTAKE IN MALAWIAN INFANTS

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Background and objectives: Clinical trials have been designed to assess the effects of LNS on infant growth and development. Infants self-regulate their energy intakes, thus LNS has the potential to reduce breast milk intake. The objective of the study was to estimate breast milk intake, in a sub-sample of Malawian infants (n=358) participating in the iLiNS-DOSE trial at 9-12 mo of age, using the dose-to-mother deuterium oxide dilution technique.

Methods: In the main trial, at 6 mo of age infants were randomly assigned to receive either LNS at a daily dose of 10 g, 20 g or 40 g, or no study supplement until 18 mo of age. Breast milk intake was assessed in 9-12 mo infants using the dose-to-mother deuterium oxide technique. An oral dose of 30 g deuterium oxide was given to mothers after collecting 4 ml and 2 ml of baseline saliva samples from mothers and infants respectively. Saliva samples from mother-baby pairs were further collected at 1, 2, 3, 4, 13, and 14 d post-dosing. Deuterium enrichment of saliva samples was measured using Fourier-transform infrared spectrometer. Mean daily breast milk intake and maternal % body fat were calculated from deuterium enrichment data based on a two-compartment, steady-state model.

Results: Daily mean (SD) breast milk intake was 752 (244) g/d and did not differ by group (p=0.51). Mean (SD) non-breast milk oral water intake was 388 (255) g/d and did not differ (p=0.81) by group. Mean (SD) maternal % body fat was 21.5 (7.7).

Conclusion: Daily consumption of LNS by healthy Malawian infants did not significantly affect mean breast milk intake. Funding was provided by the Mathile Institute for the Advancement of Human Nutrition, the International Atomic Energy Agency, the University of Tampere, and the Bill & Melinda Gates Foundation.

Key words: LNS, breast milk, deuterium oxide

PO800

PATTERNS, MICRONUTRIENT AND CALORIC INTAKE FROM BEVERAGES IN OLDER ADULTS WITH MILD COGNITIVE IMPAIRMENT

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Background and objectives: The objective of this study was to determine patterns of beverage consumption and the contribution to micronutrients and calories from beverages in older adults with mild memory decline.

Methods: This was a cross-sectional study with 60 free living older adults (71.7±5.4 years) who had mild cognitive impairment, a risk condition for dementia. Participants were mostly female (61.7%), white-American (93.3%) with some college education or above (88.3%). Dietary data collected using 3-day food records were analyzed using Nutrition Data Systems for Research.

Results: Total daily consumption of fluid was 53.6±26.7 fl oz and water was the most frequently consumed beverage (n=53, median =13.3 fl oz among consumers) followed by milk (n=49, 5.3 fl oz), tea/coffee (n=48, 16.0 fl oz), and 100% fruit and vegetable juice (n=27, 5.3 fl oz). The nutrients of greatest contribution to the diet from beverages included vitamin D (29.4±25.5% out of total vitamin D consumption), calcium (26.4±14.5%), vitamin B2 (22.0±12.8%), magnesium (18.9±8.4%), and vitamin C (18.1±23.9%). Interestingly, only about 11% of total energy and<2% of energy from added sugar came from beverages.

Conclusions: These preliminary findings suggest that nutrient dense beverages play a substantial role in overall micronutrient intake, despite comprising a small component of daily caloric intake.

Key words: beverages, older adults, micronutrients

PO801

CHANGES IN FUNCTIONAL BIOCHEMICAL ZINC INDICES AND BONE MASS OF ADULT WOMEN DURING LACTATION

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Background and objectives: Zinc is recognized to be essential for bone metabolism and antioxidant defense, which is partially related to its structural and catalytic role for different enzymes activities. Therefore, zinc deficiency during lactation could exacerbate the bone loss inherent to this period and contribute to oxidative stress. The aim of this study was to investigate the effect of lactational period (LP) on functional biochemical zinc indices and bone mineral density (BMD) of Brazilian lactating women.

Methods: Fourteen women (31 ± 4.7 y), exclusively breastfeeding, with low zinc intake (7.7 ± 3.8 mg/d) were evaluated in two LP: 2-4wk (early lactation, EL) and 12-14wk postpartum (middle lactation, ML). Functional biochemical zinc indices [erythrocyte superoxide dismutase (SOD); erythrocyte aminolevulinic acid dehydratase activity (δ-ALAD) and in vitro zinc-δ-ALAD activation (Zn-δ-ALAD%); plasma bone alkaline phosphatase (BAP)] and measures of BMD [at total body (TBMD) and lumbar spine (L2-L4)] were assessed in both periods.

Results: Comparing ML to EL, significant reduction were observed for: δ-ALAD (18%; p=0.002), indicating a lower content of zinc bound and/or oxidation of thiols groups essential for δ-ALAD activity; and SOD (21.3%, p = 0.01), suggesting increased production of oxidants during lactation. The increa-

se on BAP activity (21.9%, p = 0.003), a bone formation index, and the decreases on TBMD (p = 0.001) and L2-L4 (p = 0.002), are consistent with the high rate of bone turnover during this period.

Conclusions: Our results suggest impairment on antioxidant status and also a redistribution of zinc during lactation in order to attend the high rate of bone turnover.

Key words: Lactation, zinc, bone, antioxidant. Financial support: CNPq, CAPES.

PO802

ANTIOXIDANT CAPACITY OF BOTH PLASMA AND BREAST MILK DECREASED DURING LACTATION IN ADULT WOMEN EXCLUSIVELY BREASTFEEDING

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Background and objectives: The increased energy metabolism and the transfer of antioxidant substances to human milk could impair antioxidant status during lactation, negatively affecting maternal health. The impairment on maternal antioxidant status can also contribute to reduce the antioxidant capacity (AC) of breast milk, with possible consequences for the infant exclusively breast-fed. The aims of this study were to evaluate the effect of lactation period on AC in plasma and breast milk of adult women, and also their association.

Methods: Plasma and breast milk samples of fourteen healthy women (31±4.7 y), exclusively breastfeeding, were obtained at wk 2-4 (early lactation, EL) and wk 12-14 of lactation (middle lactation, ML). Total AC (TAC) in plasma and milk samples was assessed by ferric-reducing ability (FRAP) and oxygen radical absorbance capacity (ORAC) assays.

Results: At ML, significant reduction was observed for TAC in both, plasma (35%, $p<0.05$) and breast milk (33%, $p=0.01$) only for FRAP assay. These results suggest oxidation of reducing agents contributors to the method during lactation. By ORAC assay it was noted a significant correlation between TAC in plasma and breast milk ($r=0.74$; $p<0.001$).

Conclusions: Our results suggest that exclusive breastfeeding may impair the antioxidant status of adult women, which possibly contributes to decrease antioxidant capacity in breast milk.

Key words: lactation, antioxidant capacity, breast milk. Financial support: CNPq, CAPES.

PO803

FEASIBILITY AND ACCEPTABILITY OF INTEGRATING VITAMIN A RICH ORANGE FLESHED SWEET POTATO INTO ANTENATAL CARE SERVICES IN WESTERN KENYA

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Background and objectives: This study presents findings on the acceptability and feasibility of an integrated nutrition, agriculture and health intervention that delivers vitamin A rich, orange fleshed sweet potato (OFSP), through antenatal care services (ANC) with the goal of improving the health and nutrition of pregnant women and their infants in Western Kenya.

Methods: We explored the feasibility and acceptability of the intervention through 42 interviews with nurses, community health extension workers (CHEW), vine multiplers (VM), agriculture extension agents and district-level officials; and 24 focus group discussions with community health workers (CHW), pregnant women, and their husbands. Qualitative data was transcribed verbatim and analysed using NVivo 10.0. Content analysis was used to identify key topics, relational analysis to examine relationships between themes and respondents.

Results: Enhanced maternal and child health coupled with food security were the most recognized benefits by respondents. Mothers felt their children were less susceptible to disease and more energetic; they and their partners also valued OFSPs' shorter maturity and higher yields. Frontline health workers perceived higher ANC attendance and increased contact between mothers, their partners and children with the health system. All implementers were motivated by enhanced training, more effective nutrition messaging, tangible recommendations to improve dietary quality, community recognition, and ability to better serve their clients. CHWs emerged as key facilitators of implementation and outreach to mothers. Challenges to implementation and uptake included mothers' distance to ANC and VMs, misperceptions such as OFSP having contraceptive properties, need for continuous community sensitization, and increased workload without commiserate remuneration for CHWs and VMs.

Conclusions: Perceived benefits and motivating factors among key stakeholders outweighed challenges of integrating OFSP with ANC services. These findings contribute to other evaluation activities that assess effectiveness, feasibility and acceptability of this integrated agriculture and health intervention.

Key words: vitamin A, sweet potato, infants

PO804

CONTRIBUTION OF INTRA-ABDOMINAL AND/OR SUBCUTANEOUS ABDOMINAL AND TOTAL ADIPOSE TISSUE IN THE DEVELOPMENT OF THE CARDIOMETABOLIC RISK FACTORS IN CHILDREN

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Background and objectives: Abdominal adipose tissue is related to metabolic disturbances. Particularly, the intra-abdominal adipose (IAAT) has physiology characteristics that appear involved in the development of hyperglycemia, insulin resistance, dyslipidemia, and hypertension in adults. The aim of the present study is to examine which kind of adipose tissue (IAAT, subcutaneous abdominal adipose tissue -SAAT- or total body fat) is associated more strongly with cardiometabolic risk factors in school children.

Methods: Volunteers were 119 children aged 6-12 years from a school of Mexico City. IAAT and SAAT were assessed with imaging magnetic resonance (Phillips 3T system) in L4-L5 region. Total body fat (BF) was evaluated with dual energy x-ray absorptiometry (Discovery Wii Hologic). Fasting glucose, insulin and lipids blood concentrations were determined, the HOMA index was estimated and systolic and diastolic blood pressures (SBP and DBP, respectively) were measured.

Results: Preliminary results showed that there were no difference in adiposity and cardiometabolic parameter between girls and boys. Partial correlations adjusted by age and sex showed that IAAT was positively associated with the concentration of triglycerides ($r=0.24$, $p<0.01$) and negatively correlated with HDL ($r=-0.25$, $p<0.01$). Meanwhile SAAT was positively associated with insulin and triglycerides concentrations, HOMA index and SBP ($r=0.44$, $r=0.35$, $r=0.42$, $r=0.19$ respectively, $p<0.01$) and negatively associated with HDL concentration ($r=-0.34$, $p<0.01$). BF was also positively associated with insulin and triglycerides concentrations, HOMA index, SBP and DBP ($r=0.35$, $r=-0.27$, $r=0.33$, $r=0.20$, $r=0.19$, $p<0.050$) and negatively with HDL concentration ($r=-0.35$, $p<0.01$).

Conclusions: Adiposity negatively influences on HDL concentration. Insulin concentration and SBP only seem to be affected by subcutaneous adipose tissue. LDL and glucose concentrations could not be altered by changes in adiposity in children. These preliminary results indicate that the SAAT is associated more strongly with cardiometabolic risk indicators than the IAAT.

Key words: children, adipose tissue, caridiometabolic factors

PO805

COMPARISON OF VEGETARIAN AND NON-VEGETARIAN ADOLESCENTS ON ANTHROPOMETRIC PARAMETERS

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Background and objectives: Vegetarianism (absence of meat in the diet) has become a popular trend among adolescents. We investigated if vegetarian and non-vegetarian adolescents attending Adventist schools differ in growth indices and body composition.

Methods: We conducted a cross-sectional study among 307 adolescents (163 females and 144 males), aged 12-19 years, who reported their food consumption using a web-based food frequency questionnaire designed for the study. We measured weight, height, waist and hip circumferences, and used a bioimpedance scale for fat mass and fat-free mass measurements. "Vegetarian" was defined a priori as someone with a combined intake of less than one serving per week of meat, poultry, and fish. Gender-specific BMI-for-age and height-for-age z-scores were determined using WHO growth standards. ANCOVA was performed to test differences between vegetarians and non-vegetarians on growth indices and body composition while controlling for confounders.

Results: Seventy-six (25%) participants were vegetarians, 55% of which were females and 43% Caucasians. Height-for-age z scores were significantly higher (0.20 vs -0.12, $p=0.014$) and BMI-for-age z scores were significantly lower (-0.03 vs 0.35, $p=0.010$) for vegetarians than non-vegetarians but after adjusting for hereditary and socio-economic factors, values attenuated and lost significance. The proportion of obese vegetarians was half that of non-vegetarians (4% vs 8%). Vegetarians have lower waist circumference (73.2 cm vs 74.0 cm) and fat mass (10.5 kg vs 11.6 kg) than non-vegetarians but not significantly different after adjusting for age, gender, and ethnicity. Both groups have similar waist-to-hip ratios and fat-free mass.

Conclusions: Vegetarian adolescents tend to be relatively taller, slimmer, and have less fat mass than their non-vegetarian counterparts.

Key words: vegetarian, adolescents, obesity, body composition

PO806

MATERNAL NUTRITION AND ITS CONTRIBUTION TO POOR OBSTETRIC OUTCOMES

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Background and objectives: Poor maternal dietary intake continues to be unaddressed worldwide. Its contribution to obstetric complications (OC) is not well-documented. The Maternal and Child Health Integrated Program (MCHIP) reviewed and synthesized main findings from the literature on the subject.

Methods: On-line searches were conducted in PubMed and POPLINE to identify randomized controlled trials, systematic reviews, observational studies, and meta-analyses related to maternal nutritional status and poor obstetric outcomes, particularly postpartum hemorrhage (PPH), sepsis, pre-eclampsia/eclampsia (PE/E), and obstructed labor (OL). A total of 213 articles were retrieved and another 107 citations identified by the "snowball technique". Selection criteria included the study being related to the four maternal obstetric outcomes and any nutrient other than calcium or magnesium sulfate which was the subject of a recent review.

Results: A total of 46 papers were selected for review with half conducted in low/middle income countries. One analysis identified a 25% decrease in maternal mortality with a 1 g/dl increase in pregnancy hemoglobin. Four studies observed an increased risk of PPH with anemia. Vitamin A supplementation reduced maternal mortality in Nepali women but not in women in Ghana or Bangladesh. Low serum zinc status has been associated with poor labor and delivery outcomes (prolonged labor, e.g.); however, supplementation trials have not found an effect. Consuming fish oil appears to have no effect on PE/E but one study in Mexico found newborns were heavier when their mothers took n-3 docosahexaenoic acid. Maternal height is predictive of increased risk of assisted delivery with the risk 60% higher in women 146 cm to 157 cm compared with women in the highest quartile for height.

Conclusions: The evidence for maternal nutrition and OC is not overwhelming. More research is needed to evaluate if a nutritious diet, and all its substances, improves OC.

Key words: maternal, nutrition, obstetric outcomes

PO807

THE OPERATIONAL RESEARCH FOR THE WORLD RELIEF RWANDA INNOVATION CHILD SURVIVOR PROJECT, NYAMAGABE DISTRICT

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Background and objectives: Nyamagabe district in Rwanda has some of the highest rates of malnutrition nationwide. While there has been success tackling both acute and chronic malnutrition, stunting has not significantly improved. Strategies are needed that target the multiple causes of stunting, specifically those that address infant and young child feeding (IYCF) across the 'first 1000 days' of life. This study was designed to evaluate a behaviour change innovation, which integrates existing national nutrition programming with a week-long, hands-on nutrition training curriculum designed to empower mothers of children 0-23 months and Community Health Workers (CHWs) through participatory learning. Objectives: 1. Improve IYCF knowledge, attitudes and practices of mothers and CHWs; 2. Increase the proportion of children introduced to a minimum acceptable diet of adequate consistency; and 3. Reduce stunting among children 6-23 months.

Methods: Two 30-12 cluster samples, totalling 720 mothers of children under 24 months, were randomly selected in two hospital zones in Nyamagabe district. At baseline, mothers completed a survey of IYCF knowledge, attitudes and practices and maternal and child anthropometry was measured.

Results: Only 3% of children met the minimum acceptable diet, 57% of infants 6-8 months met IYCF recommendations for timely introduction of complementary foods, 20% of children were fed iron-rich foods, stunting prevalence was 39%, and 18% had diarrhoea in the previous two weeks, with only a small percentage receiving recommended treatment (23% received ORS, 40% offered more fluids, 17% treated with zinc).

Conclusions: Our results confirm the need for an innovative approach to improve maternal knowledge and IYCF care practices that will positively affect the nutritional status of children and mothers. Existing programs have not translated into a significant reduction in stunting or prevention of diarrhoea making this research relevant as both infection and malnutrition are linked to stunting.

Key words: behaviour change, stunting.

PO808

VITAMIN A DEFICIENCY AND ANEMIA IN CUBAN PRESCHOOL CHILDREN

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Background and objectives: Micronutrient deficiency is an unquestionable public health problem, specially anemia and vitamin A deficiency. Many studies link vitamin A deficiency with anemia, therefore retinol deficiency impairs iron utilization. A nationwide study was conducted in Cuba to assess vitamin A status and its relationship with anemia.

Methods: A cross-sectional study was carried out in 2205 preschool children aged 6-59 month in Eastern, Center and Western of Cuba. Anemia status was assessed by hemoglobin. Plasma retinol was measured by high-performance liquid chromatography (HPLC). Biochemical indicators are expressed as mean±SD, minimum and maximum values. They were also described by the prevalence of subclinical vitamin A deficiency (0.35 to 0.70 mmol/L) and prevalence of anemia (hemoglobin <11.0 g/dL). Correlations between variables were calculated using Pearson's correlation analysis for numerical data. Odds ratios stratified by groups of age (<2years/≥2years) were used to describe associations between anemia and retinol deficiency.

Results: Mean plasma retinol concentrations were 0.98 mmol/L (western), 1.10 mmol/L (central) and 1.10 mmol/L (eastern). No child had plasma retinol concentration below 0.35 mmol/L, indicative of clinical deficiency. Subclinical deficiency of retinol was seen in 8,6% of subjects (17.0% western, 4,9 % central, 7.0% eastern). The prevalence of anemia was 20.2%, 12.1%, and 14.9% in western, central and eastern region, respectively. There were significant correlations of retinol and hemoglobin in all region (r=0.113, p=0.009 western; r=0.114, p=0.000 central; r=0.095, p=0.01 eastern). Significant association between vitamin A deficiency and anemia was found in the western region (ORMH=2.80, 95%CI 1.50-5.23); however, in eastern (ORMH=1.61, 95%CI 0.94-2.76) and central (ORMH=1.97, 95%CI 0.98-3.93) region had not statistical association.

Conclusions: Vitamin A deficiency classified as a mild public health problem in eastern and central regions. Only in the western region, where the vitamin A deficiency classified as moderate and the prevalence of anemia is larger, and association between both was found.

Key words: Vitamin A deficiency, anemia, preschool-children

PO809

EFFECT OF LONG TERM SUGAR-SWEETENED BEVERAGE INTAKE ON BMI IN CHILDREN FROM 4 TO 12 YEARS OF AGE

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Background and objectives: According to the National Nutrition Survey (2006), consumption of soda was positively associated with Body Mass Index (BMI) in Mexican adolescents (10-19 years of age). For this age group, energy-containing beverages contribute to 20% of the total energy intakeThe aim of the present study was to examine the relation of sugar sweetened beverage (SSB) intake over time and BMI among children from 4 to 12 years of age.

Methods: In a cohort study in Mexico City, height and weight were measured and a food frequency questionnaire was administered at three different times in 250 children between ages 4 to 12 years. BMI (kg/m2) and SSB intake (ml/day of soda, artificial juices and flavored water with sugar added) were calculated. The association between SSB intake and BMI was estimated using a random effects model, adjusting for sex, current age and current energy intake. We conducted an additional using tertiles of soda intake.

Results: At baseline (4 years of age), mean SSB intake was 370 ml/d (39% from soda); at the final measure (12 years of age) SSB intake increased to 434ml/d (44% from soda). Every 100 ml/d increase in SSB was associated with a 0.10 kg/m2 BMI increase (p=0.01) while each increase of 100 ml/d soda was associated with a 0.15 kg/m2 BMI increase (p=0.01). Among children in the highest tertile of soda intake, BMI was 1.21 kg/m2 higher compared with the lowest tertile (p=<0.01).

Conclusions: SSB is a growing component of children´s diet in Mexico. Intake starts in the preschool years and is associated with higher BMI at age 12. Public policies are needed to decrease SSB intake, especially soda intake.

Key words: sugar-sweetened beverage, BMI, children.

PO810

DETERMINANTS OF NON-USE OF ANTENATAL IRON SUPPLEMENTS AMONG PAKISTANI WOMEN: A HOUSEHOLD SURVEY

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Background and objectives: World Health Organization (WHO) guidelines recommend that all pregnant women should be given a 6-month regimen of a daily iron supplements (a total of 180 supplements). Pakistan follows the WHO guidelines, but the coverage is poor. The aim of this study was to determine the prevalence and risk factors for non-use of antenatal iron supplements among Pakistani women.

Methods: Data was derived from a cross sectional household survey conducted in 14 districts of USAID funded project known as Family Advancement for Life and Health in 3 provinces of Pakistan. Trained female interviewers conducted interviews with married women of reproductive age from December 2011 to March 2012. Women with a singleton live birth in the preceding five years of the survey were selected for this study (n=6267). Data was analysed by using SPSS 21 and STATA 12. Multivariate logistic regression model was constructed to identify the risk factors.

Results: Out of 6267, 2400 (38.3%) women took antenatal iron during their pregnancy. Among users, the most common source of supplements was doctors (49.4%) followed by community health workers (40.3%). The mean (SD) days of iron consumed was 76.9 (±51.6) days and mean (SD) month of initiation of supplements was 5.3 (±1.7) months. Risk factors for non-use of antenatal iron were women living in Punjab province (Adj OR=1.76), aged 35 years and above (Adj OR=1.40), had no education (Adj OR=1.88), had illiterate husband (Adj OR=1.44) and had no ANC visit (Adj OR=24.50) compared to their counterparts.

Conclusions: The prevalence of antenatal iron was low in Pakistan. There is a need to develop strategies to improve coverage and increase early uptake of antenatal iron supplements among Pakistani women by designing programs that address the key barriers to use of these supplements.

Key words: iron supplements, pregnancy, determinants

PO811

ASSOCIATION BETWEEN MATERNAL PRE-PREGNANCY BODY MASS INDEX, GESTAIONAL WEIGHT GAIN AND NEWBORN WEIGHT: A RETOSPECTIVE COHORT STUDY IN CHINA

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Background and objectives: International studies have demonstrated that abnormal maternal pre-pregnancy body mass index (BMI) and gestational weight gain are the most important factors causing adverse pregnancy outcomes. It is important to examine the association in Chinese populations. The objective of this study was to determine the effect of maternal pre-pregnancy BMI and gestational weight gain on newborn's weight in China.

Methods: A total of 397 women, just after delivery, were enrolled from four big hospitals in Chongqing, Southwest China, in a retrospective longitudinal study from March 2010 to March 2012. The participants were divided into 4 subgroups (A: BMI≤19.8kg/m^2, B: BMI of 19.8-26 kg/m^2, C: BMI of 26-29 kg/m^2, D: BMI of > 29 kg/m^2) based on the maternal pre-pregnancy BMI. The following parameters were included in the analysis: maternal pre-pregnancy weight and height, maternal weight just before delivery, gestational age and newborn weight.

Results: Within the A subgroup, the occurrence of low birth weight was negatively correlated with maternal gestational weight gain (P<0.05). Within A, B, C subgroup, occurrence of high birth weight was positively correlated with maternal pregnancy weight gain (P<0.05), on the contrary, within the D subgroup, occurrence of high birth weight was negatively correlated with maternal gestational weight gain (P<0.05).

Conclusions: The interaction effects of maternal pre-pregnancy BMI and gestational weight gain on birth weight in di-

fferent sub-subgroups are different. It is critical important to carry out personalized pre-pregnancy care and prenatal care for reasonable pregnancy outcome including appropriate birth weight.

Keywords: gestational weight gain, maternal body mass index, neonatal birth weight, pregnancy

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PO812

RAPID BMI GROWTH FOLLOWED BY HEIGHT INCREASE PREDICT HIGH DHEAS IN 7 Y OLD CHILEAN CHILDREN

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Background and objectives: Accelerated weight and height gain in infancy have been associated with adrenarche. However, the exact temporality of these events remains unclear. The aim of the present study was to assess the relationship between early body mass index (BMI) and height growth and DHEAS at 7 years.

Methods: in 944 children (48% girls) of birth weights 2500-4500 g we abstracted weight and height 0-4 y from health records and measured them annually thereafter. We calculated BMI: weight/heigth2 and defined 4 periods of interest: prenatal, 0-24, 24-48 and 48-72 months. At 7 y we measured DHEAS plasmatic concentrations. We used general lineal models to test associations, adjusting for age and sex.

Results: BMI was over the WHO reference from birth on (0.87 BMI-SDS at 7 y) while height was slightly below until 4y and increased thereafter (0.05 height-SDS at 7 y). At 7y, mean DHEAS was 29.7±1.8 µg/dl. BMI and height at birth were inversely associated with DHEAS at 7 y (β=0.1; 95% CI -0.16, -0.03 and -0.11; -0.18, -0.04, respectively). BMI gains, particularly from 2-4 y increased DHEAS levels (β=0.19; 0.11, 0.26) while height gain had a weaker association (β=0.12; 0.03, 0.20). Children with high DHEAS (>;75th percentile) compared to remaining children presented significantly higher BMI from 4 y onwards (Dif BMI-SDS at 4 y: 0.30 95% CI (0.44-0.15), p<0.05) and higher height only at 7 y (Dif height-SDS: 0.21 (0.35 to 0.08), p<0.05). Analyses did not differ by sex (p>0.05)

Conclusions: In normal birthweight children, smaller size at birth, increased weight gain before 4y, and increased linear growth after 4 y were associated with higher DHEAS at 7 y; in children with high DHEAS at 7 y increased adiposity precedes and probably leads to subsequent linear growth. Funding: WCRF, Fondecyt #1100206 & 1090252

Key words: adrenarche, BMI, height, growth

PO813

BREASTFEEDING AND DEPRESSION IN PREGNANT AND LACTATING WOMEN IN MALAYSIA

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Background and objectives: Breastfeeding provides the best nutrition for infants and lifetime benefits for health. The objectives of the study were to describe breastfeeding rates in Kota Kinabalu and association between breastfeeding and maternal depression.

Methods: A cohort study of 2072 women who were recruited at a third trimester antenatal visit in the district of Kota Kinabalu, Malaysia. The mothers were followed up at 1, 3 and 6 months postpartum. At each visit the Edinburgh Postnatal Depression Scale (EPDS) was administered and details were obtained on infant feeding. Logistic regression and Kaplan-Meier survival analysis were conducted.

Results: The any breastfeeding rates of mothers at 1 month, 3 months and 6 months postnatally were 95.9%, 88.2% and 80.7% respectively and the ¡*full breastfeeding¡¯ rates were, 67.2%, 49.8% and 36.1%. Using the Edinburgh scale the prevalence of antenatal depression (EPDS≥12) was 13.8% while the prevalence of postpartum depression was 7.6%, 7.2% and 8% at 1 month, 3 months and 6 months respectively. Antenatal depression was a strong risk factor for postpartum depression, but the prevalence of postnatal depression was lower than antenatal depression. Mothers who scored higher on the EPDS in the antenatal period had similar breastfeeding outcomes to mothers with scores within normal bounds. Breastfeeding did not increase rates of postnatal depression. Similarly the existence of postnatal depression did not influence breastfeeding duration. An additional 2.6% of mothers who developed for the first time postnatally and at the same time 6.2% of mothers who were depressed fell below the depression threshold. In the postnatal period, becoming depressed, remaining depressed or improving the EDPS score were not related to breastfeeding outcomes.

Conclusions: Depression is common in pregnancy and lactation in Malaysia, but is not related to breastfeeding outcomes.

Key words: depression, breastfeeding, Malaysia

PO814

DIET, PERCENTAGE OF BODY FAT AND AEROBIC POWER IN YOUTH SERIES OF FOOTBALL PLAYERS OF THE SANTIAGO WANDERERS CLUB

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Background and objectives: For an optimal physical condition and performance a sufficient and healthy diet is fundamental. The aim of this study was to associate the diet, the corporal fat percentage and the aerobic power in football players from the Santiago Wanderers Football Club young team.

Methods: The diet quality was measured in each subject (n=46) through the healthy eating index (HEI, adapted to Chilean population) and the nutritional value of the diet through the reminder of 24 hour poll for 3 days. The aerobic power was determined through the VO2max. The fat percentage was calculated through six skinfold using a Lange caliper. For the statistic analysis we used the SPSS Statistics V 19 software and the Pearson coefficient to correlate HEI, corporal fat percentage and V02max ($p<0.05$) variables.

Results: The age, weight and height was 17.3±1.2 years 69.9±6.8 kg and 1.70±0.1 m, respectively (mean±SD). The corporal fat percentage was 11.6±2.4%. Regarding the diet, the 89% of the subjects need changes and the 11% were having an unhealthy diet. None of the subjects obtained a healthy diet according to HEI. The energy from the diet was 2765±747 kcal on average, insufficient in relation to the nutritional recommendations for football player (3189±264 kcal). The same happened with the macronutrients ($p<0.05$). The average VO2max was 58.5±4.4 ml/kg/min.

Conclusions: The diet of the football players was characterized by an insufficient nutritional value that didn't meet their nutritional requirements, with a low protein ingestion of high biological value, fruits and vegetables, wish could affect their performance. No significant association was found between the three principal variables studied.

Key words: sport, diet, nutritional requirements, football, body composition.

PO815

FOOD HABITS AND LIFESTYLE AND ITS RELATIONSHIP TO THE PREVALENCE OF CHILDHOOD OBESITY IN CIUDAD GUZMAN JALISCO

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Background and objectives: Overweight and obesity are global health problems. In Mexico more than 26% of infants are sufferers. There is little information on prevalence in local population and food habits and lifestyle related. Objective of this study was determine food habits and lifestyle infants of 8-10 years and their relationship with the prevalence of overweight and obesity in Ciudad Guzman, Jalisco.

Methods: Surveys were food habits and lifestyle to 800 primary school children, rates were estimated height for age and weight for height, BMI and nutritional status was determined according to NOM-008-SSA2-1993 NCHS tables.

Results: According to the type of data were performed ANOVA and Tukey DSF and descriptive statistical tests Ch2 seeking associations ($p<0.05$), and calculated the odds ratio (OR) for cases and controls. SPSS software was used. Data collected demonstrated that prevalence of overweight and obesity (ow-ob) was 37.33% (33% girls and 40% boys). 87% of infants consume unhealthy energy foods (chips, crackers, cakes and sugary drinks). 30% of infants of normal weight (nw) and 20% (ow-ob) watch TV>2 hours/day during this time, 80% of ow-ob and nw consume unhealthy foods, 52% of nw and 42% of ow-ob performed physical activity over an hour / day (OR=0.66), and established retail association between less physical activity and obesity in girls ($Chi2=5.75$, $p<0.05$). The prevalence found is consistent with that expected for Jalisco, like affected more males.

Conclusions: Consuming unhealthy foods corresponds to national trend nw infants reported high consumption of unhealthy foods and more TV time, but also more time doing physical activity which appears to prevent obesity

Key words: childhood- obesity, food habits, lifestyle

PO816

KNOWLEDGE, ATTITUDE AND PRACTICE OF INFANT FEEDING IN THE CONTEXT OF HIV: A CASE IN TANZANIA

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Background and objectives: Despite the fact that there is a risk of mother to child transmission of HIV through breasting, breastfeeding is still a norm practice in Tanzania. 97 percent of children in Tanzania are breastfed at some point in their life. According to the PMTCT and Paedriatric HIV scale up plan, 75 percent of all infected mothers intended to exclusively breastfeed their babies. The use of pre-lacteal feeds is 31 and 24 percent in rural and urban areas, respectively. Although the implementation of PMTCT is widely covered, there has been limited postnatal follow-up to determine prevalence of actual infant feeding practices.

Methods: A cross-sectional exploratory design was employed. Stratified sampling technique was used to select mothers with children aged 6-24 months in positive and negative HIV mothers. Descriptive analysis of data was done using SPSS version 18, and t-test for comparison of means of various indices.

Results: Majority of health service providers had inadequate knowledge about infant feeding in the context of HIV and AIDS. Similarly HIV negative women had limited knowledge on recommended infant feeding practices. There was a prevailing attitude towards use of colostrum, significant positive attitude in early complementation and negative attitude towards exclusive breastfeeding. Frequency of complementary feeding was also low and unbalanced.

Conclusions: Capacity building of health service providers on essential nutrition interventions to promote, protect and support infant and child feeding and strengthening maternal and child nutrition component in reproductive and child health services is significant.

Key words: Tanzania, infant feeding practices

PO817

HOME-BASED DIETETIC INTERVENTION IMPROVES NUTRITIONAL STATUS POST HOSPITAL DISCHARGE IN OLDER PEOPLE

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Background and objectives: In older adults, deterioration of nutritional status during hospital admission, results in many individuals being discharged home at high nutritional risk, with little community-based support. Integrated approaches between settings are needed to improve outcomes in this group. This study aimed to test whether a model of home-based dietetic care improved dietary intake and weight status in older adults post hospitalisation.

Methods: Department of Veterans¡¯ Affairs (DVA) patients aged ≥65 years were recruited from hospitals in a regional area of New South Wales, Australia (n=32 men, n=36 women). Nutritional status was assessed at home at baseline (2 weeks post discharged) and 3 months post discharged using diet history, food frequency checklist and Mini Nutrition Assessment (MNA).Personalised dietary advice was provided by a single dietitian based on their nutritional status. Dietary intakes were analysed using FoodWorks 2009 (Xyris Software, version 6.0). Statistical analysis were performed using paired t-test, Wilcoxon Signed Rank test and two-way ANOVA. P value was set as $p<0.05$.

Results: Mean body weight increased significantly from 67.1±13.5 kg to 68.0±13.7 kg (p=0.048). Mean MNA score improved significantly from "at risk of malnutrition" to "well-nourished" category (p=0.000). At 3 months, underweight group (BMI<22 kg/m^2) had significantly higher mean protein (g) intake per body weight (kg)(1.7±0.4 g/kg) compared to normal weight (BMI 22-27 kg/m^2) (1.5±0.3 g/kg) and overweight group (BMI>27 kg/m^2) (1.1±0.3 g/kg). 11.2% and 14.7% subjects consumed protein and energy supplementation at baseline and 3 months respectively. 10.3% participants received "Meals on Wheels" service. Mean energy, protein, fibre and calcium intake were adequate at baseline and 3 months, with no significant difference detected.

Conclusions: Dietetic intervention with supports from community services was proven effective in managing malnutrition in older patients.

Key words: malnutrition, older adult, nutrition intervention

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PO818

BREASTFEEDING BEYOND 12 MONTHS: WHO'S DOING THIS IN AUSTRALIA?

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Background and objectives: WHO recommends that infants be exclusively breastfed to 6 months and that mothers continue to breastfeed until their infant is two years or older. This recommendation has been modified in a number of industrialized countries including Australia and the USA where women are recommended to breastfeed to 12 months and beyond. Despite these recommendations breastfeeding beyond 12 months is relatively uncommon in Australia and most other industrialized countries. The purpose of this study was to analyze data from the first Australian National Infant Feeding Survey (NIFS) to identify predictors of extended breastfeeding.

Methods: Multivariate logistic regression analysis was used to identify independent predictors of breastfeeding beyond 12 months.

Results: Of the 4056 NIFS participants with children 12 months or older who had ever breastfed, 3795 were still breastfeeding or had indicated a valid infant age at which they had stopped breastfeeding. Of these women, almost one third (31.2%) was still breastfeeding or had breastfed their infant for longer than 12 months. Those women most likely to breastfeed beyond 12 months were 35 years or older, had a university qualification and were either not participating in the workforce or had returned to work after their infant was 12 months old.

Conclusions: These findings indicate that workforce participation is not conducive to breastfeeding for longer than 12 months. Australian women under certain conditions are entitled to 18 weeks of Government-funded Parental Leave and an additional 12 months of unpaid leave. These entitlements fall far short of those legislated by several other OECD countries and in particular the Scandinavian countries where breastfeeding beyond 12 months is more common.

Key words: extended breastfeeding, duration, determinants

PO819

DETERMINANTS OF BREASTFEEDING AT DISCHARGE IN RURAL CHINA: A PROSPECTIVE COHORT STUDY IN SICHUAN PROVINCE

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Background and objectives: China experienced a rapid decline in the prevalence of breastfeeding in the late 1970s when infant formula became readily available. In response, the Chinese government introduced the 'Baby Friendly Hospital Initiative' together with regulation of the marketing of breastmilk substitutes in the 1990s. Since then, increases in breastfeeding rates were evident with several studies reporting rates above 90% at discharge. The aim of this study was to investigate the rate of breastfeeding at discharge and associated influencing factors in rural China.

Methods: A prospective cohort study on infant feeding practices was undertaken during 2010-2011 in Jiangyou, China. A total of 695 mothers (response rate 96%) were recruited from four hospitals and three health centres and interviewed at discharge. The questionnaire included detailed information of infant feeding practices and factors related to breastfeeding initiation and duration. Binary logistic regression was used to assess the determinants of breastfeeding at discharge.

Results: The breastfeeding rate at discharge was 93.5% (95% confidence interval (CI) 91.7–95.3). Perceived paternal breastfeeding preference was positively associated with the actual breastfeeding at discharge (odds ratio (OR) 4.46, 95% CI 2.15–9.28). Other significant determinants were 'receiving breastfeeding support' from staff during hospital stay (OR 3.41, 95% CI 1.58–7.34) and making the decision on feeding method during or after pregnancy (OR 0.46, 95% CI 0.22–0.93).

Conclusions: Provision of breastfeeding support in hospital and education programs targeting expectant and future parents are recommended to further increase the rate of breastfeeding at discharge in rural areas of China.

Key words: breastfeeding, China, hospital support, paternal attitude.

PO820

FORMATIVE WORK ON COMPLEMENTARY FEEDING PRACTICES AND ANEMIA KNOWLEDGE TO GUIDE THE DEVELOPMENT OF A HOME-FORTIFICATION PROTOCOL IN RWANDA

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Background and objectives: Anemia is a widespread problem worldwide with approximately half of cases attributed to iron deficiency. Due to its negative impacts on health and economic development, addressing anemia is a priority in many countries. In consideration of the high prevalence of anemia among Rwandan children (77% among 6-9 month olds) and recent WHO guidelines recommending micronutrient powders (MNP) as part of infant and young child complementary feeding (IYCF) programming, the Ministry of Health and partners conducted formative research for a MNP intervention for children 6-23 months with the following objectives: 1. To explore knowledge on anemia and IYCF practices of caregivers and healthcare providers. 2. To evaluate the feasibility of home-fortification with MNP at the community and household level. 3. To inform and guide the training protocol and MNP programme development for implementation.

Methods: Eighteen focus groups and 97 key informant interviews were conducted among healthcare providers, caregivers, fathers and grandparents of young children in randomly selected clusters in two districts, Musanze and Nyaguru. Qualitative methods were used for analysis.

Results: Many misconceptions and knowledge gaps were identified regarding iron-rich foods, optimal IYCF, and anemia causes and symptoms. Tree tomatoes and green vegetables were incorrectly identified as being rich iron sources, while oedema and weight loss were considered symptoms of anemia. There was a strong interest in MNP and nutrition education with community health workers identified as trusted sources of information.

Conclusions: Advice to caregivers needs to be accurate and consistent regarding anemia and appropriate IYCF. The need for integrating a MNP protocol with nutrition education in the community was confirmed through our findings. Our results are guiding the implementation of home-fortification with MNP to improve the nutritional status of children in Rwanda.

Key words: micronutrient powders; infant and young child feeding practices; anemia; home fortification; qualitative methods

PO821

THE INFLUENCE OF DIFFERENT DURATIONS OF AEROBIC EXERCISE ON FUEL UTILIZATION AND LACTATE LEVELS IN TRAINED RATS

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Background and objectives: This study investigated the influence of different durations of aerobic exercise on fuel utilization and lactate levels in trained rats.

Methods: Forty rats were fed a control diet. Additionally, the animals underwent physical training (T) or no training (NT) for 6 wk. For physical training, animals exercised on treadmill for 30 min. At the end of week 6, the animals in each group were subdivided into two groups: before exercise (BE), during exercise (DE). The BE groups were sacrificed without having performed exercise at the end of week 6. The DE rats exercised on a treadmill for 30min (DE-30), 1h (DE-1) and 2h (DE-2) immediately before being sacrificed. Glucose, protein, triglyceride (TG), free fatty acid (FFA), and lactate levels in the plasma, glycogen, TG and protein levels of liver and skeletal muscle of the rats were compared.

Results: Glucose level of control group was significantly low in DE-2. Muscle and liver glycogen levels were significantly low in DE-1 and DE-2 but there were no significant difference between DE-1 and DE-2 in trained group. Liver protein of control group was significantly low in DE-2. Muscle TG levels decrease at DE-30 in trained group. But control group decrease at DE-1. FFA levels were increase at DE-30 in trained group but in control group increase at DE-1. Lactate levels increase at DE-30 in control group but in trained group increase at DE-1.

Conclusions: It is suggested that, training may improve exercise performance by facilitating the mobilization and oxidation of fat and conserving limited carbohydrate store and may delay the onset of fatigue associated with low lactate levels. This study was supported by 2012 Research Grant of Duksung Women's University.

Key words: duration of exercise, training, glycogen, free fatty acid, lactate

PO822

BASAL METABOLIC RATE AND BODY COMPOSITION MEASURED FOR NUTRITIONAL ASSESSMENT IN RUGBY FOOTBALL PLAYERS

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Background and objectives: In recent years, nutritional management has been considered to maintain and improve the competitive power and conditioning of athletes. Rugby football players are required to build the body in relation to agility, endurance, and combative sports ability. This preliminary study was designed to evaluate the need for nutritional assessment based on basal metabolic rate and body composition in amateur rugby football players.

Methods: Thirty male amateur rugby football players (23.5±4.6 years) from one team participated in this study. Basal metabolic rate (BMR) was measured by indirect calorimetry with a Douglas bag (mBMR-D). Body weight, lean body mass (LBM), and % body fat (BF) were measured using a full body composition meter. To detect the factors influencing mBMR-D, stepwise multiple regression analysis was performed using the independent variables of age, body weight, LBM, and %BF. Energy and nutrient intakes were investigated using a food frequency questionnaire.

Results: A highly significant correlation (r=0.901) was found between mBMR-D and LBM, including data on other athletes. mBMR-D was found to be a useful measure and appropriate method for determining nutritional status, considering each individual's physical properties. Multiple regression analysis revealed that LBM (fÀ=0.950) and %BF (fÀ=-0.178) were factors affecting mBMR-D (R2=0.873). When physical properties were analyzed according to playing position, BMR, LBM, and %BF of forwards (FW) were significantly higher than that of backs (BK). Significant differences were seen in body characteristics, but not energy or nutrient intake, between FW and BK.

Conclusions: The results indicate that players should receive adequate energy and nutrition to increase LBM and decrease %BF. Nutritional assessment is important to estimate the energy and nutrient requirements according to playing position.

Key words: lean body mass, body fat, physical properties, playing position

PO823

DIETARY INTAKE AND ANTHROPOMETRIC CHARACTERISTICS OF ADOLESCENT FEMALE BALLET DANCERS–A CROSS-SECTIONAL DESCRIPTIVE STUDY

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Background and objectives: Ballet dancing requires dynamic and isometric strength yet due to its aesthetic qualities there is pressure to maintain a lean physique. Adolescent ballet dancers face the additional challenge of extra nutritional requirements for growth and development. This study aimed to investigate the macronutrient intake and anthropometric characteristics of adolescent female ballet dancers living in Auckland, New Zealand.

Methods: Female ballet dancers aged 13-18 years (n=47) who danced a minimum of one hour per day at least five days per week participated in this cross-sectional study. Body mass index (BMI) was determined from weight and height measurements and percentage body fat measured using Dual Energy X-ray Absorptiometry (Hologic Discovery A). Participants completed a 4-day estimated food record (analysed using Foodworks Professional 2009).

Results: Mean BMI was 19.7±0.3 kg/m2 and percentage body fat 23.3±0.6%. The majority (89.4%) of dancers had a healthy weight (5th–85th percentile) using the Centers for Disease Control and Prevention BMI-for-age growth charts. Two (4.3%) of dancers were underweight (<5th percentile) and three (6.4%) were overweight (85th–95th percentile). Food records were completed by 41 participants. Mean energy intake was 8183.9±337.0 kJ/day with a macronutrient distribution 17.0% protein, 50.0% carbohydrate and 33.0% fat. Mean protein and carbohydrate intakes were 78.4±3.3 g/day (1.6±0.1 g/kg body weight/day) and 244.8±10.0 g/day (4.9±0.2 g/kg/day) respectively. Eleven participants (26.9%) consumed less than 1.2 g protein/kg/day and over half (58.5%) of participants consumed less than 5 g carbohydrate/kg/day. Mean dietary fat intake was 74.1±3.9 g/day.

Conclusions: While mean body composition measurements and macronutrient intakes as a percentage of total energy intake fell within the recommended range for healthy populations, a number of adolescent ballet dancers may be at risk of consuming inadequate carbohydrate and to a lesser extent, protein based on current sporting recommendations.

Key words: diet, anthropometry, ballet, adolescent, female

PO824

INFLUENCE OF MACRONUTRIENT INTAKES ON SALIVARY IMMUNOGLOBULIN A LEVELS IN ATHLETES

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Background and objectives: Depressed immune function during intensive training is associated with the incidence of illness in athletes. Previous reports suggested that there is correlation between resting salivary immunoglobulin A (sIgA) levels and the incidence of upper respiratory tract infection (URTI) symptoms. The purpose of this study was to evaluate the physical, mental, and nutritional condition of male long-distance runners during high-intensity endurance training.

Methods: Eighteen male athletes (age, 19±1 years) participated in this study. Heart rate and rate of perceived exertion were recorded to monitor exercise intensity. Wet bulb globe temperature was measured during training. Saliva samples were collected before and after training for 6 months. Saliva flow rate and sIgA concentration were determined by enzyme-linked immunosorbent assay and expressed as secretion rate. Mood states, including total mood disturbance (TMD), were assessed by using the profile of mood states inventories. URTI symptoms were investigated by using a questionnaire. Energy and nutrient intake was evaluated by using a food frequency questionnaire.

Results: Intensive training decreased sIgA levels and increased TMD after training in a hot environment (>25 degrees C). Low sIgA levels before training were found in the presence of URTI symptoms. There was a significant inverse correlation between the sIgA level before training and energy-adjusted carbohydrate intake as well as a positive correlation between the sIgA level during training and energy-adjusted fat and protein intake.

Conclusions: These findings suggest that intensive exercise in a hot environment decreases the sIgA level after training. In addition, the sIgA level before training is associated with URTIs and macronutrient intake.

Key words: salivary immunoglobulin A, upper respiratory tract infection symptoms, profile of mood states, nutritional status, exercise

PO825

NUTRITION AND ECCENTRIC EXERCISE IN PEOPLE OVER 65 YEARS: EVIDENCE STUDY

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Background and objectives: To review the scientific literature about the benefits that proper nutrition and training with eccentric exercise can provide people over 65, and their possible ways of application.

Methods: Documental study by systematic technique of randomized clinical trials (RCT) published in journals indexed in international database, excluding the documents were not based on the target population (over 65 years) and / or drugs used in the intervention. Additionally, as a secondary search, the bibliographies given in the selected articles were reviewed in order to identify studies not found by the primary search (in order to reduce potential publication bias).

Results: 10 articles (RCT) were selected for review from the following countries of origin: Switzerland, USA, Canada and UK. Some are based on healthy population and other on diseases cardiovascular, musculoskeletal, Parkinson and Hemiparesis. The eccentric exercise (ECC) was applied: bikergometer, knee exercise with dynamometer, walker and exercises with machines.

Conclusions: The eccentric training is an option to reduce and prevent Sarcopenia (although there was a better response when combined with proper nutrition). Because of its low metabolic cost and reduced oxygen consumption is optimal in cardiovascular disorders, chronic illness and frailty. Decreases risk of falling and improved mobility and quality of life. The bicycle, treadmill, movements aimed at specific segments with or without load and ride on down are low cost resources that can be used. It is recommended to continue the development of research on this theme and expand the population sizes in studies including interventions for upper body segments.

Key words: eccentric exercise; health promotion; aged; sarcopenia.

PO826

A PROTEIN-ENRICHED DIET FAVOURABLY AFFECTS CARDIOVASCULAR HEALTH IN ELDERLY WOMEN UNDERTAKING PROGRESSIVE RESISTANCE TRAINING

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Background and objectives: Progressive resistance exercise (PRT) ameliorates age-related muscle loss, but the impact of a modest increase in dietary protein combined with PRT on cardiovascular risk factors in older people is unknown. We examined differences in blood pressure and blood lipid responses to a modest increase in dietary protein through increased consumption of lean red meat compared to a control diet in elderly women undertaking PRT.

Methods: Women (n=100) aged 60-90 years undertook PRT sessions twice weekly for 4 months and were randomised to either a protein-enriched diet group (PE) (160g/day lean red meat) or a carbohydrate control diet group (CC) (1 serve carbohydrate/day).

Results: Ninety-one women completed the study: n=48 PE, mean (SD) age 72.3 (6.2) years, and n=43 CC, 74 (7.3) years. The mean (±SE) intervention dietary protein intakes in the PE and CC groups were 1.3±0.1 g/kg/d and 1.2±0.1 g/kg/d ($p<0.05$). Greater decreases from baseline values for systolic and diastolic BP in PE compared to CC did not reach significance (systolic -4±1.5% vs -1.9±1.8%, $P<0.30$; diastolic -4.2±1.6% vs +0.7±2.5%, $p<0.09$). However, in women on hypertensive therapy (PE n=27; CC n=26), PE had a fall in diastolic pressure of 5.9±2.3% while CC rose 3.8±3.4% ($p=0.02$, between-group difference). Both groups had similar reductions in total cholesterol (2.4–3.4%) and LDL-cholesterol (4.7%, 4.8%) (all $p<0.01$), with no changes in body weight.

Conclusion: In older women undertaking 2 sessions/week PRT for 16 weeks, consuming an average of 1.3 g protein/kg/d by eating lean red meat had a favourable effect on blood pressure in those taking anti-hypertensive medication. PRT had a favourable effect on total and LDL-cholesterol which was independent of any dietary protein differences. In addition to the health benefits of maintaining lean mass, PRT reduces cardiovascular risk factors in older women.

Key words: Dietary protein, elderly, women, resistance training

PO827

MONITORING FINDINGS FROM A COMMUNITY-BASED PROGRAMME TO PROMOTE AND SUPPORT EXCLUSIVE BREASTFEEDING IN BANGLADESH

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Background and objectives: Exclusive breastfeeding is being promoted for many years, but findings of monitoring visits are not available. In our programme areas, community-based female peer counsellors have been successfully promoting and supporting exclusive breastfeeding since 1995. To ensure that good quality breastfeeding counselling is sustained, monitoring visits were undertaken regularly.

Methods: Five peer counsellors in urban Dhaka (Badda) and 7 in rural Chittagong (Anowara) counselled mothers for optimal breastfeeding in the last trimester of pregnancy, within two days of delivery, around seven days and monthly till babies complete six months. Each peer counsellor was responsible for 50-60 mothers living within walking distance of her residence. From February to December 2012, 775 lactating mothers were counselled. Programme staff aimed to monitor 10% of peer counsellors visits and randomly interview 10% of counselled mothers by using check lists. Data from observations and interviews was analysed and feedback given to the peer counsellors for improving performance.

Results: Comparisons of peer counsellors observations (n=105) and mothers' interviews (n=90) show that nearly all mothers received relevant information about optimal breastfeeding practices and were helped with correct positioning and attachment. During last 24 hours, 94% babies below 6 months were exclusively breastfed. The major gaps identified were that although 80% mothers reported expression of breastmilk had been explained to them at least once, it was not demonstrated, whereas peer counsellors demonstrated expression during 50% observation visits. Reliable signs of sufficient breastmilk could be repeated by only 58% mothers versus 79% heard during peer counsellors observations.

Conclusions: Exclusive breastfeeding prevalence was high in the programme area. Frequent monitoring of peer counsellors' visits and comparisons with mothers' reports about what they have been told and demonstrated are essential to ensure good quality counselling and sustain optimal breastfeeding practices.

Key words: breastfeeding, monitoring, observations, interviews, peer counsellors

PO828

THE INFLUENCE OF DIETARY HABITS AND PHYSICAL ACTIVITY ON BONE MASS IN FLEMISH CHILDREN

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Background and objectives: This study aimed analysing how children's bone mineral content and density (BMC and BMD) are associated with dietary habits (dairy consumption and vitamin D intake) and physical activity (PA). Moreover, the interaction between diet and physical activity on bone was studied.

Methods: Participants were Flemish children (6-12 years). Body composition and bone mass was measured with dual-energy X-ray absorptiometry (DXA), dietary habits with a food frequency questionnaire and PA with an accelerometer (minimum 3 days, 8 hours per day). In total, 272 children underwent a DXA scan and 264 had complete FFQ data. Only 202 children had matching accelerometer data, due to the limited number of accelerometers. Regression analyses were used to study the associations between diet, PA, BMC and BMD, always correcting for age, sex, puberty stage and fat mass.

Results: PA (moderate and vigorous activity) was positively associated, while sedentary activity was negatively associated with BMC and BMD. Also dairy consumption was positively associated with bone mass, but vitamin D showed no association. Moderation effect through sex was only present for sedentary activity on the BMC outcome. Only for boys, the association with BMC was significant. No moderation effect from diet and PA ($p>0.05$) on bone mass was found.

Conclusions: Already at young age, PA and dairy consumption positively influence bone mass according to this study. Promoting PA and dairy consumption in young children will therefore positively influence their bone health and help to maximize peak bone mass, an important protective factor against osteoporosis later in life.

Key words: bone mineral density, bone mineral content, calcium, physical activity, children

PO829

CONTRIBUTION OF NUTRITION EDUCATION INTERVENTION TO YOUNG ATHLETES IN TAIPEI

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Background and objectives: Exercise nutrition program should target at promoting optimal nutrient intakes by athletes, especially young athletes. To enhance the nutrition knowledge and improve the dietary practice and learning ability of young athletes, a nutrition intervention course of one semester was offered to the middle school athletes via a popular science education program.

Methods: Young athletes (n=303, M=235, age=12-18 y, BMI=21.7 kg/m2) of two middle schools (intervention group vs control group) in Taipei participated in the study. A basic nutrition course (8 lectures) was offered to the school of intervention group only, which also included two lectures with lab of meal plan and preparation, and a supermarket field trip. Each lecture of 2*50 min was given every two weeks. Intervention was separately proceeded for senior or junior athletes. Before and after the course intervention, data on dietary and physical activity survey, test for attention performance (both the reaction time and accuracy of flexibility, divided attention, and working memory), and body composition measurements were collected from the young athletes of both middle schools; which were analyzed as the criteria to evaluate the function of nutrition knowledge applied in popular science.

Results: At entry, the fat-free mass percentages of senior male, senior female, junior male, and junior female were 84.5±5.3, 76.7±5.0, 81.6±6.4, and 74.9¡Ó±9.9, respectively. After the intervention, the improvement in accuracy of working memory of intervention group was significantly higher ($p=0.009$) than that of control group, but which was only found in junior, not the senior. The accuracy of working memory in junior was positively associated with their daily protein intake ($r=0.257$, $p=0.028$, n=73).

Conclusions: The nutrition education program should be further strengthened among the senior young athletes, especially with the dietary practice focused on the exercise nutrition knowledge.

Key words: nutrition knowledge, daily protein intake, test for attention performance

PO830

RESTORATION OF BRAIN DHA LEVELS IN YOUNG-DEFICIENT RAT IS BETTER WITH 1.5%ALA DAIRY FAT BLEND COMPARED TO 1.5% ALA VEGETABLE BLEND

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Background and objectives: Achieving an appropriate docosahexaenoic-acid (DHA) status in the neonatal brain is an important goal of neonatal nutrition. Infant formulas have been gradually replacing mother's milk and are usually prepared with vegetable oils. The essential fatty acids (EFA) composition of these formulas are controlled (ALA, LA) and DHA supplementation has been more recently proposed to mimic mother-milk. In an attempt to validate the potential replacement of vegetable fat with dairy fat in infant formulas, we used the brain DHA level of rats as a nutritional model to compare the effects of blends based on dairy fat instead of palm oil providing the same EFA quantities (commonly recommended values for commercial vegetable fat formulas: 1.5% and 16%, respectively).

Methods: Three groups of rats (10 males and 10 females), born from dams fed over gestation/lactation with a low ALA-diet (0.4% FA), were fed, for 6 weeks after weaning, diets providing similar levels of ALA (1.5%, from rapeseed source), blended with (i) anhydrous dairy fat, (ii) palm oil or (iii) palm oil supplemented with DHA (0.12%). Brain FA were determined by gas chromatography at weaning and after the post-weaning diets

Results: Restoration of brain DHA levels was superior with the 1.5% ALA-dairy-fat compared to both 1.5% ALA-palm-blends (without/with DHA supplementation) for increasing brain DHA (+80%, +65% and +60%, respectively $p<0.001$). A gender/diet interaction showed lower levels of brain DHA of males with the 1.5% ALA-palm diet, while brain DHA was similarly restored in males and females by the 1.5% ALA-dairy-fat diet or by DHA supplementation of palm diet

Conclusions: Restoration of brain DHA levels of young deficient rats is more efficient with a 1.5% ALA dairy fat blend diet compared to vegetable blends despite similar dietary ALA levels supplemented or not with DHA. Human application for infant formulas should be considered. Granted by Lactalis

Key words: dairy-fat, brain, DHA, ALA

PO831

CHALLENGES OF A COMMUNITY-BASED PEER COUNSELLING PROGRAMME TO PROMOTE AND SUPPORT APPROPRIATE COMPLEMENTARY FEEDING IN BANGLADESH

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Background and objectives: Although several programmes have promoted exclusive breastfeeding, there are very few which have promoted and monitored appropriate complementary feeding. In the Foundation's programme areas, community-based peer counsellors have been successfully promoting and supporting exclusive breastfeeding since 1995. To ensure that they also promote appropriate complementary feeding, monitoring visits were undertaken.

Methods: Five community-based peer counsellors in urban Dhaka (Badda) and 7 in rural Chittagong (Anowara) counselled mothers for appropriate complementary feeding when babies completed six months and monthly until 18 months. Each peer counsellor was responsible for 50-60 mothers living in her neighbourhood. From February to December 2012, 541 mothers were counselled. Programme staff planned to monitor 10% of PCs visits and randomly interview 10% of counselled mothers by using check lists. Data from observations and interviews were analysed and feedback given to the peer counsellors for improving performance.

Results: Comparisons of observations of peer counsellors visits (n=102) and from mothers' interviews (n=92) showed that nearly all the mothers received information about appropriate complementary feeding practices and were demonstrated correct amounts and consistency at end of 6 months. However 50% mothers reported they were not shown recommended consistency of foods at 9 and 12 months. During observations, intake of 4 food groups was encouraged, benefits of each food with age appropriate frequency and consistency mentioned, but actual amounts were shown in 69% of visits, and only about half the mothers could recall the benefits of each group of complementary food. Washing mothers' hands before preparation of food and feeding was mentioned, but not observed by the peer counsellors.

Conclusions: Frequent monitoring of peer counsellors' visits and comparisons with mothers reports about what they have been told and demonstrated, are essential to ensure good quality counselling and complementary feeding practices.

Key words: complementary feeding, monitoring, peer counsellors

PO832

ASOCIATION BETWEEN MICRONUTRIENTS AND THE GROWTH, BODY COMPOSITION AND EARLY MARKERS OF CHRONIC DISEASES IN CHILEAN CHILDREN

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Background and objectives: The relationship between micronutrients and obesity and/or chronic diseases in early life is not clear. The objective of the study was to assess the associations between biochemical indicators of several micronutrients and the growth, body composition and early markers of chronic diseases in children.

Methods: Cross-sectional study of 300, 8-11 y children. The following measurements were obtained: 1) Anthropometry: weight (wt), height (ht), zBMI; 2) Body composition: % body fat; 3) Biomarkers metabolic risk: insulin, glucose, serum lipids, adiponectin, leptin; 4) Micronutrient indicators: hemoglobin (hb), serum ferritin (SF), serum transferrin receptors (TfR), hepcidin, plasma zinc (ZnPl) and serum VD concentrations (25OHD).

Results: 26% of children were overweight and 29% obese. None of the children were anemic or Zn deficient. 4% were Fe deficient and 28% VD deficient. No associations were found between FS or 25OHD and either wt, ht, % fat or metabolic risk indicators. A significant direct association was observed between TfR and Wt (r 0.24), ht (r 0.14), zBMI (r 0.25), % body fat (r 0.22). Significant correlations were found between hepcidin and both wt (r -0.12) and zBMI (r -0.12). ZnPl correlated with % body fat (r 0.12) and insulin (r -0.20). No significant differences in Hb, SF, hepcidin or 25OHD were found between obese (Ob) and non-obese children. Both TfR and ZnPl were significantly higher in Ob children.

Conclusions: Vitamin D status is not associated to Ht, % body fat or biomarkers of metabolic risk. Ob children had higher ZnPl and TfR concentrations than N children.

Key words: micronutrients, obesity, chronic disease

PO834

INCREASING APPROPRIATE COMPLEMENTARY FEEDING IN A RURAL DISTRICT OF BANGLADESH: IMPLICATION FOR SOCIAL MOBILIZATION

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Background and objectives: BDHS reports showed that in Bangladesh, stunting, underweight and wasting are 41%, 36% and 16% respectively. After decade of stagnant exclusive breastfeeding rate which was 43% and has now improved to 64%. But the quality of Complementary feeding is still under satisfactory level, only 21%. Alive and Thrive comprehensive delivery model in Bangladesh introduced in 2009 intended to- • Increase exclusive breastfeeding (breast milk only) by almost 50 percent and reduce stunting by 10 percent in children under five. Alive and Thrive initiative aimed to develop scaled up models for preventing child malnutrition through improving Infant and Young Child Feeding (IYCF) practices • Intensive counseling, coaching and demonstration to mothers and caregivers for appropriate feeding practices of children 0-2 yrs. • Social mobilization. It raises awareness of IYCF and seeks the commitment of influential members in the community and family elders to take action for improvement of IYCF practices. In 2009, base line survey was conducted to identify facilitating factors and barriers to adopting appropriate complementary feeding approach, programmatic and behavior change communication initiatives. Main barriers for adopting appropriate complementary feeding are mothers' perception that they have insufficient breast milk and their observation that children lack an appetite. In 2012 main indicators of IYCF shows a great improvement. Early incitation of breast feeding was increase from 64% to 89%, Exclusive breast feeding from 60% to 80%, Timely initiation of complementary feeding from 57% to 93%, intake of animal protein 22% to 87% and hand washing 21% to 81%. Social mobilization can help to remove the barrier to adopt appropriate complementary feeding practices. Though these improvements are not only due to social mobilization but still it can create an environment in the community and households that supports mothers to adopt and maintain good feeding practices. IYCF, Social mobilization, Complementary feeding.

PO835

VITAMIN D INSUFFICIENT INFANTS (3 MONTHS OF AGE) HAD SUFFICIENT VITAMIN D STATUS AT 12 MONTHS OF AGE

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Background and objectives: Breast milk is considered to be the optimal infant diet and the postpartum period represents a time of increased maternal nutritional need due to lactation. Oily fish, fortified foods and supplements are the only significant dietary sources of vitamin D in the Nordic countries. In Norway, knowledge about vitamin D status in postpartum women and their infants is limited. The aim of the present study was to assess the vitamin D status in mothers and their infants at 3, 6 and 12 months postpartum in relation to eating habits.

Methods: This longitudinal population study from a municipality in Western Norway followed mothers and their infants from 28 weeks of gestation until 12 months postpartum. The source population was all women who were pregnant within November 2009-June 2011. The vitamin D status was assessed as serum 25-hydroxy vitamin D (25OHD) in the mothers and their infants 3, 6 and 12 months postpartum. Seafood intake was recorded through validated food frequency questionnaires.

Results: The mean level of 25OHD in the infants increased significantly from 68±40 nmol/l at 3 months to 85±16 nmol/l at 12 months of age. The lowest 25 percentile had the largest 25OHD improvement from 3 months (34 nmol/l) to 12 months (74 nmol/L) of age. At 12 months every single child had a sufficient vitamin D status (25OHD> 50 nmol/l). Among the mothers the vitamin D status at 3, 6 and 12 months after delivery was fairly stable, however just above the sufficient level of 25OHD>50 nmol/l.

Conclusions: Insufficient vitamin D status in 3 months old infants was considerably improved at 12 months of age. The mothers had sufficient vitamin D status at all sampling points.

Key words: vitamin D status, serum 25-hydroxy vitamin D, infant, mothers, seafood

PO836

THE ASSOCIATION BETWEEN DIETARY CALCIUM INTAKE AND CHILDHOOD OBESITY IN MULTI-ETHNIC SCHOOL CHILDREN IN MALAYSIA

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Background and objectives: The increase in the prevalence of overweight and obesity among children in Malaysia has been a cause for concern as obesity in childhood has been shown to sustain into adulthood. Several studies have shown that calcium intake was identified to have protective effect against obesity. A cross-sectional study was conducted to determine if there is any association between calcium intake and body mass index (BMI) among children.

Methods: A total of 540 children (257 boys and 283 girls) aged between 9 to 10 years participated in the study which was conducted in the states of Selangor and Putrajaya. The height and weight for each child was measured in order to calculate their BMI-for-age. Dietary calcium and energy intakes were assessed using a previously validated calcium-focused food frequency questionnaire (FFQ).

Results: Mean BMI for boys was 20.1±5.6 kg/m2 and 18.0±4.2 kg/m2 for girls The mean estimated daily calcium intake was 295.2±136.6 mg for boys and 360.8±142.2 mg for girls. There was no significant association between the intakes of calcium and dairy products with BMI. However, there was a significant difference in daily calcium intake between different ethnicities with significantly higher calcium intake for Malay boys and girls compared to the Chinese or Indians.

Conclusions: There was no significant association between dietary calcium intake and childhood obesity, however dietary calcium intake was significantly different among children of different ethnicities.

Key words: dietary calcium intake, childhood obesity, ethnicity, BMI

PO837

INFANT FEEDING PRACTICES AMONG LIBERIAN REFUGEE WOMEN DURING THE EMERGENCY AND PROTRACTED PHASES OF REFUGEE SETTLEMENT

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Background and objectives: Optimal infant and young child feeding (IYCF) practices is crucial for child survival,

particularly in refugee situations. Research on IYCF practices among refugee caregivers is limited and it is unknown whether caregivers' IYCF experiences differ during the emergency and protracted phases of the refugee situation. The study was aimed at identifying the prevalence and determinants of optimal and sub-optimal IYCF practices of Liberian refugee caregivers in emergency and protracted refugee situations in the Budubu-ram Refugee Camp (BRC) in Ghana.

Methods: This was cross-sectional study involving Liberian refugee women; 1) who arrived at the BRC with children<2 years of age during the emergency phase of the refugee situation (ERS) in 1991 (n=84) and 2) living at the BRC during the protracted phase of the refugee situation (PRS) who had children less than 2 years at the time of the survey in 2010 (n=407). Semi-structured questionnaires were used to interview the ERS and PRS women about their sociodemographic characteristics, IYCF practices, and challenges and facilitators to optimal IYCF practices. Chi-Square and logistic regressions analysis were used to identify differences in and predictors of optimal IYCF practices respectively.

Results: The PRS caregivers were more likely than ERS caregivers to have optimal exclusive breastfeeding duration (83.6% vs 68.2; p=0.05), and complementary feeding initiation (75.5% vs 8.6%; p≤0.001). Positive predictors of optimal BF initiation among PRS caregivers included being married, male child and delivery at a health facility. PRS caregivers who had received IYCF counseling had greater odds for optimal breastfeeding duration (OR 2.5; CI 1.32, 4.56) and timely complementary feeding initiation (OR 3.8; CI 1.92, 7.70).

Conclusions: Counseling on optimal IYCF is an important determinant of optimal IYCF practices in refugee situations. Caregivers in the emergency phase of refugee settlement may need increased support for improved IYCF practices.

Key words: IYCF, refugees

PO838

RELATIONSHIP BETWEEN LOWER GASTROINTESTINAL DISTRESS AND DIETARY HABITS IN LONG DISTANCE RUNNERS.

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Background and objectives: Gastrointestinal complaints are common matter in long distance runners. In particular, diarrhea and the frequent occurrence defecation are serious problems because of declining the performance in training and competitive events. The aim of this study was to investigate the prevalence of gastrointestinal (GI) complaints and the conditioning for these distresses in long distance runners and to determine the relationship between dietary habit and GI complaints.

Methods: A simple questionnaire to investigate whether having GI complaints or not in training and competitive events was sent to 449 well-trained male athletes composed of 13 kinds of sports: long and short distance runner, american football, valley ball and badminton, judo, wrestling, karate, boxing and fencing, gymnast, alpine, cyclists, and rowing player and sent back by upper 90% of these groups, respectively. Furthermore, rehydration status, monthly distance of run and dietary habits in a long distance runner were investigated.

Results: Long distance runners experienced GI distress higher (57% and 49%) than other sports player (26% and 17%) in training and competitive events, respectively. The claim of chronic diarrhea was more frequent than other players in long distance runners. As for the rehydration and the dietary habits, the GI distress did not have relationship with them. On the other hand, there was a correlative tendency between the running diarrhea and monthly running distances. The causes of the diarrhea runners thought were mental stress (24%), exposure stomach to the cold (22%) and intake of cold water (18%).

Conclusions: Long distance running is caused lower tract of GI distress, and it is associated with monthly running distances. More research on the possible predisposition of athletes for GI distress during exercise is needed.

Key words: long distance runner, gastrointestinal distress, dietary habits, diarrhea, rehydration

PO839

THE ASSOCIATION BETWEEN STUNTING AND ANAEMIA AMONG SCHOOL-AGED CHILDREN AND ADOLESCENTS IN 10 LOW-INCOME COUNTRIES

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Background and objectives: Iron deficiency anaemia is a significant global public health problem. Few studies have examined the association between undernutrition and anaemia in male and female adolescents in disadvantaged populations. The objective of this paper is to examine the relationship between undernutrition (stunting and thinness) and anaemia among school age boys and girls.

Methods: Cross-sectional anthropometric and haemoglobin data were analysed from samples of school children aged 5-17 years within the school health and nutrition programmes

of Save the Children School (USA) from 10 low income countries (n=19,722). Z-scores of height-for-age and BMI-for-age were calculated using WHO growth references (WHO, 2006). Stunting was defined as height-for-age <-2z scores of WHO reference median, and thinness defined as BMI-for-age <-2z-scores of WHO reference median. Anaemia was classified according to recommended thresholds of haemoglobin concentration (UNICEF/UNU/WHO, 2001).

Results: Among all age groups, stunted children and adolescents were significantly more likely to have anaemia than their non-stunted counterparts. The prevalence of anaemia was 42.7% and 27.9% for stunted and not-stunted boys respectively (OR=1.98; CI 1.81-2.16). In girls the prevalences were 36.5% versus 27.3% respectively (OR 1.58; CI 1.44-1.74). Stunted adolescent boys had a higher prevalence of anaemia than stunted girls (p<0.01). There was no association between thinness and anaemia at any age.

Conclusions: These data reveal a significantly higher prevalence of anaemia in stunted boys and girls, with stunted adolescent boys being at greater risk of anaemia than stunted adolescent girls. These samples are only representative of children attending school, and actual rates of anaemia and undernutrition may be higher among those not attending school. Among school children participating in the School Health and Nutrition programme stunting is a risk factor for anaemia, but thinness is not.

Key words: adolescent health; stunting, anaemia, haemoglobin

PO840

THE AVOIDANCE OF SPECIFIC FOODS AND BEVERAGES DURING PREGNANCY AND LACTATION IN THE WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: Women's food choices during pregnancy and lactation can affect the nutrient adequacy of the diet. When providing women with food supplements, cultural customs should be respected. We sought to determine specific foods and beverages avoided during pregnancy and lactation.

Methods: 181 women (88 pregnant and 93 lactating) living in rural, semi-rural and urban areas of the department of Quetzaltenango in the Western Highlands of Guatemala were interviewed on a single occasion to evaluate dietary practices. Women were asked if they ate more while pregnant or lactating and if they avoided certain foods and beverages during these periods.

Results: 60% of the participants were of Mayan Indigenous origin and 40% were Ladinas. The vast majority of women were in the 2nd (48%) or 3rd (51%) trimester of pregnancy. Most women (74%) were breastfeeding a child in the first trimester. Almost half (49%) of the pregnant women and two-thirds (67%) of the lactating women reported eating more than usual. Significantly fewer (p<0.001) pregnant women in the rural area (23%) reported eating more than in the semi-rural (62%) and urban (62%) areas. Half (51%) of the pregnant women and one-third of (33%) the lactating women reported avoiding specific foods or beverages. Food avoidance during pregnancy was less prevalent in the rural area (43%) than in the semi-rural (55%) and urban (55%) areas and more prevalent during lactation in the urban area (47%) than in the semi-rural (29%) and rural (29%) areas. The 5 most common avoided were ice cream, beef broth, fat, coffee and chicken during pregnancy and were ice cream, black beans, chicken, potatoes, and herbs during lactation.

Conclusions: Food avoidance during pregnancy and lactation are common in the Western Highlands of Guatemala and limit food choices in critical stages of development.

Key words: Guatemala, pregnancy, lactation, food choices

PO841

CONSUMPTION OF GRUELS DURING PREGNANCY AND LACTATION IN THE WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: Food choices during pregnancy and lactation are partly determined by cultural beliefs. "Atoles" (thin gruels) are a traditional hot drink, typically based on corn-dough (masa) and commonly consumed in Central America. Atoles are of reputed to be of important cultural significance during pregnancy and lactation in Guatemala, especially during the 40 days immediately following birth (quarantine). The objective of the current study was to determine the intake of atoles during pregnancy and lactation and its distribution within the household.

Methods: 130 women (30 pregnant and 100 lactating) living in rural and semi-rural areas of the department of Quetzaltenango in the Western Highlands of Guatemala were interviewed on a single occasion to determine usual intake of gruels. Types of gruels most commonly prepared, usual daily intakes, and distribution within the household were asked.

Results: The vast majority of women reported consuming gruels during pregnancy (83%) and lactation (97%). Three-

quarters of women reported consuming greater quantities of gruels during pregnancy (73%) and lactation (74%) than usual. The most commonly consumed gruels (in descending frequency) were: Incaparina®, cracked corn, corn dough, oats, and corazón de trigo® cereal during pregnancy and Incaparina®, corn dough, oats, corazón de trigo® cereal and maize meal during lactation. Women preferred savory and sweet gruels equally. Importantly, one-fourth of pregnant-but two-thirds of lactating women-consumed gruels prepared for themselves, and reportedly not sharing with other family members.

Conclusions: In our sample of Guatemalan women, usual intake of gruels increases during pregnancy and lactation, providing additional energy and nutrients during this critical period. The responses of these women could be important in framing a public health and educational redress to dietary imbalance during this vulnerable period. Funded by Hormel Foods Corporation, Austin, MN

Key words: Guatemala, pregnancy, lactation, food choices

PO842

LOCAL CONCEPTS OF "HOT" AND "COLD" FOODS IN GUATEMALA: EFFECT OF FOOD TEMPERATURE-QUALITIES ON EATING BEHAVIORS DURING PREGNANCY AND LACTATION

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Background and objectives: Numerous reports describe heightened risks of poor maternal and birth outcomes for Guatemalan women and the importance of understanding of the cultural aspects that affect women's dietary choices. This study aimed to understand food and health choices of pregnant and lactating women living in rural and urban areas of the western highlands of Guatemala.

Methods: The reported results are from a larger study conducted in rural and urban Quetzaltenango, Guatemala. Ethical approval was obtained from the Human Subjects Committee of CeSSIAM. Participation was voluntary and no compensation was given for participation. A total of 6 focus groups (FG) with 5-12 participants were carried out with pregnant (n=17) and lactating (n=27) mothers, using open question guides and reflective dialogues to initiate the discussions. FG were digital recorded and transcribed verbatim. Data were coded using predetermined themes within the study domains using HyperResearch® software.

Results: The local concept of "hot" and "cold" attributes temperature-qualities to different food items. The balance between "hot" and "cold" properties of foods and drinks is perceived by mothers who believe that such attributes in themselves can directly impact their health and that of their infant. The perceived impact of "hot" and "cold" properties of foods and drinks may also influence the quality and quantity of breast-milk, or may increase susceptibility to both allopathic and traditional illnesses.

Conclusions: Local narratives surrounding "hot" and "cold" foods are key in determining food choices amongst mothers, especially during lactation; the perceived effect on breast-milk production across this polarity also exerts a strong influence on a woman´s food choices following delivery. The findings of this study provided a clearer understanding of "hot" and "cold" cultural aspects that affect women's dietary choices. Funded by Hormel Foods Corporation, Austin, MN

Key words: "hot and cold" concept, pregnancy, lactation, eating behaviors, Guatemala.

PO843

FOOD AVERSIONS AND FOOD CRAVINGS DURING PREGNANCY: A QUALITATIVE APPROACH EXAMINING EATING BEHAVIOURS AMONG MAYAN GUATEMALAN WOMEN

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Background and objectives: Abundant studies support the importance of nutritious and balanced diet during pregnancy as a key contributor to women´s and their infants' health. Food aversions and food cravings can determine the type of food women would have during pregnancy and can influence diet diversity in this period. This study aims to examine perceptions on food aversions and food cravings during pregnancy among Mayan Guatemalan women.

Methods: The reported results are from a larger study conducted in rural and urban Quetzaltenango, Guatemala. Ethical approval was obtained from the Human Subjects Committee of CeSSIAM. Participation was voluntary and no compensation for participation was given. A total of 3 focus groups (FG) ranged 5-7 participants were held with pregnant women (n=17) using open questions guides and reflective dialogues to promote the discussions. FG were digital recorded and transcribed verbatim. Data were coded using predetermined themes within the study domains using HyperResearch® software.

Results: Mothers´ perceptions relate to the physiological effect of certain food items during pregnancy. These include nausea and vomiting and the resulting aversion women have to certain foods, especially during the first trimester of pregnancy. During pregnancy, food cravings were mentioned by women as

being important factors in their food choices. Acceding to food cravings was perceived as being critical in assuring the health of the fetus and pregnancy, and the success of the delivery.

Conclusions: Food choices regarding cravings and aversions during pregnancy are not only tied to gustatory preferences, but also to the perception that certain foods might benefit or harm mothers and their offspring. Information about perceived cultural and physiological aspects that affects pregnant women's dietary choices is important to design and contextualize food and nutrition interventions. Funded by Hormel Foods Corporation, Austin, MN

Key words: food aversion, food cravings, pregnancy, lactation, eating behaviors, Guatemala

PO844

ADHERENCE TO LIPID-BASED NUTRIENT SUPPLEMENT (LNS) AND IRON/FOLIC ACID TABLET (IFA) RECOMMENDATIONS DURING PREGNANCY AMONG RURAL BANGLADESHI WOMEN

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Background and objectives: Barriers and facilitators to sustained LNS consumption have not been evaluated among pregnant and lactating women (PLW) in Bangladesh. This study aimed to assess the adherence to and acceptability of LNS and IFA to improve maternal nutrition and prevent child stunting among women participating in a community health program in two northern districts of Bangladesh.

Methods: A subsample was randomly selected from an ongoing trial aimed at assessing the effectiveness of LNS provided to PLW and their children on nutrition and health outcomes. Women were interviewed at home about their use and preferences of LNS or IFA. Due to a disruption in the LNS supply, some of the women had experience with both LNS and IFA at different times during their pregnancy (n=70), and were asked to compare LNS and IFA.

Results: Mean and median self-reported adherence was 4.8 (±3.0) and 6 (0-13) sachets per week among women receiving LNS and 5.9 (±1.8) and 7 (0-9) tablets per week among women receiving IFA (p=0.08). 21.9% and 5.6% of women given LNS and IFA, respectively, reported not consuming supplements in the previous week (p=0.02). The median overall acceptability score for both LNS and IFA was 5 (range: 1-5), "Like it a lot". Organoleptic properties of LNS were acceptable with median scores of 4 or 5. Among the women who used both LNS and IFA, 48.6% preferred LNS and 51.4% preferred IFA.

Conclusions: These results suggest there is high acceptability of both LNS and IFA, yet a greater prevalence of non-adherers to LNS compared to IFA. Further investigation of potential barriers is needed to understand how to improve adherence to LNS during pregnancy.

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PO845

ENERGY AND NUTRIENT CONTRIBUTION OF COMPLEMENTARY FOODS IN 6 TO 11 MONTH OLD CHILDREN IN THE WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: The WHO recommends the introduction of nutritionally-adequate and appropriate complementary feeding at 6 mo of age, with continued breastfeeding for 2 years and beyond. Our objective was to assess the nutritional adequacy of complementary foods to the diets of Guatemalan infants with continued breastfeeding.

Methods: A single previous-day record was collected from a convenience sample of mothers of 94 infants, aged 6-11 mo, in the urban area of Quetzaltenango, Guatemala. Energy and 19 selected nutrient content in complementary foods and modeled volumes of breastmilk were calculated and nutrient adequacy was assessed using the 2004 WHO/FAO Recommended Nutrient Intakes (RNIs). Nutrient densities and critical nutrient densities of complementary foods were computed to identify "problem nutrients" and main sources of these nutrients were identified.

Results: Complementary diets were adequate for protein, but inadequate for pantothenic acid and vitamins C, A, D, E, and K, as well as calcium, iron and zinc. For small girls, with limited energy allowances, riboflavin, niacin, vitamin B6 and magnesium were identified as "problem nutrients" as well. Formula milk, cow milk and Incaparina® were main sources of the nutrients ("problem nutrients"), whose recommended intakes were still not being met by the total complementary fare offered.

Conclusions: We conclude that, as persistently reported in developing countries, the complementary feeding of Guatemalan infants is nutritionally inadequate. Public health actions to continue to narrow the nutrient gap of complementary foods in infants should include maternal education in early-feeding practices to select nutrient-rich foods. Furthermore, home fortification, or special fortified foods or a combination, is likely to be required for assuring consumption of the recommended amounts of micronutrients for sound infant growth. Funded by Sight & Life, Basel, Switzerland

Key words: human milk, complementary feeding, infant feeding, micronutrient intake, Guatemala

PO846

GROWTH PATTERN OF EXCLUSIVELY AND NON-EXCLUSIVELY BREASTFED INFANTS IN UMUAHIA URBAN, NIGERIA

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Background and objectives: This was a prospective comparative study carried out from April 2011 to February 2012 to assess the growth pattern of exclusively (EBF) and non-exclusively breastfed infants (NEBF) in the first six months of life

Methods: A total of 213 lactating mothers and their infants aged less than 7 days and weighing >2.5kg were recruited into the study and followed up at 6, 10, 14, 18 and 24 weeks. Infants were classified into EBF and NEBF groups based on their current feeding pattern during the follow up. Anthropometric measurements of weight and length were taken and compared with WHO curves. Data analysis was carried out using frequencies, percentages, means (SD), T-test.

Results: The rate of exclusive breastfeeding declined from 82.5% at delivery to 23% at the end of six months. The EBF infants had significantly higher mean weight and length from the 6th to 14th week than their NEBF counterpart ($p<0.05$). Despite a decline in mean weight of EBF infants after the 14th week, they retained the higher mean weight achieved earlier. Average cumulative weight gain of 3.33 kg and 3.02 kg were recorded for EBF and NEBF infants, respectively during the six months follow up.

Conclusions: The mean weight and length of the EBF infants was comparable to the WHO curve than for the NEBF infants. This suggests that the practice of exclusive breastfeeding is adequate to sustain normal growth in infants during the first six months of life.

Key words: breastfeeding, growth pattern, WHO curve

PO847

KNOWLEDGE AND AWARENESS OF ANEMIA AMONG YOUNG ADOLESCENT GIRLS IN SOUTH SULAWESI, INDONESIA

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Background and objectives: Anemia is one of the major nutrition problems among adolescent girls in Indonesia. Adequate nutrition to prevent anemia is required since this population group experience rapid growth and developmental changes as well as high possibility to enter early pregnancy. As dietary knowledge is critical to improve nutritional behaviors, adolescent girls should have adequate knowledge and awareness regarding anemia and dietary-related issues in order to improve their eating habits to prevent the problem. However, studies investigating dietary knowledge in Indonesian adolescent girls are insufficient.

Methods: Two phases of data collection were undertaken among school girls residing in two districts of the South Sulawesi Province. A survey questionnaire (Cronbach's Alpha=0.84) was distributed among 518 girls aged 12-15 years and qualitative in-depth interviews were performed with 19 girls to investigate their knowledge and perceived awareness of anemia. Descriptive analysis was performed for the survey data and thematic analysis was undertaken with the interview data.

Results: Knowledge of anemia was low with only 6 out of 16 items were correctly answered by at least 60% of the girls. This finding was confirmed by the results of interview, anemia is poorly understood by the girls. Both survey and interview data revealed that although the girls could recognize common symptoms of anemia, they did not clearly define causes and consequences of the problem. As a result, the seriousness of the problem and the risk of adolescent girls of developing iron deficiency anemia were not fully understood.

Conclusions: Young adolescent girls in South Sulawesi had insufficient knowledge and awareness regarding anemia. Ensuring adequate knowledge and awareness of anemia among this group is an important issue to be addressed when developing strategies to control anemia among Indonesian adolescents.

Acknowledgement: This research received grant from Neys-van Hoogstraten Foundation

Key words: adolescent girls, knowledge, anemia, Indonesia

PO848

DOES FREQUENCY OF FAMILY MEALS MAKE A DIFFERENCE AMONG ADOLESCENTS IN MALAYSIA?

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Background and objectives: Despite many benefits of family meals, high prevalence of infrequent family meals was observed among adolescents. Limited study examined the consequences of family meal frequency among adolescents in Malaysia. This study aimed to determine the consequences of family meal frequency among adolescents in Kuala Lumpur.

Methods: A total of 490 adolescents (41.4% males, 58.6% females) aged 13 to 16 years from four secondary schools in Kuala Lumpur, Malaysia were involved in this study. Most of them were Malays (48.4%), followed by Chinese (39.4%), Indians (9.6%) and other ethnic groups (2.6%). Family meal frequency and adolescent's meal frequency were assessed using Eating Behaviors Questionnaire. Risk of eating disorders and self-esteem were assessed using Eating Attitudes Test-26 and Rosenburg Self-Esteem Scale, respectively.

Results: Mean family meal frequency among respondents was 5.4±2.1 days in a week. Mean intakes for breakfast, lunch and dinner among adolescents were 4.9±2.5, 5.7±2.0 and 5.9±2.0 days in a week, respectively. About a quarter of adolescents (25.5%) were at-risk of eating disorders. Mean score for self-esteem was 29.1±4.3. Frequent family meals was associated with frequent intakes of breakfast ($r=0.128$, $p<0.01$), lunch ($r=0.255$, $p<0.01$) and dinner ($r= 0.324$, $p<0.01$) among adolescents. Additionally, frequent family meals among adolescents was associated with low risk of eating disorders ($r=-0.105$, $p<0.05$) and high self-esteem ($r=0.136$, $p<0.01$).

Conclusions: In other words, frequent family meals play an important role in promoting frequent meal intakes, low risk of eating disorders and high self–esteem among adolescents. Thus, future nutrition-related intervention programs should encourage frequent family meals among adolescents.

Key words: family meals, meal frequency, disordered eating, self-esteem, adolescents

PO849

EFFECTS OF LONG-TERM SUPPLEMENTATION WITH A MIXTURE OF SHORT AND LONG CHAIN INULIN-TYPE OLIGOSACCHARIDES ON FAECAL MICROBIOTA IN INFANTS

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Background and objectives: Human milk stimulates the growth of bifidobacteria because of its high oligosaccharides content. The aim of this study was to investigate whether the ingestion of infant formula supplemented with a mixture of short and long chain inulin-type oligosaccharides modulates the composition of faecal microbiota in infants.

Methods: Healthy term babies aged between 0-4 months, exclusively fed infant formula were enrolled in a multicenter, double-blind study. Infants were randomized to receive either an infant formula supplemented with 0.8 g/100 ml of oligofructose-enriched inulin (Synergy 1®) or a standard formula. Growth and clinical parameters were measured throughout the study. Stool samples were collected from a subgroup of infants at 2, 6, and 12 months of age. Bacterial populations were analysed by qPCR. The study was approved by ethical committees.

Results: The ITT population consisted of 154 infants. Growth related variables did not differ between the two groups at any study point. Compared to the CONTROL group, bifidobacteria counts in the PRE group were significantly higher at month 6. When results were expressed as proportions of bifidobacteria in relation to total bacteria, the PRE group showed significantly higher values at month 2 and 6, but not at month 12. Total bacterial counts and proportions of Bacteroides, C. coccoides, C. leptum and Enterobacteriaceae did not differ between groups. The rate of adverse events was low and similar in both feeding groups.

Conclusions: Ingestion of infant formula supplemented with short and long-chain inulin-type oligosaccharides increases bifidobacteria populations in the faecal microbiota in infants. These differences may disappear as the ingestion of total

amounts of infant formula decrease and diversification of the infant's diet occurs. Supported in part by the Commission of the European Communities, 6th Framework Programme, contract no. 007036.

Key words: microbiota, infants, inulin, oligofructose, prebiotics

PO850

SKIPPING BREAKFAST MAY INDUCE DYSMENORRHEA AND IRREGULAR MENSTRUATION IN POST-ADOLESCENT WOMEN IN JAPAN

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Background and objectives: In recent years, increasing attention has been paid to the adverse effects of skipping breakfast on quality of life including young people. However, there were very few reports concerning the relationship between skipping breakfast and reproductive function. Therefore, in this study we examined this issue by conducting a questionnaire survey of young Japanese women who are undergoing post-adolescent maturation.

Methods: Subjects were recruited from female college students aged from 18 to 20 years old. We sent questionnaires to 2215 students, and responses were received from 2166 students between 2000 and 2011. Information regarding the aim of this study was sent with the questionnaire and consent was obtained from all participants.

Results: The severity of dysmenorrhea was significantly higher in the population that skipped breakfast. The incidence of irregular menstruation was also higher in the population that skipped breakfast, although there was no difference in the incidence of premenstrual symptoms and in body mass index.

Conclusions: These findings suggest that skipping breakfast induce menstrual disorders. Considering that body mass index was not related with skipping breakfast, rhythmic disturbance of food intake may explain these adverse effects of skipping breakfast. Since these menstrual disorders influence the quality of life of young women in the future, skipping breakfast should be re-evaluated from the perspective of female reproductive function.

Key words: dysmenorrhea, irregular menstruation, post-adolescent women, skipping breakfast

PO851

FIRST (FOOD-BASED INTERVENTION AND PSYCHOSOCIAL STIMULATION) PROGRAM: COMMUNITY-BASED INTERVENTION TO IMPROVE INTAKES OF KEY PROBLEM NUTRIENTS AND PSYCHOSOCIAL CARE

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Background and objectives: Under-nutrition and sub-optimal development amongst under-two-year-old children in Indonesia were prevalent. This study aimed to assess effect of optimized complementary feeding recommendation (CFR) and psychosocial stimulation on intakes of "key problem nutrients", nutritional status, psychosocial care and development.

Methods: A community intervention trial using quasi-experimental design was conducted in Lombok, West Nusa Tenggara Province, Indonesia. There were four groups: control, stimulation, CFR, and CFR+stimulation (n=120/group). CFR was developed using linear/goal programming approach and stimulation was developed using locally-available resources to promote verbal, social-emotional, gross and fine motor developments. Intervention included monthly cooking sessions and weekly visits in CFR groups and weekly visits in stimulation groups. Mother's nutrition knowledge, feeding practices, psychosocial care (HOME Inventory score); child's nutrient intakes, nutritional status (Z-scores, hemoglobin), development (using Bayley Scale of Infant Development II) were measured before and after 6-month intervention. Structural equation modeling (SEM) was used to assess structural relationship between variables.

Results: Calcium, iron, and zinc were the key problem nutrients and CFR improved intakes of these nutrients directly and indirectly through improved nutrition knowledge. Stimulation improved psychosocial care. Income contributed to nutrient intake through better dietary diversity, also to psychosocial care through maternal mental health. Mother's education was positively related to psychosocial care at baseline and endline. Despite increase in nutrient intake and psychosocial care, nutritional status and development were not affected. The significant correlation at endline between psychosocial care and nutritional status and between nutritional status and development suggested that the non significant net-effect of the intervention was probably due to short duration and relatively small increase in nutrient intakes during intervention.

Conclusions: Six-month intervention with CFR and psychosocial stimulation improved intakes of key nutrients and psychosocial care but not yet nutritional status and development.

Key words: complementary feeding recommendation, linear/goal programming, nutrient intakes, psychosocial care, stimulation

PO852

EFFECT OF CONSUMPTION OF FREEZE-DRIED POWDERED YACON (FDY) ON PREVALENCE OF OBESITY, DYSLIPIDEMIA, OBESITY IN ELDERLY PEOPLE

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Background and objectives: Ageing is related to changes in metabolism of glucose and lipids and anthropometric parameters. The use of prebiotics, fructooligosaccharides (FOS), has been shown a positive effect to lower fasting glycaemia, total cholesterol and lipoprotein concentration and demonstrated efficacy to against pathological conditions that are common in the elderly, including diabetes, heart disease and metabolic syndrome. The aim of this work was to evaluate the effect of daily consumptions of freeze-dried powdered yacon (FDY) on the prevalence of hyperglycemia, dyslipidemia, overweight and obesity in elderly people.

Methods: During 9 weeks elderly people received daily doses of 18 g FDY containing 7.4 g of FOS. Abdominal obesity and overweight were assessed using the body mass index (BMI) and waist circumference (WC), respectively, before and after 9 weeks. Biochemical parameters as serum levels total cholesterol, HDL-cholesterol, LDL-cholesterol, triacylglycerol, C-reactive protein and glucose were determined before and after 9 weeks.

Results: After daily consumption of 18 g FDY for 9 weeks, the results showed a significant reduction of 58.7% of hyperglycemia prevalence, reducing in prevalence of hypercholesterolemia of 33,3%, decrease in prevalence of hypertriglyceridemia of 66.7% and the prevalence of elderly with normal C-reactive protein levels increased significantly 40.6%. After 9 weeks daily consumption of 18 g FDY, the prevalence of abdominal obesity, according WC, was 30%. No significantly change in prevalence of BMI, HDL and LDL-cholesterol was revealed.

Conclusions: A daily consumption of FDY containing 7.4 g FOS for 9 weeks showed to decrease a prevalence of elderly people with hyperglycemia, hypercholesterolemia, hypertriglyceridemia and abdominal obesity, and consequently could has on benefits related with the reduction or prevention of cardiovascular disease in elderly.

Key words: elderly healthy, dyslipidemia, hyperglycemia, freeze-dried powdered yacon, obesity

PO853

NUTRITION -KNOWLEDGE, -BEHAVIOUR AND -OPINIONS OF THE ELDERLY SWISS CONSUMERS

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Background and objectives: Europe has a steady increase in people older than 60 years. The aim and need is to assure their health in order to save resources-be that of financial, medical or political origin. But the main person responsible for reaching that aim is the consumer himself. A healthy lifestyle including a balanced diet may help a lot to reach the goal of healthy ageing. In that context, it is of high importance to know about the consumer behavior and nutrition knowledge of the elderly.

Methods: A questionnaire covering the three official Swiss languages was distributed amongst a representative sample of persons aged 50 to 80 years in Switzerland between September and October 2012. It contained 50 questions of three categories: general questions about nutrition and health, milk and dairy products as well as meat and meat products (no fish). The participants were free to choose whether they wanted to complete the survey in paper or online format.

Results: 646 questionnaires were completed (487 paper, 159 online, response rate: 89%). The participants consisted of 48% men and 52% women. 92% of the participants stated that they regard their nutrition as healthy and rather healthy. At the same time, 50% of the men and women consider the information about the impact of nutrition on human health as confusing. Most participants trust their doctors in regard to information concerning nutrition whereas almost 50% do not rely in food producer's information. More interesting results will be presented.

Conclusions: Many factors influence the elderly population in regard to behaviour and nutrition knowledge. Consumer surveys are important tools to understand the needs and thoughts of elderly people. The results will be used to inform them correctly and adequately about nutrition and health.

Key words: elderly nutrition, consumer questionnaire, consumer behaviour

PO855

MATERNAL KNOWLEDGE ABOUT FEEDING EARLY IN LIFE

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Background and objectives: The introduction of appropriate foods allows the child to acquire habits that are responsible for determining their pattern of consumption in the future. Parental influence on food choices play a preponderant role in the development of children's eating behavior. Data from studies emphasize high prevalence of inadequacy in relation to infant feeding. The aim of the present study was to evaluate maternal knowledge about feeding early in life.

Methods: Cross-sectional study with mothers and children between 4 and 24 months admitted to a University hospital in Porto Alegre. Sociodemographic information were questioned, data obtained through questionnaire was built based on the Food Guide for children younger than 2 years of the Ministry of health of Brazil who underwent evaluation process content through the Delphi method. Categorical variables were described by simple frequency and percentage and quantitative variables as mean and standard deviation. The ANOVA test was used for variables with normal distribution and Kruskal-Wallis was used for skewed distribution.

Results: Of the 229 mothers and children assessed, 77.3% are C-class families, 55.5% of mothers had schooling between 9 and 11 years and 63.9% of children are well nourished. In the questionnaire, the average percentage of correct answers was 75%. We observed a significant association between maternal education and number of hits ($p<0.001$).

Conclusions: There was a high percentage of knowledge about nutrition early in life. However it is necessary to investigate the relationship of knowledge to the practice of breastfeeding and introduction of complementary foods.

Key words: maternal knowledge, infant nutrition, feeding.

PO856

HOW DOES THE ROLE OF GRANDMOTHERS AS PRIMARY CAREGIVERS IN POOR HOUSEHOLDS, COMPROMISE THEIR OWN RIGHT TO ADEQUATE FOOD?

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Background and objectives: South Africa is currently experiencing serious challenges affecting household food security. For the elderly, the situation is critical. Instead of being looked after by their children, they are now taking care of their grandchildren. There are concerns especially regarding grandmothers´ enjoyment of social welfare systems, more specifically their use of the older persons grant to people over 60 years in relation to their right to health which includes the right to adequate food. The aim of the study was to better understand if and how the role of grandmothers (both above and below 60 years) as primary caregivers in poor households living in two communities (Zweletemba and Avian Park) in the Western Cape (South Africa), affected the realization of their own right to adequate food.

Methods: Data was collected in February 2012 using qualitative research methods. Questionnaires were completed by 45 grandmothers who also participated in 9 focus group discussions. Ten key informants were also interviewed. All interviews were recorded and transcribed using a grounded theory approach. Atlas ti was used to code transcripts.

Results: Almost all (44/45) households experienced hunger. The grandmothers were the primary caregivers in the households and their grant money did not even begin to fulfill their basic needs. Furthermore, their realization of the right to adequate food was greatly affected by living with grandchildren. The grandmothers reported sacrificing their own basic needs including food, in order to feed their grandchildren.

Conclusion: Living with grandchildren was the biggest constraint for the grandmothers' enjoyment of their access to adequate food for themselves and was identified as a major barrier to realizing their right to food and nutrition.

Key words: grandmothers, poverty, food insecurity, human rights, right to adequate food.

PO857

BREAKFAST CONSUMPTION AND STAGES OF BEHAVIORAL CHANGE AMONG BRAZILIAN HIGH SCHOOL GIRLS

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Background and objectives: The transtheoretical model (TTM) has been extensively used to guide behavior change for health promotion. Dietary applications of the TTM include fat reduction, weight control, consumption of dairy products, and fruit, vegetable and grain intake. Cross-sectional studies support the utility of the model for understanding and predicting food intake among adolescents. However, little is known about breakfast behaviors. The aim of the present study was to evaluate the self-reported breakfast consumption and the stages of change among Brazilian adolescents.

Methods: Cross-sectional study with 159 girls enrolled in public high schools in the city of São Paulo, Brazil, in 2012. A self-report validated questionnaire was used to assess breakfast consumption (days of week) and individual classification within the stages of behavioral change. The girls were classified in the stages of change by means of a specific algorithm. Descriptive analyses, student t-test and chi-square tests were conducted with difference considered significant at $p<0.05$.

Results: The average age of the girls was 16.2±1.2 years. The mean of breakfast consumption was 4.4±2.5 days/week. About 47% of the girls were in the decision/preparation stage of change (mean=3.5, SD=1.2 and 95% CI 3.3-3.6). A significant relationship between the stages of change and days/week for breakfast intake was found (p=0.000). Although was found a significant association (p=0.012) with vegetables, there was no significant association with fruits intake.

Conclusions: Classification of the adolescents into the stages of change, together with self-report breakfast consumption data, enable identification of groups at risk, in accordance with their inadequate breakfast habits and resistance for change. Nutrition intervention programs should be improved if their actions are directed according to the needs of each stages of change that are identified through the methodology adopted in this study.

Key words: stages of change, breakfast consumption, adolescent girls

PO858

ASSOCIATION BETWEEN MATERNAL NUTRITION STATUS AND BIRTH OUTCOME

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Background and objectives: Various maternal anthropometric criteria (pre-pregnancy weight, height, weight gain during pregnancy period) has been significantly associated with intrauterine growth. Birth weight plays an important role in infant mortality and morbidity, development, and future health of the child. Maternal nutritional status both before and during pregnancy is a well-recognized determinant of birth outcomes. The aim of the study was to examine maternal nutritional status and its relationship to infant birth weight and birth length.

Methods: The study was conducted on 510 women between the ages of 18-47 (28.1±4.8 years) who were patients of hospitals in the province of Warmia and Mazury. The course of pregnancy was uncomplicated, finished with natural labor, in biological time limits. The impact of mother's nutritional status before pregnancy and weight gain on newborns weight, length, Ponderal Index was estimated by multivariate linear regression.

Results: The infant birth weight depended on mothers BMI before pregnancy and was lower in the group of underweight subjects (2988.8 g vs 3380.6 g, $p\leq0.05$). Women with low increase in body mass during pregnancy delivered newborns with lower anthropometrics parameters. The increase in gestational weight gain of one kg resulted in statistically significant increase of birth weight by 40.1 g, increase of Ponderal Index 0.22 kg/m3.

Conclusions: Maternal BMI and gestational weight gain of pregnant women could be considered as predictive factors of birth weight of neonates.

Key words: maternal BMI, gestational weight gain, birth weight, maternal factors

PO859

DETERMINATION OF CALCIUM AND SODIUM CONTENTS IN UHT AND POWDERS MILKS MARKETED IN THE CITY OF RIO DE JANEIRO - BRAZIL

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Background and objectives: The milk and its derivatives, beyond primary sources of calcium, have this mineral more bioavailable to the human be. The intake of calcium is important. Low calcium intake may cause obesity, hypertension and osteoporosis. The bioavailability of calcium is influenced by sodium, since the high intake of this nutrient increases renal calcium excretion. It is not common to associate the milk consumption to increased sodium intake. Since the industrialized milk containing additives, which are usually sodium salts, is not known if the real sodium content is reported in the label. The Ministry of Health of Brazil recommends that children consume three servings of dairy products per day. Considering the mean value for sodium declared on the labels of processed milks fluids (130 mg/200 m) and powdered milk (130 mg/26g),the consumption of 250 ml milk would contribute with about 490 mg sodium per day . In view of the above, it was decided to determine the amount of calcium and sodium in UHT milks and powders.

Methods: Were analyzed 3 different brands of UHT milk and 2 of powder milk. Calcium was measured directly in the samples by titration with EDTA and sodium by flame photometry after attack of samples with HNO3/H2O2 solution (8:2) and heating. The sodium and calcium determinations were made in triplicate.

Results: For UHT milk, the mean levels for calcium and sodium were respectively: 283±7 mg/200 ml and 174 mg ± 15/200 ml. For milk powder the calcium and sodium were respectively 259±0,3 mg/26g and 121±0.7 mg/26g.

Conclusions: The results show that by drinking 750 ml of milk per day, a children consume, depending on the type of milk, between 22% and 32% of sodium intake recommended by WHO.

Key words: milk; determination; calcium and sodium contents.

PO860

EVALUATION OF NUTRITIONAL STATUS OF PREGNANT WOMEN ASSISTED IN A HEALTHCARE UNIT IN PETRÓPOLIS, RJ, BRAZIL

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Background and objectives: Nutritional requirements are increased for pregnant women; the outcome of pregnancy is highly dependent on the mother nutritional status. This study aimed to evaluate the nutritional status of pregnant women assisted in a healthcare unit in Petrópolis, RJ, Brazil, in 2011.

Methods: It is a retrospective cohort study conducted with 72 pregnant women between 20 and 44 years old. Data were collected in the medical records, being obtained information on demographic and socioeconomic conditions (age, skin color, marital status and education), obstetric history (number of previous childbirths and abortions), and anthropometric measures (initial or pre-pregnancy weight, final weight, height, initial and final BMI).

Results: Women mean age was 28 years old (SD = 5.2); 52% were white, 54% were unmarried, and 63% had only elementary education (8 years of schooling). Initial mean weight was 61.6 kg (SD = 14) with an average initial BMI of 24.2 kg/m^2 (SD = 5). Seven percent of the women were underweight before the pregnancy, while 17% were overweight, and 12% presented obesity. Final weight status revealed that 11% were underweight, 30% overweight, and 19% were obese. As for the total weight gain during pregnancy, 47% had adequate weight gain, 31%, excessive weight gain, and 22% presented insufficient weight gain. Only 17% of the women received nutritional counseling during the pregnancy.

Conclusion: Nutritional counseling and assistance might be important to minimize complications related to inadequate weight gain and impaired nutritional status during pregnancy and, consequently, to ensure a favorable obstetric outcome.

Key words: Pregnancy, nutrition during pregnancy, anthropometry, weight status.

PO861

BIRTH WEIGHT AND EXCESS WEIGHT IN CHILDREN ASSISTED IN A PUBLIC HEALTHCARE UNIT IN PETRÓPOLIS, BRAZIL

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Background and objectives: Birth weight has become an important topic of research due to its possible association with obesity and other metabolic diseases later in life. This study aimed to evaluate the association between birth weight and excess weight in childhood.

Methods: This was a retrospective cohort study conducted with 83 children between 7 and 10 years old assisted in healthcare unit in the municipality of Petropolis, Brazil. The children's weight status was assessed using the sex- and age-specific BMI z-scores of the World Health Organization reference curves. Birth weight data was obtained in medical records and classified as macrosomia: >4000 g; adequate birth weight: >3000 g and <4000 g; underweight: >2500 g and <3000 g; low birth weight: <2500g and <1500 g; and very low birth weight: <1500 g.

Results: Among the studied 83 children, 11% (n=9) were overweight (1< z-score <2 standard-deviation - SD), 5% (n=4) obese (2< z-score <3 SD), and 18% (n=15), severely obese (z-score >3 SD). The frequency of low birth weight was 5%, 26% (n=22) were born underweight, 64% (n=53), with adequate birth weight, and the frequency of macrosomia was 5%. Among those 27 children born underweight or with low birth weight, ten were overweight, obese or severely obese. Therefore, 40% of children with birth weight <3000 g presented excess weight later in life, while, among those born with adequate birth weight, 30% developed excess weight. Nevertheless, in the studied group the risk ratio was not significant (RR=1.3; 95% IC=0.7, 2.4).

Conclusions: The prevalence of excess weight was elevated, as well as was high the prevalence of inadequate birth weight. Nevertheless, the association between birth weight and weight status in childhood was not significant. Urgent health promotion actions targeting adequate nutrition during pregnancy and childhood are needed in the studied area.

Key words: birth weight, nutritional status, overweight, obesity, childhood.

PO862

TRENDS IN LOW BIRTH WEIGHT PREVALENCE IN PETRÓPOLIS, RIO DE JANEIRO, BRAZIL BETWEEN 1994 AND 2010

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Background and objectives: According to the World Health Organization in 2004, more than 20 million infants worldwide were born with low birth weight (LBW), i.e. birth weight < 2.500 g. LBW is associated with fetal and neonatal mortality and morbidity, inhibited growth and cognitive development and chronic diseases later in life. Therefore, it could be considered as a sensitive public health indicator because measure long-term maternal malnutrition, ill health, hard work and poor pregnancy health care. This study aimed to evaluate the occurrence of low birth weight children born from adult mothers in the city of Petrópolis, Rio de Janeiro, Brazil.

Methods: Ecological study evaluating LBW prevalence trends in the municipality of Petrópolis, Brazil, between 1994 and 2010 using linear regression models, having LBW incidence rate as dependent variables and time (years) as independent variables. Data on LBW prevalence and socioeconomic factors were obtained in the Birth Information System (SINASC) from the Ministry of Health, Brazil.

Results: The prevalence of LBW decreased 0.05% per year (p = 0.09) with a non-constant decline. Considering only the first and the last years of the time series, it was observed a reduction of 18.42% in LBW prevalence. The prevalence of LBW varied with the number of prenatal care sessions, mother's schooling, marital status, and skin color, and also with the type of delivery (cesarean section or normal), and pregnancy duration.

Conclusions: In the studied city, LBW showed downward trends, however the decrease was not statistically significant. LBW deserves attention and adequate resources since it is a powerful predictor of infant growth and survival caused by different factors including biological, socioeconomic and cultural aspects. Further studies are necessary to confirm the association with the studied variables.

Key words: low birth weight, ecological study, trends, birth information system.

PO863

TOLEDO AREA STUDY: ASSESSMENT OF DIET QUALITY, GLYCEMIC INDEX AND INSULIN RESISTANCE IN ADOLESCENTS

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Background and objectives: The Toledo Area Longitudinal Study (TALS) examines the influence of dietary, anthropometric and metabolic parameters at birth and their parents about different lipoprotein markers and insulin resistance (IR) in children and adolescents of Toledo Health Area. The objective is to evaluate quality diet influence and its carbohydrate profile on IR.

Methods: In a sub-sample of 53 adolescents TALS (16-17 years old), a 72-hour recall, food-frequency questionnaire with photographic were performed. The results were analyzed using the DIAL® software. The diet quality was determined by the Healthy Eating Index (HEI 0-100), by consumption of food groups and variety (0-10). Glycemic Load (GL) was calculated by multiplying Glycemic Index value by the grams of available carbohydrates. Insulin Resistance (IR) was assessed by HOMA-IR (≥1.5). Descriptive statistics (median and interquartile range) and analytical (nonparametric tests) were performed by SPPS® 15.0.

Results: The HEI was 64.9 (22.0) and food groups score: cereals-legumes 8.2 (2.4), vegetables 6.6 (5.4), fruits 7.6 (7.0), dairy 6.5 (3.6), meat-eggs-fish 10.0 (0.0), the food variety 5.0 (4.0). GL was 129.7 (36.3). Adolescents with HOMA-IR ≥1.5 compared to those with HOMA-IR<1.5 showed less IAS (50.1 vs 68.4 p = 0.028) and worse scores in group intake vegetables (5.4 vs 6.8 p = 0.078), meat-eggs-fish (9.0 vs 10.0 p = 0.026), food variety (3.5 vs 6.0 p = 0.008) and GL (130.7 vs 121.2 p =0.215).

Conclusions: The diet of adolescents in TALS is drab, with a low diet quality, high GL, aspects clearly associated with the degree of IR.

Key words: Diet quality, adolescents, insulin resistance, 72-hours recall, food-frequency questionnaire.

PO864

RELATION BETWEEN THE DEPRESSION AND THE NUTRITIOUS CONDITION IN ADOLESCENTS OF MIDDLE SCHOOLS IN MEXICO CITY

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Background and objectives: The adolescence is the stage in which the human beings become vulnerable, they have existential problems, which lead them to conditions of depression and, derived to these conditions sometimes leads them in the habit of excess eating or diminish ingestion. The aim of the present study was to evaluate if the depression influences the nutritious condition of teen students of middle public schools in Mexico City.

Methods: The study sample was constituted by 142 adolescents enrolled in school from 11 to 13 years of age, being 72 women and 70 men, belonging to middle public schools in Mexico City. The conditions of depression and nutritious insole was obtained by the 'scale HAD depression' that consists of 7 items and the Who Anthro Plus. The percentage of adolescents without depression was 69.7% (women 35.2%/men 34.5%), the percentage of adolescents with probable anxiety was 18.3% (women 10.6%/men 7.7%) and finally with significant depression 12% (women 5%/men 7%). With regard to the nutritious condition there was demonstrated that 1.4% was presenting thinness (women 1.4%), 57.7% normal weight (women 34.5%/men 23.2%), 27.5% overweight (women 10.5%/ men 17%) and 13.4% obesity (women 4.2%/men 9.2%). The statistical analysis chi2 of Pearson threw independence of variables (p 0.05) between depression and nutritious condition. One recommends to extend the study and to correlate the nutritious condition with other variables that allow knowing the factors that predispose the increase of weight in the teenagers of secondary schools in Mexico City.

Key words: depression, teen, middle school, nutritious condition, Mexico.

PO865

FAMILY VIOLENCE AND BODY IMAGE OF ADOLESCENTS IN A HEALTH FACILITY IN THE CITY OF RIO DE JANEIRO

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Background and objectives: Recent studies show that domestic violence is associated with nutritional deficits, especially in young females. The relationship between sexual abuse and eating disorders has also been the subject of research in recent years. However, there are few studies that focus on the relationship between family violence and body image perceptions in adolescents. The aim of this study was to investigate the relationship between parental violence against adolescent and poor body image.

Methods: Cross-sectional study involving 201 adolescents aged 10 to 19 years enrolled in the Bolsa Família program of a health facility in the city of Rio de Janeiro, Brazil, in 2008-2009. The measurement of body image of adolescents was based on the questionnaire Body Areas Satisfaction Scale - BASS. Violence, specifically verbal and physical aggression between parents and adolescents, was measured by the Portuguese version of the Conflict Tactics Scales Form R (CTS1). Psychological violence was assessed by the scale of psychological violence against teenagers. Associations between variables were expressed as odds ratios (OR) and their respective 95% confidence intervals (95% CI) estimated via logistic regression. All analyses were developed for boys and girls separately.

Results: Among only girls, psychological violence was associated with poor body image (OR = 4.19; 95% CI, 1.37 to 12.86).

Conclusions: It is important that actions to promote and protect health also incorporate psychological violence as another factor related to body image perception in adolescence.

Key words: body image, adolescents, family violence.

PO866

A NATIONAL STUDY OF CHILEAN SCHOOL CHILDREN: RELATIONSHIP BETWEEN SUGARED NON-ALCOHOLIC BEVERAGES AND BODY MASS INDEX

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Background and objectives: The changes in food consumption patterns in the last few years have been notable. A generalized increase in calorie consumption indicates that this intake is due to behaviors and habits acquired early in life. The objective was to evaluate the relationship between sugared non-alcoholic beverages and Body Mass Index (BMI) in Chilean school children.

Methods: The study used a population-based cross-sectional design. Multi-stage probability sampling was used to select 1074 school children between the ages of 6 and 18 residing in urban and rural areas of the country. A Quantitative Consumption Tendency Survey was applied, which analyzed the food habits and behaviors in the last 30 days. Linear multivariate models were adjusted to determine the increase in BMI per 250 ml daily serving.

Results: Of the total, 92.0% (CI = 89.9-94.2) consume sugared beverages daily with a mean of 424.3 ml (p25-p75=212.1-707.2). For school children who consumed more than one serving (250 cc) daily, the increase in the BMI coefficient in school children aged 6 to 13 is â=0.49 ($p < 0.001$) and â= -0.01 ($p = 0.60$) in school children aged 14 to 18.

Conclusions: Chilean school children have a high daily consumption of high-energy beverages. Consumption of sugared non-alcoholic beverages is positively associated with BMI only in school children aged 6 to 13.

Key words: school children, diet, sugared beverages.

PO867

MALNUTRITION IN JAZAN REGION, KINGDOM OF SAUDI ARABIA

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Background and objectives: The nutritional status of young children is one of the most sensitive indicators of sudden changes in health status. The main objective of this research was to investigate the nutritional status of children less than five years and to assess the associated different factors that assumed to

influence nutritional status of the children.

Methods: Across sectional survey covered a random sample of 431 children less than five years in a randomly selected five primary health care centers in Jazan region. Data were collected using structured questionnaire designed to collect information on demographic characteristics of children, background information of the mothers and infant feeding practices. SPSS program was used for data entry and processing, p value less than 0.05 were set to be significant.

Results: Among all studied children malnutrition indicators were as follow, moderate and sever underweight was 15.9% and 12.6%, respectively. Moderate stunting was 15.9%,compared with severe 36.9%. Moderate wasting was 6.85% while severe was 7.95%. No significant difference was found between these indicators for males and females. Breastfeeding indicators revealed that 90% of the children were naturally breasted, 29.5% of them were exclusively breastfed during the first four months of birth and 48.3%of the children were breasted for 7-12 months. An association between mother's educational and occupational status and breast-feeding was found p value 0.036 and 0.003, respectively.

Conclusions: The study provided nutritional indicators below the average of KSA, this calls for more nutritional surveys and programs to be conducted to monitor the nutritional health of Saudi southwestern region children.

Key words: malnutrition, children, Jizan, Saudi Arabia Aknowledgement Thanks to students who collected the data, and PHC Directorate and its staff at PHC.

PO868

MOTHERS PERCEPTION, FEEDING AND CARE OF LOW BIRTH WEIGHT INFANTS IN LAGOS STATE, NIGERIA

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Background and objectives: Low Birth Weight (LBW) infants suffer from high rates of morbidity and mortality of infectious diseases and are often underweight, stunted or wasted from the neonatal period through childhood if adequate feeding and care are not provided. Not much is known about community/mothers' perception of LBW babies, as well as their feeding and care practices. This study evaluated the feeding and care practices of LBW infants in their first four months of life.

Methods: 130 infants (65 LBW and 65 Normal Birth Weight, NBW) were studied over a period of four months from birth. Data were collected using qualitative instruments.

Results: Mean weight of the LBW and NBW infants were 2.2 ± 0.26 and 3.11±0.40 kg, respectively. Mothers rated the sizes of their infants as very small (31.2%), smaller than average (47.5%), average (14.8%) and greater than average (6.5%). 26.1% of mothers of LBW infants recognized the need for immunization compared to 4.5% of mothers of NBW. Similarly 35.4% of mothers of LBW infants recognized the need for exclusive breastfeeding compared to 15.3% of the mothers of NBW infants. However, 0% and 3.1% of LBW and NBW infants, respectively, had complete immunizations, relevant to their ages while 35.4% and 15.3% of LBW and NBW infants were exclusively breastfed. Although there was no significant difference in the care and feeding patterns of LBW and NBW infants, a process called "Agbelegbomi" in which small infants are fed herbs to increase body weight was practiced by TBAs thus hindering optimal breastfeeding.

Conclusions: The findings of this study suggest that although mothers could identify LBW infants, they do not recognize the problems/risks associated with LBW. There is need for intervention to create awareness of these problems/risks to ensure proper care of LBW infants.

Key words: infants, feeding practices, LBW, NBW.

PO869

ASSOCIATION OF BREAKFAST CONSUMPTION WITH OBJECTIVELY MEASURED AND SELF-REPORTED PHYSICAL ACTIVITY, SEDENTARY TIME AND PHYSICAL FITNESS IN EUROPEAN ADOLESCENTS: THE HELENA STUDY

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Background and objectives: Skipping breakfast has been associated with inactive lifestyle in adolescents. The aims of this study were to examine the association of breakfast consumption with objectively measured and self-reported physical activity (PA), sedentary time (ST), and physical fitness.

Methods: The study comprised 2148 adolescents participating in the HELENA Study. Breakfast consumption was assessed by 2 non-consecutive 24 h recalls and by a 'Food Choice and Preferences' questionnaire. PA, ST and physical fitness components (cardiorespiratory fitness, muscular fitness and speed-agility) were measured and self-reported. Socioeconomic status was assessed by questionnaire.

Results: Breakfast consumption was not associated with measured or self-reported PA. However, 24 h recall breakfast consumption was related to measured ST in males and females, although results were not confirmed when using other methods to assess breakfast patterns or ST. Male breakfast consumers had higher cardiorespiratory fitness compared with occasional breakfast-consumers and -skippers, while no differences were observed in females. Overall, results were consis-

tent using different methods (all $p < 0.005$). In addition, both male and female breakfast-skippers (assessed by 24 h recall) were less likely to have a high measured cardiorespiratory fitness compared with breakfast consumers (OR: 0.33, 95%CI 0.18-0.59 and OR: 0.56; 95%CI 0.32-0.98, respectively). Results persisted across methods. Breakfast consumption was not related to muscular fitness and speed/agility in males and females.

Conclusions: Skipping breakfast consumption does not seem to be related to PA, ST or muscular fitness and speed-agility as physical fitness components in European adolescents; yet it is associated with both measured and self-reported cardiorespiratory fitness, which extend previous findings.

Key words: breakfast, physical activity, sedentarism, aerobic capacity, muscular strenght, speed/agility, HELENA study.

PO870

NUTRITION AND DYSPHAGIA IN ELDERLY: THE IMPORTANCE OF SCREENING FOR EARLY IDENTIFICATION

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Background and objectives: Dysphagia is clinically very frequent in elderly and constantly associated with increased of malnutrition, dehydration and aspiration pneumonia. Early diagnosis of signs of dysphagia is important to avoid complication and guarantee an adequate nutritional status. Risk identification through dysphagia screening may positively alter health outcomes. The aim of this study was to evaluate a tool for identifying risk of dysphagia in a reference institution in São Paulo, Brazil.

Methods: This study is cross-sectional, analytic, observational, uncontrolled with convenience sample and included 422 individuals from both genders, aged between 60 and 90 years old, from July to December 2011. Because most screening tools are complex, the Brazilian Society of Geriatrics and Gerontology (SBGG) developed an instrument to identify dysphagia in hospitalized elderly and the instrument was evaluated in an outpatient reference institution. The reference institution adopts its own instrument screening that includes investigating difficulties to communicate, chew, swallow, and the frequency of choking and pneumonia. The instruments were compared and the predictive variables identified the analysis of variance (ANOVA) was conducted with a 5% significance level.

Results: Dysphagia was found in 43.1% of the sample to be used the instrument of SBGG and 13.7% when using the the screening of the institution. The agreement was inadequate and low (kappa = 0.29, $p < 0.05$). Dysphagia was associated with the weight of older males, but was not associated with age ($p < 0.05$).

Conclusions: Dysphagia was common in this population and was associated with weight, but not associated with age and early identification should provide adequate nutritional intervention.

Key words: dysphagia, elderly, screening tool.

PO871

CHILDREN FROM THE WEALTHIER HOUSEHOLDS ARE LESS LIKELY TO BE EXCLUSIVELY BREASTFED: A STUDY FROM EAST NUSA TENGGARA, INDONESIA

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Background and objectives: About 58% of preschool children in East Nusa Tenggara, Indonesia are stunted, while exclusive breastfeeding is evident to be protective against stunting in this poor population. This study was conducted to assess whether mother's child care and socio economic status are associated with breastfeeding practice.

Methods: A cross-sectional study was conducted in Timor Tengah Selatan District. The study subjects were 408 children aged 6-24 months and their mothers. Data on mother's child care, breastfeeding history, and socio-economic status were collected using structured questionnaires by trained nutritionists.

Results: About sixty one percent (61%) of children in this study population were reported to be exclusively breastfed, and 44.1% of them were stunted. Compared to children from the poorest households (1st quintile), children from the 2nd quintile and 3rd quintile were not significantly different ($p > 0.05$) in terms of having exclusive breastfeeding. However, children from the 4th quintile were 2.1 times (OR=2.1: 95% CI=0.24-0.93) less likely, and children from the 5th quintile (the wealthiest) were 2.4 times (OR=0.42: 95% CI=0.21-0.83) less likely to be exclusively breastfed compared to children from the poorest households adjusting for the remaining demographic and socio-economic factors. Children who were not daily cared by their mothers were 3.5 times (OR=0.29: 95%

CI=0.10-0.81) less likely to be exclusively breastfed compared to children who were daily cared by their mothers adjusting for the remaining demographic and socio-economic factors.

Conclusions: Children from wealthier households and children who were not daily cared by their mothers were less likely to be exclusively breastfed. Breastfeeding promotion targeting to mothers with no daily child care and to the wealthier households could be an effective strategy to improve exclusive breastfeeding.

Key words: breastfeeding, children, household's wealth, Indonesia.

PO872

MATERNAL DECISION MAKING ABILITY AND SOCIAL SUPPORT: ASSOCIATIONS WITH INFANT YOUNG CHILD FEEDING AND NUTRITION IN RURAL NICARAGUA

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Background and objectives: The role of maternal caring behavior has been highlighted as an underlying factor for infant and young child feeding and nutrition. Mothers' ability to make decisions and the social support they receive to do so, may be of importance for their caring capacity. We aimed to study the associations between maternal decision making ability, their social support and feeding and nutritional status of their 0-35 months old children..

Methods: In a cross-sectional survey, data on 1371 mother-infant pairs were collected in los Cuatro Santos area, rural Nicaragua. At household visits mothers were interviewed about their decision-making ability and social support using commonly used instruments. The scores attained were turned into tertiles for analyses. Infant and young child feeding was assessed using WHO recommended key indicators. Children's height and weight was collected using standard procedures and converted to nutritional indices based on WHO child growth standards. Adjusted multivariate regression models were conducted to estimate associations between outcomes and main explanatory variables.

Results: Compare to mothers in highest tertile of decision making ability, mothers in the lowest tertile were more likely to exclusively breastfeed their infants under 6 months of age and continue breast feeding after one year. Complementary feeding practices were better among mothers within the middle tertile of decision making capacity. Similarly, mothers in the middle tertile of social support had children with significantly higher weight-for-height and BMI-for-age z-scores as well as lower odds of wasting 0.13 (95% CI; 0.03-0.60) compared to the mothers in the highest tertile.

Conclusion: In this sample of rural Nicaraguan mothers, optimal feeding practices and higher body mass was observed more among the children of mothers with lower decision making capacity and social support but associations may not be causally interpreted. Funded by Sida

Key words: social support, decision making, children, nutrition, Nicaragua.

PO873

GLUTEN CONSUMPTION AT EARLY AGE IS DIFFERENT AMONG INFANTS FROM DIFFERENT EUROPEAN COUNTRIES. THE PREVENT-CD COHORTS

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Background and objectives: To evaluate mean daily gluten intake (MDGI) in children DQ2/DQ8 positive with a 1st degree relative with CD recruited from 2007-2010 shortly after birth (EU-PreventCD project,www.preventcd.com).

Methods: A prospective evaluation of MDGI in 11-36 months old infants in the PreventCD cohorts from Spain (Valencia, Madrid, Reus), Italy, Germany and the Netherlands, was accomplished by specific previously developed food records (FR), adapted to local dietary habits. All of FR corresponds to a period of 7 days and these were completed at 11, 12, 14, 16, 18, 22, 24, 28, 30, 34 and 36 months of age. The MDGI was calculated by the accepted method of multiplying the grams of vegetable protein, derived from gluten-containing cereals according to the food product composition, by 0.80.

Results: 906 FR (2-3 per child) were evaluated. MDGI increased progressively from 12 months onwards in all centers, the highest MDGI being registered in the older age group (25-36 months). MDGI (in grams) for Valencia, Madrid, Reus, The Netherlands and Germany are respectively: 2.95, 3.26, 2.09,

5.82, 4.09 (11-12 months); 4.35, 4.11, 4.75, 7.81, 6.54 (14-18 months); 4.80, 4.28, 4.77, 8.33, 7.21 (20-24 months) and 5.18, 4.14, 4.63, 8.91, 7.94 (25-36 months). Differences in MDGI are statistically significant between Spanish children and those from The Netherlands and Germany ($p < 0.001$), the latter 2 countries displaying more similar MDGI, except at the youngest age.

Conclusions: In the different countries MDGI increases sharply in-between 12 and 18 months of age, but it remains quite constant thereafter. However, The Netherlands and Germany have overall significant higher gluten consumption at any age. Further analysis including genetics and breast feeding as well as longer follow up of this cohort is mandatory to ascertain the true relevance of gluten intake at early ages in the natural history of CD in European children.

Key words: gluten consumption, European children.

PO874

ANEMIA PREVALENCE AMONG PREGNANT WOMEN RECEIVING CARE AT A HOSPITAL IN GHANA

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Background and objectives: Anemia continues to be a global challenge particularly among pregnant women. In Africa about 20% of maternal deaths have been attributed to anemia. The objective of this study was to determine the prevalence of anemia at different trimesters among pregnant women aged 18-49 years receiving prenatal care at a Public Hospital.

Methods: This was a cross-sectional study involving 120 pregnant women. A semi-structured questionnaire was used to obtain information on socioeconomic and demographic factors, anemia knowledge and vitamin-mineral supplement use. Participants most recent hematological data on Hemoglobin level (Hb), Hematocrit (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Hemoglobin Concentration (MCHC) previously determined using hematology automated analyzer were obtained from hospital records. Anemia was classified based on WHO Hb and other hematological cut-offs. Pearson chi-square test was used to investigate associations between variables.

Results: Normocytic and microcytic anemia was present among 65% and 35% of the pregnant women respectively. Some of the women (45.0%) at one point in pregnancy had anemia. The prevalence of anemia was significantly higher ($p = 0.049$) in those in their third trimester than those in their first and second trimesters of pregnancy. A high percentage (94.2%) had knowledge about anemia during pregnancy. Majority (98.3%) were using some form of supplement, however, combination of iron and folic acid were the commonest supplements among 54.2% of the pregnant women. The women's age, socioeconomic status and supplement use had no significant relationship with hemoglobin concentration ($p > 0.05$).

Conclusions: The prevalence of anemia in pregnancy is still high even though majority of the women had prior knowledge about anemia during pregnancy and were using vitamin-mineral supplements. Innovative ways to address anemia is therefore warranted.

Key words: anemia, pregnancy, supplement use, knowledge Acknowledgement: The authors thank all the women who volunteered.

PO875

ASSOCIATIONS BETWEEN NUTRITIONAL STATUS, HOUSEHOLD FACTORS AND SPECIFIC DIARRHEAL PATHOGENS AMONG CHILDREN IN MIRZAPUR, BANGLADESH

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Background and objectives: Childhood malnutrition determinants are multi-factorial and so causal pathways linking them require further clarification. We ascertained what household sanitation and hygiene factors and diarrheal pathogens determined nutritional status of children in rural Bangladesh.

Methods: Children with diarrhea and matched control children <60 months of age were recruited in Mirzapur, Bangladesh for the Global Enteric Multi-Center Study (GEMS) between December 2009 and December 2012. Clinical information on children was collected along with information on household hygiene and sanitation factors. A stool sample collected from each child was screened for bacterial, viral and protozoa enteric pathogens. Children's anthropometric measures were used to classify them as stunted, underweight or wasted. Associations between indices of malnutrition status and household hygiene and sanitation factors as well as diarrheal pathogens among combined cases and controls were analyzed using hierarchical logistic models.

Results: The prevalence of stunting, underweight and wasting among children was 18%, 22% and 14%, respectively. Greater caregiver's education, feces disposal, and child's age, were associated with reduced stunting and underweight while household animals increased the risk of both. Greater caregiver's education and water treatment were associated with reduced wasting. Cryptosporidium parvum and Shigella flexneri infections were significantly associated with increased stunting and wasting, respectively.

Conclusions: These results suggest that different sets of risk factors are associated with indices of short term acute and longer term chronic malnutrition. These differences are reflected in the importance of acute, severe bacterial and chronic parasite infections as proximal risk factors for these outcomes.

Key words: childhood malnutrition, risk factors, Bangladesh.

PO876

A GROWING PROBLEM IN CONSUMPTION OF ALCOHOLIC AND ENERGY DRINKS AMONG ADOLESCENTS

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Background and objectives: Consumption of alcoholic drinks among Bulgarian adolescents was identified as a serious problem 15 years ago but the use of energy drinks which popularity is currently increasing has not been studied. The purpose of this survey is to investigate the consumption of alcoholic drinks among schoolchildren and to estimate its trends, to examine the use of energy drinks by children and adolescents and its correlations with those of alcoholic drinks.

Methods: Cross-sectional nutrition survey on a national representative sample comprising 4322 schoolchildren aged 6-18 years was performed in 2011. Consumption of alcoholic and energy drinks for the past year was studied by Food Frequency Questionnaire. Statistical analyses were performed using SPSS v. 17.

Results: Among schoolchildren aged 10-13 years 56% never consumed alcoholic drinks, in the age 14-18 years - only 17%. At least once weekly beer consumed 38.5% of schoolchildren 14-18 years old, wine - 26.7%; spirits - 39.5% as 10% of boys reported every day spirit consumption. There is a tendency for increasing in alcohol consumption among schoolchildren comparing to findings from the national survey in 1998. This study revealed that consumption of energy drinks starts still in the age 6-9 years. Non-consumers of energy drinks (never consumed, consumed less than once monthly) were 50.4% of schoolchildren aged 10 -18 years. At least one energy drink weekly consumed 18.3% of adolescents aged 10-13 years and 33.5% of schoolchildren 14-18 years old, as 13.4% of boys in this age have ingested energy drinks every day. Co-occurrence of energy and alcoholic drinks consumption was determined among adolescents aged 10-18 years. Correlation between use of energy drinks and consumption of spirits and beer was revealed ($r=0.3$, $p < 0.000$).

Conclusion: Findings from the study are worrisome and call for effective policy measures.

Key words: alcohol, energy drinks, adolescents.

PO878

DIETARY PATTERN, FIBER AND CHOLESTEROL, OF A GROUP OF ELDERLY YORUBA IN IBADAN, NIGERIA.

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Background and objectives: Elevated high density lipoprotein-cholesterol (HDL-C) concentrations have been found to influence longevity, suggesting the need to increase HDL-C concentrations in elderly individuals. This cross sectional descriptive study assessed demographic and dietary characteristics of 240 elderly subjects in Ibadan, Nigeria, including Fiber intake and lipid profiles.

Methods: All respondents filled out appropriate questionnaires in respect to dietary pattern and blood was drawn for biochemical analysis.

Results: The 240 respondents ranged in age from 60 to 95 years and included 114 (47.5%) men and 126 (52.5%) women. Their diets were high in roots and tubers, moderate in legumes and low in fruits and animal proteins and fats. Mean fiber intake was 16 g/day, energy ranged from 6136-8368 kJ/day and protein ranged from 28-50g/day. Zinc, vitamin A and B vitamin were generally low. Assessments of their lipid profiles showed that 53% of men and 70% of women had normal low density lipoprotein-cholesterol (LDL-C) concentrations. HDL-C concentrations ranged from 33-39.74 mg/dl, with 69% of men and 35% of women having normal HDL-C. Most women (80%) had normal total cholesterol (TC) concentrations. Total triglyceride concentrations ranged from 76–117 mg/dl. In addition, there is a significant different between male and female LDL and HDL. Furthermore, age affected the lipid profiles and general health of these elderly subjects. Age is associated with decreased lipid concentrations, especially of HDL-C, and decreased energy intake. Fiber intake was positively correlated with Vitamin A ($r=0.30$; $p < 0.05$), Vitamin B1 ($r=0.41$; $p < 0.05$) and Zinc (0.40; $p < 0.05$).

Conclusions: These findings suggest that fiber, age and gender have a significant effect on the lipid profiles of elderly Yoruba. Most of these subjects consumed diets rich in plant sources.

Key words: diets, lipid profile, fiber, elderly.

PO879

EARLY ADIPOSITY REBOUND IS ASSOCIATED WITH INCREASED METABOLIC RISK AT AGE 7Y IN CHILEAN CHILDREN

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Early adiposity rebound (< age 5y; EAR) has been consistently associated with increased obesity risk, but its relationship with metabolic disorders is less clear; also importantly, the mechanisms involved in these associations are not yet established. Therefore, we aimed to assess the association between timing of adiposity rebound (AR) and metabolic status at age 7, evaluating the potential role of total adiposity, adipose function, and biological maturation in these associations. In 910 children from the Growth and Obesity Chilean Cohort Study (GOCS) we built BMI curves from 0-7y and estimated the age at AR. At 7y we measured waist circumference, glucose, insulin, triglycerides and HDL-cholesterol and a metabolic risk score based on standardized scores was constructed. At 7y we also measured percentage of fat mass (adiposity), leptin and adiponectin (adipose functionality) and ultrasonographic bone age (maturation). We found that mean age at AR was 5y in girls (5.19 ± 1.82y) and boys (5.42 ± 1.70y) and 44% of the children had EAR. EAR was associated with larger waist circumference [?: 5.10 (95% CI: 4.29-5.91)], higher glucose [?: 1.02 (1.00- 1.03)], insulin resistance [? HOMA-IR: 1.06 (1.03- 1.09)], and triglycerides [?: 10.37 (4.01- 6.73)], and worse metabolic risk score [?: 0.30 (0.02- 0.37)]. Associations decreased significantly when adding adiposity to the models (i.e. ? waist circumference: 0.85 (0.33- 1.38) and to a lesser extent when adding functionality [i.e. ? waist circumference: 0.73 (0.14- 1.32) and maturation [i.e. ? waist circumference: 0.65 (0.10- 1.20). We conclude that in Chilean children younger ages of adiposity rebound predict higher metabolic risk at 7y; these associations are explained by increased maturation and adiposity dysfunction, but mostly by greater adiposity. Funding: FONDECYT # 1090252, CC has a Wellcome Trust Training Fellowship. Keywords: adiposity rebound, obesity, metabolic risk

PO880

THE RISK OF VITAMIN B12 DEFICIT ASSOCIATED WITH THE USE OF METFORMIN IN CHILEAN OLDER PEOPLE

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Background and objectives: Metformin is widely used for the treatment of Type 2 diabetes and has been associated with decreased plasma levels of vitamin B12 (B12). Considering the important effects of B12 deficit in older people, the aim of the study is to estimate the risk of B12 deficit associated with the use of metformin in diabetic older subjects.

Methods: Case-Control study in 514 (73.4% female), community-dwelling diabetic subjects aged 65-74 y randomly selected from Primary Care Centers registries from Santiago Chile. The protocol was approved by the ethical committee of INTA. Cases (118) were defined as diabetic older people with low plasma B12 (<221 pmol/l). Controls (396) were comparable diabetic individuals with B12 >221<700 pmol/L. High Metformin doses were defined as Percentile 75 (>2500 mg/day). Pearson simple correlation between metformin doses and vitamin B12 levels was performed. Logistic regression models were used to explore association between low vitamin B12 and p75 metformin doses. The models was adjusted by sex, age, alcohol use and metformin time of use.

Results: Mean age of the sample was 68.2±4.6. Use of metformin was present in 74.4% (95%CI: 70.4-78.1) subjects. The metformin median doses/day was 1700 mg (IQR:850-2550) High doses of metformin was present in 23.1% (95%CI: 19.5-27.0) of the subjects similar for both men and women. Low plasma vitamin B12 was found in 31.6% (95%CI: 24.4-40.6) of men and 19.6 (95%CI: 15.7-24.0) of women ($p < 0.01$). Alcohol consumption was present in 30.9% of men and 9.1% of women. The mean time of metformin use was 8.2 months with no gender difference. The adjusted models showed an increased risk of low vitamin B12 in the subjects with using high metformin doses (OR 1.82; 95% CI: 1.07-3.08).

Conclusions: These results support considering use of >2500 mg/day of metformin as a risk factor for B12 deficit Supported by Grant FONIS SA11I2092.

PO881

A SYSTEMATIC REVIEW AND IMPLEMENTATION EVALUATION OF FEEDING PROGRAMMES FOR INFANTS AND YOUNG CHILDREN: FINDINGS AND IMPLICATIONS

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Background and objectives: Under-nutrition contributes to five million deaths of children under five each year. Throughout the life cycle, under-nutrition contributes to risk of infection, lowered cognitive performance, chronic disease in adulthood, and mortality. To intervene effectively, we need to understand what works, what does not, and why.The aims of this study were, 1. To assess the effectiveness of feeding programs for children aged three months to five years. 2. To undertake an implementation evaluation.

Methods: We included RCTs, CCTs, CBAs and ITS. Programs provided energy and nutrients through: hot or cold meals, snacks, take-home or home-delivered rations. Recipients had to be aged three months to five years, from all countries. We used standard systematic review methods and also evaluated implementation, including nutritional quality of the food.

Results: 29587 papers were identified through searches: 277 were retrieved and 27 studies met inclusion criteria; 25 of these were from LMIC. Energy provided in 15 studies ranged from 20% to 157% of the recommended daily allowance (RDA) and protein ranged from 18% to 425% of the RDA. Our meta-analyses showed small (0.26 cm) significant effects on height gain in RCTs, but no other effects on growth. A few studies showed effects on cognitive ability (SMD = 3.06, 95% CI = 2.6 to 3.6) and psychomotor development (SMD = 1.4, 95% CI .56 to 2.2) in RCTs. We will present results of subgroup analyses by nutritional adequacy, age, initial nutritional status and method of delivery. Our implementation review identified several possible reasons for the ineffectiveness of some programs, including: substitution, redistribution of food within the family, caregiver burden and stress, lack of supervision and pipeline breaks.

Conclusions: We provide evidence that feeding programs for young children can work, but that many do not. Our review suggests ways in which program design can be improved.

Key words: feeding programs, policy.

PO882

FOOD INTAKE PATTERN OF INFANTS IN KOREA

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Background and objectives: This study was conducted to examine the food intake pattern of Korean infants, as a part of dietary intake survey on physiologically vulnerable population to hazardous materials.

Methods: With a nationwide stratified multistage cluster sampling of 50 survey sites, 250 breastfed infants were investigated during winter (December 2011 through February 2012). Information on food intake of infants was collected by proxy interviews on mothers with 24-hour recalls on 2 non-consecutive days by household visits.

Results: Among 245 infants included in the final analysis, the number of babies of early infancy (E: 0-2 months), mid-

infancy (M: 3-5 months), and late infancy (L: 6-12 months) was 80 (33%), 102 (41%), and 63 (26%), respectively. Proportion of babies fed complementary foods was 29.8% with the first introduction of complementary food at 5.4 month of age. The amounts of food groups consumed per day by M were breast milk and/or infant formula 678.4 g, grains 5.5 g, fruits 3.7 g, vegetables 0.2 g and meats 0.1 g, and those consumed by L were breast milk and/or infant formula 572.3 g, cereals 31.5 g, vegetables 12.9 g, fruits 12.4 g, meats 11.3 g, potatoes 3.3 g and legumes 3 g. Frequently consumed foods by L, except breast milk and infant formula, were white rice (consumed by 81.0%), beef (39.7%), carrots (33.3%), chicken (22.2%), broccoli (22.2%), cheese (15.9%), confectionery (15.9%), onions (15.9%), pumpkins (14.3%) and glutinous rice (11.1%). The average number of complementary foods consumed by L per day was significantly higher ($p < 0.05$) in infants of mothers with higher educational attainment (college graduate and higher) (3.9±2.2) compared to infants of mothers with lower education (high school diploma and lower) (2.6±1.6).

Conclusions: This result can be utilized in assessing exposure to hazardous materials through foods in infants.

Key words: Korean infant, food intake, complementary food. [This research was supported by a grant (11062KFDA732) from Korea Food & Drug Administration in 2011~2012].

PO883

HOUSEHOLD FOOD INSECURITY AND HOUSEHOLD EXPENDITURE ON CIGARETTE ASSOCIATED TO UNDERWEIGHT AMONG PRESCHOOL CHILDREN IN EAST JAVA, INDONESIA

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Background and objectives: Preschool-children underweight is still prevalent in East Java Province of Indonesia. Poverty and food insecurity might be the dominant contributing factors. East Java is categorized as chronically food insecure area and one of the main provinces contribute to total number of poor population in Indonesia. On the other hand, data showed that during the crisis, household food expenditure declined, however, expenditure on cigarette did not decline. This work asses the association of household food security and household expenditure on cigarette with preschool children underweight status.

Methods: Data was obtained from the 2010 Indonesian basic health research, consist of 2247 households with preschool children in East Java. Households were categorized as food secure if proportion of budget allocated for food was less or equal to 60% and caloric availability per adult equivalent was more than 80% (Jonsson dan Toole, 1991).

Results: Overall, only 19.5% households were food secure. Multivariate analysis using logistic regression by including household size, food expenditure, expenditure on cigarette, household calorie availability, household food security status, child calorie consumption and child protein consumption as the candidates of predictors for underweight, showed that household food insecurity and household expenditure of cigarette significantly associated to underweight. Children living in food insecure household had 2.183 times higher risk of being underweight compared to those living in food secure household. While children from households with cigarette expenditure more than 12000 rupiahs per day had 1.296 times higher risk of being underweight.

Conclusions: This analysis concluded that household food insecurity and household expenditure on cigarette were associated to underweight among preschool children. Beside to support evidence that household food insecurity is still an emerging issue need to overcome, this analysis also suggest the importance of educating poor people to allocate their cigarette expenditure into food for their children.

Key words: household food security, underweight, cigarette.

PO884

EFFECTS OF CARBOHYDRATE SUPPLEMENTATION ON PHYSIOLOGICAL VARIABLES DURING EXERCISE IN HYPOXIA

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Background and objectives: In normoxia, carbohydrate supplementation is a classic method to delay fatigue and reduce the effects of stressful exercise on physiological variables. During exercise in hypoxia, the importance of carbohydrate metabolism increases. Therefore, it is very important to elucidate the effects of carbohydrate supplementation in this condition. This study aimed to evaluate the effects of carbohydrate supplementation on performance and physiological variables during exercise in hypoxia.

Methods: Five physically active male volunteers underwent three sessions of exercise at 70% VO2 peak until exhaustion: (1) no supplementation in normoxia, (2) no supplementation in hypoxia, and (3) supplementation with 8% maltodextrin

(200 ml/20 minutes) in hypoxia. All procedures were randomised and double blind. The hypoxia simulated an altitude of 4500 m. The following parameters were assessed every 15 minutes during the exercise: heart rate(HR), hemoglobin O2 saturation (SaO2), rating of perceived exertion (RPE), HR/RPE, HR/SaO2, and RPE/SaO2. Statistical analysis was performed by Two-way ANOVA followed by Tukey post test, considering statistical significant p<5%.

Results: For the exercise in hypoxia, the SaO2 decreased ($p < 0.05$) and the HR/RPE and RPE /SaO2 increased within 15 minutes of exercise ($p < 0.05$ for both) relative to the corresponding values in normoxia. Additionally, the performance during hypoxia was less than that in normoxia ($p < 0.05$). No difference was observed between the exercise performed in hypoxia with and without supplementation.

Conclusions: The carbohydrate supplementation was not able to reverse the effects of hypoxia during exercise and delay fatigue. These findings are the opposite of the effects described for normoxia.

Key words: exercise, hypoxia, carbohydrate supplementation.

PO885

EFFECT OF GLUTAMINE SUPPLEMENTATION ON TH1/TH2 BALANCE DURING EXERCISE IN HYPOXIA

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Background and objectives: Several studies conducted in normoxia have suggested that glutamine supplementation attenuate the immunosuppressive effects of strenuous exercise, however little is known about the importance of glutamine during exercise in hypoxia. This study aims to evaluate the effects of glutamine supplementation on Th1/Th2 balance during exercise in hypoxia.

Methods: Five physically active male volunteers underwent three sessions of exercise at 70% VO2 peak until exhaustion: (1) no supplementation in normoxia, (2) in hypoxia no supplementation (placebo) and (3) after 6 days of glutamine supplementation (20 g/day) in hypoxia. All procedures were randomised and double blind. The hypoxia simulated an altitude of 4500 m. Before and after the exercise, blood was collected, and the lymphocytes (1x105cel) were incubated in 96-well plates containing RPMI 1640 supplemented with 2 mM glutamine, 10% homologous serum and 5µg/ml Concanavalin A. After 48h, the supernatant was collected to measure the IL-2, IL-4 and IL-6 levels using kits from R & D Systems. Statistical analysis was performed by Two-way ANOVA post Tukey test p<5%.

Results: Exercising in hypoxia decreased the performance ($p < 0.05$) and the hemoglobin oxygen saturation(SaO2) ($p < 0.05$) in relation to normoxia. Furthermore, no difference in cytokine levels were found relative to exercise in normoxia. However, for exercise with supplementation, there was a decrease in the IL-4 level ($p < 0.05$) and increase in the IL-6 level ($p < 0.05$), in relation to normoxia and hypoxia condition.

Conclusions: Glutamine supplementation appeared to influence the Th1/Th2 balance, attenuating the Th2 response after exercise in hypoxia. However, the supplementation was not sufficient to reverse the decline in performance caused by hypoxia.

Key words: exercise, hypoxia, glutamine, lymphocytes.

PO886

RURAL-URBAN DIFFERENTIALS IN LIFESTYLE AND FOOD SECURITY OF OLDER PERSONS IN IBADAN, NIGERIA

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Background and objectives: Healthy lifestyle and good nutrition help promote active ageing. Knowledge of rural/urban differentials in lifestyle and food security is essential to design locality-driven programmes. This study assessed rural/urban differences in lifestyle and food security of older people in Ibadan.

Methods: This comparative cross-sectional survey involved 168 and 178 respondents from two urban and two rural Local Government Areas (LGAs) of Ibadan. A three-stage sampling technique was used to select LGAs, wards/communities and respondents, respectively. A semi-structured questionnaire was used to collect information on socio-demographic and lifestyle profile of the respondents. Socio-Economic Status (SES) was categorised as low (6-13), moderate (14-21) and high (22-29) and lifestyle was assessed using levels of smoking, alcohol intake and physical activity. Food security was determined using household coping strategies. Data were analyzed using descriptive statistics and logistic regression at 5% level of significance.

Results: Mean age was 68.9±4.7 and 69.7±4.4 years in urban and rural areas, respectively. Respondents in low SES were more (6.7%) in rural than urban areas (2.4%) ($p < 0.05$). Prevalences of heavy alcohol intake (16.1%, 16.9%) and irregular physical activity (1.8%, 9.6%) were lower in urban than rural

areas. Current smokers were thrice higher (13.5%) in rural than urban areas (4.8%). Food insecurity with hunger was nine-times higher in rural (16.9%) than urban areas (1.8%) while food insecurity without hunger was 17.4% and 7.1% in rural and urban areas, respectively. Smoking and alcohol intake had no significant relationship with food security in both areas. The likelihood of being food insecured reduced in urban than rural when respondent had at least moderate-SES (OR: 0.15 vs 0.10) or married (OR: 0.6 vs 3.5) among other results.

Conclusions: Poor lifestyle and food insecurity were higher in rural than urban areas. Intervention programmes should direct attention to older persons in rural areas.

Key words: lifestyle, food security, older people, rural/urban, differential.

PO887

COMPARISON OF NUTRIENT INTAKE OF OLDER PERSONS IN RURAL AND URBAN AREAS OF IBADAN, NIGERIA

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Background and objectives: Adequate nutrition is essential for healthy ageing and reduction of morbidity among older persons. Knowledge of rural/urban differential is essential to design programmes that promote healthy ageing and quality of life. This study was aimed at assessing rural/urban differences in nutritional status of older people in Ibadan.

Methods: This study is comparative cross-sectional in design and involved 168 respondents from Ibadan North-West and South-West (Urban) and 178 respondents from Ido and Egbeda (Rural) Local Government Areas (LGAs) of Ibadan. A three-stage sampling technique comprising stratified, cluster and simple-random samplings was used to select LGAs, communities and respondents, respectively. A semi-structured questionnaire was used to collect socio-demographic information and Socio-Economic Status (SES) was categorised as low, moderate and high. Direct weighing method was used for dietary assessment and nutrient intake was determined using the Total Dietary Assessment software. Weight and armspan were assessed to calculate Body Mass Index (BMI) categorised as underweight (<16.5 Kg/m2), normal-weight (16.5-22.9 Kg/m2) and overweight (>23.0 Kg/m2). Data were analyzed using Chi-square test at $p < 0.05$.

Results: Respondents´ mean age was 68.9±4.7 years in urban and 69.7±4.4 years in rural. Respondents in low SES were more (6.7%) in rural than urban areas (2.4%) ($p < 0.05$). Inadequate intakes of calorie (61.3%, 52.2%), calcium (98.8%, 97.8%), zinc (82.7%, 71.9%) and vitamin B1 (51.2%, 44.9%) were higher, while protein (17.9%, 19.7%) and iron (5.4%, 7.9%) were lower in urban than rural areas, respectively. Underweight was higher in rural (24.2%) than urban (16.7%), while overweight was higher in urban (8.3%) than rural (7.3%) areas. The odds of undernutrition was six times higher in rural than urban when respondent had less than moderate SES (OR: 2.53 vs 0.432) among other results.

Conclusions: Undernutrition was higher in rural than urban areas. Nutritional intervention programmes should consider older persons in rural areas as a priority group.

Key words: nutritional status, nutrient intake, older people.

PO888

NEUROCOGNITIVE ABILITIES AND FOOD HABITS AMONG MOROCCAN CHILDREN

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Background and objectives: Some food habits could affect the balance of nutritional status and impair brain and consequently neurocognitive performances among children. The objectives of this study is to evaluate some neurocognitive abilities (short term memory, working memory and ADHD) among Moroccan children and to study the relationship between the performances in these tests and some food habits (drinking tea during/or just after meals, frequency of red meat consumption, frequency of orange juice, vegetables and fruits consumption).

Methods: The study is realized among 129 children, aged 6 to 8 years and living in urban, periurban and rural zones of Gharb plain (North West of Morocco). Memory Sub-test of WISC III (Wechsler Intelligence Scale for Children) and two questionnaires are used; one based on the DSMVI to evaluate ADHD and another about quality of life of children.

Results: The obtained results show that the important scores of memory impairments are registered among rural children compared to others group ($p < 0.01$). Besides, only 11% of urban children are hyperactive against 28% periurban and 33% rural ones. Moreover, a significant correlations between the decrease of performances of short term memory and increase of consumption frequency of tea during or just after meals ($p < 0.05$), and between decrease of performances of working me-

mory and both consumption of tea during or just after meals ($p < 0.01$) and decrease of red meat consumption are registered. The presence of ADHD is, also, correlated to the decrease of red meat consumption ($p<0.01$).

Conclusions: Neurocognitive impairments recorded among these children appeared in connection with some food habits, but a deeper investigation is needed for studying all factors that can affect these performances (environmental, psychological and socio-economical ones).

Key words: neurocognition, children, food habits, Gharb plain, Morocco.

PO890

BODY IMAGE PERCEPTION OF SCHOOLCHILDREN IN SÃO PAULO

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Background and objectives: Health promotion with a focus on healthy weight can impact children, who now have concerns about weight and body shape. This study aims to evaluate the distortion and body dissatisfaction of schoolchildren.

Methods: The study was conducted in a public school in the city of São Paulo, with 205 distributed among schoolchildren aged 7-10 years old of both sexes. Children were measured and weighed to obtain the Real BMI (BMIR) and also answered two questions about body awareness with the silhouette scale validated for Brazilian children, which indicate the value of the Actual BMI (IMCA) and Desire (IMCD). 1) Show that the figure is more like body with your own body? IMCA 2) What is the figure that shows the body you wish you had? IMCD The distortion was accomplished by the difference between the IMCA-IMCR, dissatisfaction the difference between the IMCD and IMCA and the difference between IMCD and IMCR. ANOVA was used for statistical tests comparing the mean BMI values of boys and girls by age with a significance level of $p < 0.05$.

Results: The girls 7 y old overestimate their body image, as well as all the girls evaluated when compared with boys ($p < 0.05$). The girls aged 7 and 10 y old and evaluated all the girls have desire to have a smaller body compared to boys ($p < 0.05$). The difference between the actual and desired body was higher for girls aged 9 y and for all girls compared to boys ($p < 0.05$).

Conclusions: Girls school, starting from the age of 7 and distortion reported dissatisfaction with their body weight.

Key words: behavior, body image dissatisfaction, childhood.

PO891

PHYSICAL ACTIVITY AND OVERWEIGHT IN CHILDREN AND ADOLESCENT: A CASE-CONTROL STUDY

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Background and objectives: Overweight in children and adolescents has shown increasing occurrence both in developed as in developing countries. In Brazil, over the last 40 years it is possible to observe expressive reduction in malnutrition prevalence and a rapid increase in overweight prevalence in children and adolescent and the sedentary lifestyle is an important risk factor for this condition. Considering this, the objective of this study is to investigate the relationship between physical activity level and overweight in children and adolescents.

Methods: It is a case-control study including 372 both sexes children and adolescents aged 7-14 years registered in primary schools located in the urban area of Mutuípe, Bahia, Brazil. The case group included 112 overweight students and 224 normal weight individuals matched by sexe and age composed the control group. The main independent variable was the sedentary lifestyle. To evaluate the association between sedentary lifestyle and overweight it was used the multivariate conditional logistic regression, appropriate for case-control studies with matched groups construction, using odds ratio (OR) as a measure association.

Results: maternal schooling and obesity family history were identified as confounding variables for sedentary lifestyle and obesity relationship. Controlling for these variables, it was observed 51% greater chance of overweight in sedentary students (OR=1.51).

Conclusions: independently of maternal schooling and obesity family history, sedentary lifestyle showed associated with overweight in this population.

Key words: sedentary lifestyle, overweight, children and adolescents.

PO892

CYSTEINE SERUM LEVELS AND OBESITY IN CHILDREN AND ADOLESCENT

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Background and objectives: Obesity prevalence is increasing worldwide and its occurrence has been frequent in childhood. Currently, cysteine serum levels have been identified as a possible risk factor for this morbidity and identifying this relationship may be an important finding for Public Health. Considering this, the objective of this study was to identify the relationship between cysteine high levels and obesity in children and adolescents.

Methods: it was a cross-sectional study including 603 children and adolescents of both sexes aged 7-14 years registered in primary schools located in the urban area of Mutuípe, Bahia, Brazil. The main independent variable was cysteine serum levels and it was considered the P95 value as a high level for this variable. It was calculated the frequency distribuition for the descriptive analysis. To evaluate the relashionship between cysteine and obesity it was performed the logistic regression analysis, using odds ratio (OR) as a measure association.

Results: It was observed that 61.3% of children with cysteine elevated levels were older than 12 years (p = 0.03) and 74.2% of them reported to sleep during the day (p = 0.00). Considering the confounding analysis, the variables maternal schooling, habit of sleeping during the day and triglycerides serum levels were confounded of the relationship between cysteine and obesity and were included in the final logistic model. The logistic regression analysis showed that obese students have 271% greater chance of presenting increased serum levels of cysteine when compared to non-obese (CI: 1.12-9.25).

Conclusions: there is a positive relationship between cysteine high levels and obesity in children and adolescents.

Key words: cysteine, obesity, children and adolescents.

PO894

DETERMINANTS OF EXCLUSIVE BREASTFEEDING AMONG MOTHERS AGED 45 YEARS AND BELOW IN KUALA LUMPUR,MALAYSIA -A QUALITATIVE STUDY

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Background and objectives: Breastfeeding is the gold standard for optimum nutrition for newborn babies. Data from the Third National Health and Morbidity Survey in Malaysia showed that only 14.5% Malaysian babies were given breastmilk exclusively in their first 6 months of life. Hence, this study aimed to identify the determinants of exclusive breastfeeding and to determine factors associated with infant-feeding decisions among mothers in Kuala Lumpur using a qualitative approach.

Methods: Mothers with infants aged below two years were interviewed using semistructured interview. Two groups of mothers participated; (1) mothers who breastfed exclusively for 6 months and (2) mothers who did not breastfeed or who breastfed less than 6 months. Interviews were recorded, transcribed verbatim and were reviewed and assessed independently by two researchers. Key themes were extracted and grouped, and secondary thematic analysis were used to explore key concepts.

Results: Data saturation was reached after interviewing eight mothers who breastfed exclusively and nine mothers who did not. Eight themes emerged as determinants of exclusive breastfeeding: (1) strong determination and self efficacy to breastfeed, (2) understanding the benefits of breastfeeding, (3) social support from family members,(4) good bonding with baby, (5) belief that breastfeeding is economical, (6) adequate exposure to information regarding breastfeeding, (7) influence of religion (8) demographic and biophysical factors. Mothers who breastfed less than 6 months found it difficult to complete the six months breastfeeding period due to (1) perceived insufficient supply of breastmilk, (2) mother returning to work after two or three months of maternity leave, and (3) inconvenience due to lack of facilities for breastfeeding in the workplace.

Conclusions: These determinants are the important basis for successful exclusive breastfeeding among Malaysian mothers. We suggest that interventions aimed at prolonging breastfeeding duration should give due consideration to these factors.

Key words: exclusive breastfeeding, qualitative, breastfeeding duration.

PO895

BODY MASS INDEX IS ASSOCIATED WITH FAT MASS IN NORMAL, OVERWEIGHT/OBESE, AND STUNTED PRESCHOOL CHILDREN IN CENTRAL THAILAND

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Background and objectives: Body mass index (BMI) is widely used as a surrogate measure of adiposity. The relationship between BMI and body fatness varies by race, sex, and age and more variations have been found among children. This study aimed to investigate the relationship between BMI and fat mass determined by deuterium dilution technique among 3-5 years old children with different nutritional status.

Methods: A cross-sectional study was conducted in 15 day-care centers in central Thailand. 137 healthy preschool children were recruited according to their nutritional status: thinness [body mass index for age Z scores, (BAZ) < -2 SD], normal (-2 SD â‰€ BAZ â‰€ +2 SD), overweight/obesity (BAZ > +2 SD), and stunting [Height for age Z scores, (HAZ) < -2 SD]. Fat-free mass and fat mass were determined by deuterium dilution technique. Fat mass index (FMI, fat mass/ht2) was then calculated.

Results: In the thin group, girls had higher FMI compared to boys [3.2 kg/m2 vs 2.8 kg/m2, $p < 0.05$]. BAZ was significantly associated with FMI (adjusting for HAZ, sex, maternal education, age of children, and birth weight): for 1SD increase in BAZ, FMI increased by 0.91 kg/m2 (95% CI: 0.85, 0.97). The relationship between BAZ and FMI differed by nutritional status. BAZ was more strongly associated with FMI in the overweight/obese ($r=0.97$, $p = 0.000$) and the normal ($r=0.86$, $p = 0.000$) groups than in the stunted group ($r=0.59$, $p = 0.002$); and no association in the thin group ($r=0.13$, $p = 0.534$).

Conclusions: The inconsistence in the relationship between BAZ and body fatness suggests that the ability of BAZ in reflecting the amount of fat mass differs by nutritional status in preschool children. BAZ better reflects fatness among normal to overweight/obese children, but less so among stunted and none among thin children.

Key Words: preschool children, fat mass, BMI, deuterium.

PO896

RECALL OF BREASTFEEDING DURATION IN AUSTRALIAN SURVEYS

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Background and objectives: Recall accuracy during surveys is related to the length of time between the event of interest and point of recall. In Australia, information about infant feeding is collected through cross-sectional and cohort studies. This paper aims to assess the influence of recall time in breastfeeding duration.

Methods: Duration of exclusive breastfeeding in the Perth Infant Feeding Study Mark II (PIFSII) was compared to that of the 2010 Australian National Infant Feeding Survey (ANIFS). The PIFSII was a cohort study of 587 consecutive mothers (and their infants) in Perth, Western Australia, in 2002-03. The ANIFS was a national Australian cross-sectional survey of 51.018 mothers/ carers of infants aged to 24 months in 2010-11. Both surveys included similar questions to measure exclusive breastfeeding duration. In PIFSII, questions asked of mothers related to their current practices while those in the ANIFS were asked up to 24 months after giving birth.

Results: The proportion of PIFSII infants aged four months and exclusively breastfed for four months was 11.3 ± 2.6% and the proportion for those aged six months and exclusively breastfed for six months was 0.4 ± 0.5%. The proportion of ANIFS infants reported to be exclusively breastfed for four months ranged from 24.4 ±0.6% (95% CI) of those aged 4 months to 42.1 ±0.3% (95% CI) of those aged 19 to 24 months at the time of the survey. ANIFS infants exclusively breastfed for six months ranged from 5.6 ±0.3% of those aged 6 months to 18.1 ±0.3% of infants aged between 19 and 24 months.

Conclusions: The proportion of ANIFS infants reported as exclusively breastfed for four or six months changed as length of recall increased. Breastfeeding duration is more accurately reported in prospective cohort studies.

Key words: breastfeeding, exclusive, duration, survey, methodology.

PO897

EARLY EVOLUTION OF STUNTING FROM BIRTH: A CROSS-SECTIONAL PERSPECTIVE ON LINEAR GROWTH FAILURE IN THE MAM-MAYAN WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: Classical under-five stunting rates derive from surveys on children 6-59 months of age. We sought to assess length-for-age (HAZ) progression within the first 6 months of life among infants from 8 rural Mam-Mayan communities in the Western Highlands of Guatemala.

Methods: Supine length was measured to the nearest 0.5 cm by standardized anthropometrics on a SECA210 infantometer, and weight to the nearest 10 g on a SECA354 balance. 53 infants 0-46 days old (35% F) and 57 infants 4-6 mo old (56% F) were recruited. Stunting was defined as <-2 SD of HAZ (2006 WHO growth standards). All analyses were done using SPSS 20.0.

Results: In the 53 newborns, mean age (days) was 21 (2-46). 41% were stunted (17% severe). Median HAZ was -1.83 (mean: -1.98±0.19; range: -5.80 to +0.53). In the 57 infants aged 4-6 mo, mean age was 148 (116-184). 53% were stunted (23% severe). Median HAZ was -2.32 (mean: -2.11±0.19; range: -5.76 to +2.24). The difference in HAZ between genders and between both age groups was not statistically significant. The median decline in HAZ units between 21 and 148 days calculates to -0.12/month. By contrast and for comparison, the median WAZ was -0.75 at mean 21 days and -1.10 at mean 148 days.

Conclusions: This, to our knowledge, is the first report on the progression of linear growth failure within the first 6 months of life. Stunting in this setting begins in utero, is disproportionally worse than weight deficit, and appears to progress throughout the first 6 months of life. Its prevention therefore is linked with maternal care strategies beginning during gestation, if not before. Funding: GWIS Nell Mondy Fellowship, McGill University Graduate Travel Award, GHR-CAPS Doctoral Fellowship.

Key Words: stunting, very young infants, indigenous, Guatemala.

PO898

RELATIONSHIP BETWEEN OVERWEIGHT AND CONCURRENT STUNTING IN VERY YOUNG INFANTS: EARLY NUTRITION TRANSITION IN THE MAM-MAYAN WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: Stunting (a 2 standard-deviation deficit in height-for-age, HAZ) affects 67.5% of indigenous children under 5 years of age in Guatemala. Children who are both stunted and overweight are at an increased risk of chronic disease in later life, and studies in preschool and schoolchildren have shown an association between shorter stature and excess weight. Our objective was to determine the prevalence of stunting and overweight in early infancy in a population, namely in rural Mam communities of the Western highlands of Guatemala, where stunting is prevalent by 4-6 mo, and assess for any correlation with higher weight status.

Methods: We measured height and weight in 52 boys and 50 girls in 8 communities, and determined HAZ, weight-for-age (WAZ) and body mass index (BMI). All data was analyzed with SPSS 20.0.

Results: Mean infant age (days) was 146±2. Mean HAZ was -1.95±0.15 (median: -1.76; range: -6.52 to +2.24), WAZ -0.97±0.12 (median: -0.81; range: -5.42 to +1.14), and BMI 0.28±0.10 (median 0.39; range: -2.83 to +3.45), with no significant gender difference. Stunting prevalence was 45% (27%, moderate; 18%, severe). No infants were overweight by WAZ, but 3% were by BMI. In terms of associations, height and weight were actually positively correlated (Spearman: r=0.82, p = 0.001), as were HAZ and WAZ (r=0.77, p = 0.001). Height and BMI were not correlated (r=0.08; p=0.44).

Conclusions: The high stunting prevalence is concerning at this early age. Prevalence of frank overweight is low to null. We did not find an increased risk for excess weight in stunted compared to non-stunted infants of 4-6 mo of age. Funding: GWIS Nell Mondy Fellowship, McGill University Graduate Travel Award, GHR-CAPS Doctoral Fellowship.

Key Words: overweight, stunting, nutrition transition, Guatemala.

PO899

THE DOUBLE BURDEN OF MALNUTRITION: PREVALENCE OF INFANT STUNTING AND MATERNAL OVERWEIGHT/OBESITY IN THE MAM-MAYAN WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: The household double burden of malnutrition (DB), is defined as the combination of maternal overweight/obesity and infant undernutrition within the same family. It is well established that stunting increases the risk of both acute, infectious and chronic disease and is a traditional problem in Guatemala. Our objective was to determine its prevalence in rural Mam communities in the Western Highlands.

Methods: We measured height and weight in 101 mothers and their infants (4-6 mo; 50 girls, 51 boys) in 8 communities. Infant stunting (height-for-age, HAZ) and maternal overweight/obesity (via body mass index, BMI) were determined. All data was analyzed with SPSS 20.0.

Results: Mean maternal height (meters) was 1.47 (median 1.47; 1.34-1.62) and mean BMI (kg/m2) was 23.8±0.4 (median 23.2; 17.9-41.7). 11% of mothers were underweight, 24% overweight and 6% obese. Mean infant age (days) was 145±2, and mean HAZ -1.91±0.14 (median -1.75; -6.52 to 2.24), without significant gender difference. 45% of infants were stunted (28% moderate, 17% severe). Of the 30 overweight/obese women, 11 (37%) had stunted infants vs 13 (44%) expected by chance alone (p = 0.300).

Conclusion: The high stunting prevalence is concerning at this early age. The combination of maternal overweight/obesity and infant stunting was no more nor less than what would be expected by random-association; hence no excess prevalence of DB exists in this early (infancy) period in this specific setting. But, the apparent chance association of overweight/obese mothers with stunted infants is consistent with the evidence of Dieffenbach and Stein (2011) that household double burden may be a mathematical artifact. Funding: GWIS Nell Mondy Fellowship, McGill University Graduate Travel Award, GHR-CAPS Doctoral Fellowship.

Key words: overweight, double burden, stunting, Guatemala.

PO900

FOOD AVOIDANCE: POTENTIAL IMPACT ON DIETARY VARIETY DURING PREGNANCY AND EARLY LACTATION IN THE MAM-MAYAN WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: Food choices during pregnancy and lactation directly affect nutritional intake with potential repercussions on a mother and her infant's health. Our objectives were to determine specific food avoidances during pregnancy and early lactation and understand underlying drivers and motivations.

Methods: We interviewed 144 pregnant (3rd trimester) and 145 breastfeeding (<1 month postpartum) women living in 8 rural Mam-Mayan communities in the Western Highlands of Guatemala. A short survey inquired about current food avoidances and the motivations behind them.

Results: 37% of the pregnant and 20% of the breastfeeding women reported food avoidance. During pregnancy, animal products were most commonly avoided; 26% (n=38) avoided eating meat products (14% beef, 7% chicken and 5% both beef and chicken) and 3% (n=5), eggs. The main reason reported was due to nausea, followed by new aversion. During lactation, greens (n=9, 6%), beans (n=7, 5%) and meat products (n=5, 3%) were most commonly avoided, covering 72% of all reported avoidances. The main reason reported was because greens and beans, culturally perceived as "cold" foods (in the hot-cold continuum of temperature-regulating attributes of foods and beverages), which can "cool" the breast milk and, through the imbalance, cause the lactating infant to become irritable or ill.

Conclusions: What may be important for perspective is that 63% and 80% of pregnant and lactating respondents, respectively, did not circumscribe their diet. Avoidance of specific food items, especially animal-source foods, however, is sufficiently common in these rural communities among pregnant and lactating women to potentially impact dietary variety during critical stages of infant development. Funding: GWIS Nell Mondy Fellowship, McGill University Graduate Travel Award, GHR-CAPS Doctoral Fellowship.

Key Words: Guatemala, pregnancy, lactation, food choices.

PO901

A SYSTEMATIC REVIEW AND META-ANALYSIS OF THE EFFECT AND SAFETY OF GINGER IN THE TREATMENT OF PREGNANCY-ASSOCIATED NAUSEA AND VOMITING

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Background and objectives: Nausea and vomiting during pregnancy (NVP) is common, and possible harmful side-effects of conventional medicine to the fetus, necessitate the need for alternative treatment options to relieve NVP symptoms. This systematic review (SR) investigated current evidence regarding ginger for the treatment of NVP. The primary objective was to assess the effectiveness of ginger in treating NVP. The secondary objective was to assess the safety of ginger during pregnancy, by identifying adverse events or side-effects.

Methods: An electronic bibliographic database search was carried out. Randomized controlled trials (RCTs) of the efficacy of ginger by any route, as treatment for NVP in pregnant women, were included. Two authors independently extracted data and assessed trial quality. RevMan5 software was used for data analysis. $p < 0.05$ was considered statistically significant.

Results: Eleven RCTs involving 1176 pregnant women were included. Ginger significantly improved the symptoms of nausea when compared to placebo (MD 1.20, 95% CI 0.56-1.84, p = 0.0002, I2=0%). Ginger did not significantly reduce the number of vomiting episodes during NVP, when compared to placebo, although there was a trend towards improvement (MD 0.72, 95% CI -0.03-1.46, p = 0.06, I2=71%). Subgroup analyses seemed to favor the lower daily dosage of <1500 mg ginger for nausea relief. Ginger did not pose a significant risk for spontaneous abortion compared to placebo (RR 3.14, 95% CI 0.65-15.11, p = 0.15; I2=0%), or vitamin B6. Similarly, ginger did not pose a significant risk for the side-effects of heartburn or drowsiness.

Conclusions: This review suggests potential benefits of ginger in reducing nausea symptoms in pregnancy. Ginger did not have a significant impact on vomiting episodes, nor pose a risk for side-effects or adverse events during pregnancy. Ginger could be considered a harmless and possibly effective alternative option for women suffering from the symptoms of NVP.

Key words: pregnancy, ginger, nausea, vomiting, systematic review.

PO902

EFFECT OF LONG-TERM INTERMITTENT MULTIPLE MICRONUTRIENT SUPPLEMENTATION IN BANGLADESHI RURAL ADOLESCENT GIRLS WITH NUTRITIONAL ANEMIA

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Background and objectives: Previous short-term supplementation studies showed no additional hematologic benefit of multiple micronutrients (MMN) compared with iron + folic acid (IFA) in adolescent girls. This study examines whether long-term once- or twice-weekly supplementation of MMN can improve hemoglobin (Hb) and micronutrient status more than twice-weekly IFA.

Methods: Anemic girls (n = 324) aged 11–17 y attending rural schools were given once- or twice-weekly MMN or twice-weekly IFA, containing 60 mg iron/dose in both supplements, for 52 wk in a randomized double-blind trial. Blood samples were collected at baseline and 26 and 52 wk.

Results: Intent to treat analysis showed no significant difference in the Hb concentration between treatments at either 26 or 52 wk. However, after excluding girls with hemoglobinopathy and adjustment for baseline Hb, a greater increase in Hb was observed with twice weekly MMN at 26 wk (p = 0.045). Although all 3 treatments effectively reduced iron deficiency, once-weekly MMN produced significantly lower serum ferritin concentrations than the other treatments at both 26 and 52 wk. Both once- and twice-weekly MMN significantly improved riboflavin, vitamin A, and vitamin C status compared with IFA. Overall, once weekly MMN was less efficacious than twice-weekly MMN in improving iron, riboflavin, RBC folic acid, and vitamin A levels. Micronutrient supplementation beyond 26 wk was likely important in sustaining improved micronutrient status.

Conclusions: These findings highlight the potential usefulness of MMN intervention in this population and have implications for programming.

Key words: anemia, micronutrients, adolescent girls, Bangladesh.

PO903

DIETARY DIVERSITY PREDICTS MEDICAL EXPENDITURES IN TAIWANESE ELDERS

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Background and objectives: More nutritious diets, as reflected in greater food diversity, is important to elderly health and survivorship. However, it is unclear how this factor affects medical costsThe aim of this study is to assess dietary quality using a dietary diversity score (DDS) and evaluate the association between DDS and medical service utilization and expenditure. **Methods:** This study evaluates the DDS (range: 0-6) of the Elderly Nutrition and Health Survey in Taiwan (1999-2000) using a 24-h dietary recall design. We linked 1781 elders to National Health Insurance (NHI) claims, excluding those with no NHI records or with catastrophic illness history; 1650 elders were eligible. Generalized linear models were used to appraise the association between DDS and annual medical utilization and expenditure.

Results: Those with a higher DDS had lower medical service utilization and expenditure for emergencies and hospitalization. After adjustment for potential confounders, emergency and hospitalization expenditures for elders with DDS = 6 were lower than those with DDS≤3. However, for preventive care and dental services, a higher DDS predicted greater utilization (0.25 and 0.5 times) and expenditure (270 and 420 NTD). Findings remained unchanged when those who died in the first year or had any medical utilizations and expenditure one year prior to death were excluded.

Conclusions: Greater dietary diversity is associated with lower emergency and hospitalization utilization and expenditure, but not ambulatory services. There is a need for nutrition policy in health services for nutritionally disadvantaged groups.

Key words: dietary diversity, medical expenditures, elderly, disadvantaged groups.

PO904

INCREASING MATERNAL BODY MASS INDEX (BMI) AFTER THE FIRST TRIMESTER OF PREGNANCY HAS A POSITIVE ASSOCIATION WITH INFANT BIRTH OUTCOMES

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Background and objectives: Maternal nutritional status, as indicated by maternal BMI, impacts on the outcome of a pregnancy. The study sought to determine the relationship between maternal nutrition and pregnancy outcomes.

Methods: Mothers with singleton deliveries (n=120) were recruited from the Maamobi polyclinic and Ridge Hospital in Accra, Ghana. Infant outcomes investigated included the following; birth weight, birth length and APGAR (Appearance, Pulse, Grimace, Activity and Respiration) scores taken at 5 minutes. Maternal weight taken continuously during pregnancy (obtained from antenatal cards), postpartum maternal weight and height were measured and used to compute BMI during the three pregnancy trimesters and postpartum. The differences between maternal BMI and birth weight were determined using ANOVA.

Results: The mean maternal BMI (M±SD) among the participants was 25.2±5.0, 26.5±5.4, 28.2±5.5 and 26.6±5.4 kg/m2, respectively for the first trimester (n=35), second trimester (n=92), third trimester (n=104) and postpartum (n=108). Infant birth weight (BW) and birth length averaged 3.1±0.5 kg and 49.5±2.6 cm, respectively. Prevalence of Low BW (BW<2.5 kg) among the sample population was 10.8%. Postpartum maternal BMI was reflective of BMI during the second trimester of pregnancy (r=0.940 p = 0.000). Significant positive correlations were observed for maternal BMI and BW for the third trimester (r=0.240 p = 0.014) and postpartum (r=0.197 p = 0.042). An equal variances t test revealed a statistically reliable difference between the mean infant BW for mothers with postpartum BMI>20 kg/m2 (M±SD=3.2±0.5 kg) and BMI<20 kg/m2 (M±SD=2.6±0.6kg), t(105)=2.514, p = 0.013, α =0.05 as well as between the mean infant birth length for mothers with BMI>20kg/m2 (M±s=49.6±2.6cm) and BMI< 20kg/m2 (M±SD=46.8±1.7cm), t(96)=2.138, p=0.035, α=0.05.

Conclusions: Maternal BMI remains a major determinant of positive birth weight. Given the high prevalence of LBW in this population, public health interventions targeted at improving maternal nutritional status and not necessarily BMI should be encouraged.

Key words: maternal nutrition, pregnancy outcome, maternal BMI, birth weight, APGAR scores.

PO905

PROCESS INDICATORS FOR A RANDOMIZED TRIAL OF CELL PHONE BASED PEER COUNSELING TO SUPPORT EXCLUSIVE BREASTFEEDING IN KENYA

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Background and objectives: In Kenya, cell phone (CP) use is high and presents new opportunities to support breastfeeding. We examined data from a randomized intervention trial showingCP based support (CPS) increases the prevalence of exclusive breastfeeding (EBF) to identify threats to the validity of findings and evaluate quality of intervention delivery.

Methods: We randomized at third trimester low-income women attending antenatal care (ANC) at a large hospital to (i) continuous cell phone based peer support (CPS) or (ii) monthly peer support group (PSG) or (iii) standard care by existing facility-based support (SOC=control). We analyzed participant flow and process indicators to assess the quality of delivery of CPS and PSG interventions and potential biases at enrolment and through dropout.

Results: There was no difference in dropout by baseline CP access (p = 0.119) or intervention allocation (p = 0.905). Among participants with CP, there was no difference in baseline indicators by intervention allocation. Among women without CP, those allocated to PSG reported less frequent prior prenatal care (2.4 vs 2.7 times; p = 0.039). At baseline, women allocated to each group shared many characteristics, except hours worked outside the home (4.7, 4.0, 3.6 h for CPS, PSG, SOC; p = 0.036), unemployment (40.4%, 54.3%, 56.1% for CPS, PSG, SOC; p = 0.023).

Conclusions: Indications that cell phone based counseling is potentially as or more effective in supporting EBF than other approaches are unlikely to be attributable to poor quality of delivery of alternative intervention or unanticipated bias at allocation or differential dropout.

Key Words: breastfeeding, peer support, mHealth.

Acknowledgements: We thank the participants and hospital staff. Kenya National Council on Science and Technology and University of Toronto provided ethical oversight. Bill & Melinda Gates Foundation to FHI 360, through the Alive & Thrive Small Grants Program managed by UC Davis;Global Alliance for Improved Nutrition; Canada Research Chair program.

PO906

BREAKFAST CONSUMPTION IN 16-18 YEAR OLDS: CURRENT TRENDS IN CONSUMPTION PATTERNS AND THE ASSOCIATION WITH WEIGHT STATUS

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Background and objectives: Regular breakfast consumption is associated with positive outcomes on diet quality, micronutrient intake, weight status and cognitive performance in children and adolescents. Despite known benefits, data on breakfast consumption and its association with weight status in older adolescents in the UK is lacking. The objective of the study was to establish breakfast consumption patterns in a UK cohort of older adolescents in whom dietary habits may still be developing, have independence over dietary choice along with rapid development and growth.

Methods: A cross-sectional survey study was used to collect data from 297 adolescents aged 16-18 years (77.4% female). Subjects completed a 7-day food diary to report breakfast intake and questionnaire obtaining demographic information. Height and weight was recorded by trained researchers to calculate BMI z-scores. Food diaries were analysed using WinDiets software. Breakfast was considered adequate if it provided >15% of estimated Total Energy Expenditure. Breakfast eating frequency per week was classified into five categories: 1; 1-2; 3-4; 5-6; 7.

Results: Only 14.9% of subjects ate breakfast every day. Breakfast skipping was highly prevalent with 49% of subjects eating breakfast 0-2 times per week. Gender was significantly associated with breakfast consumption (X2=24.757, df=4, p=0.000) with more males never eating breakfast compared with females (35.8% vs. 13.9% respectively). Breakfast consumption frequency was significantly associated with weight status (X2=29.987, df=12, p=0.003) with more overweight (29.3%) and obese (48%) subjects never eating breakfast compared with normal weight (13%). Where breakfast was eaten, it provided good amounts of micronutrients vitamin B6 (mean: 0.35 ± SD:0.03; 23% Reference Nutrient Intake [RNI]), B12 (mean: 0.63 ± SD: 0.05; 42% RNI), calcium (mean: 147.2 ± SD:126.1; 14.7% RNI) and iron (mean: 1.89 ± SD:1.87; 12.8% RNI).

Conclusions: The importance of breakfast should be promoted in older adolescents on benefits to weight status and micronutrient intake.

Key words: Breakfast, adolescents, weight, micronutrient

PO907

ASSESSMENT OF NUTRITIONAL STATUS AND DEPRESSION PREVALENCE IN FREE-LIVING ELDERLY IN TABRIZ, IRAN

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Background and objectives: Good nutritional and mental statuses are important factors that affect on fitness of elderly people. With attention to data scaring on the subjects, the aim of this study was to assess the nutritional status and prevalence of depression in the free-living elderly in Tabriz, Iran.

Methods: This cross-sectional study was carried out on 184 elderly people (male=97; female=87) with age 60 years and above. All subjects selected from daily care centers for elderly people. After explanation of the study, a written informed consent was taken. Two questionnaires including Mini Nutritional Assessment (MNA) with eighteen items and Geriatric Depression Score (GDS) with fifteen close questions were used to evaluate the nutritional status and depression prevalence, respectively. Chi-square test was used for comparison of nominal variables and spearman's correlation was employed to determine the relationship between variables.

Results: The results showed that up to 50% of subjects had poor nutrition (about 6% undernourished and about 46% at risk of malnutrition). Regarding the results of GDS test, it was revealed that about 14% of elderly people had serve depression and 28.3% had mild depression. In this study, there was a positive significant correlation between MNA and GDS tests in both gender ($r=0.416$; $p < 0.001$).

Conclusions: No acceptable level of nutritional status and depression level was observed in free-living elderly people exist. Malnutrition and depression prevalence in our population were high compared with western societies. Further studies are needed to determine other factors such as social and biological that promote quality of life in elderly people.

Key words: depression, elderly, geriatric depression score, Mini Nutritional Assessment.

PO908

COMPLEMENTARY FEEDING AND INFANT BODY COMPOSITION IN NORTHERN SPAIN

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Background and objectives: Nutrition has an important role in early infant growth but specific impact of complementary feeding on infant body composition has not been elucidated. Our objective was to describe the pattern of complementary feeding intake in Northern Spain and to explore whether associations between food intake and body composition changes exist in infants 6 to 9 months of age.

Methods: Longitudinal study in 245 healthy infants (133 males), enrolled at 6 months of age and followed-up until 9 months, as part of a larger study about complementary feeding and body composition. 24-h food recall questionnaires were used to assess patterns of food intake (breastfeeding, formula, cereals, fruit, yogurt, vegetables and meat or fish porridge (VMFP)). Anthropometric variables were measured at 6 and 9 months of age under standardized methodology.

Results: Prevalence of breastfeeding was 42.3% at 6 months and 27.4% at 9 months. Percentage of infants consuming each food group at 9 months of age and mean daily intake were: formula 76.6% (472±190 ml); cereals 77.4% (26±16 g); fruit 68.5% (192±70 g); yogurt 22.6% (131±35 g); VMFP 80.6% (259±108 g). Cereal consumption mostly took place added in the baby bottle during breakfast and dinner; VMFP was usually consumed at lunch while fruit for supper. Breastfed infants consumed lower amounts of both infant formula and VMFP than bottle fed infants. Variations in anthropometric values from 6 to 9 months indicated an increase in weight and height but a physiologic reduction in body adiposity. No relationship was found between food intake and anthropometric changes during this period.

Conclusions: Prevalence of breastfeeding is high in the north of Spain. The majority of infants consumed all food groups at 9 months of age. There is no relationship between the amount of foods consumed and body composition during this period.

Key words: breastfeeding, infant feeding, body composition.

PO909

NUTRITION, FITNESS AND CARDIOMETABOLIC RISK IN CHILEAN CHILDREN

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Background and objectives: To evaluate the association of cardiorespiratory endurance and muscle strength with cardiometabolic risk (CMR), in a sample of school children in Santiago Metropolitan Region.

Methods: The Growth and Obesity Cohort, measured CMR (glucose, triglycerides, HDL, insulin and waist circumference / height), nutritional status (BMI, WHO 2007) and fitness (cardiorespiratory endurance (test modified 6-minute walk) and muscle strength (hand grip strength and horizontal jump) in a group of 742 children characterized from birth 2002 to age 10. Descriptive analysis was performed and CMR score was calculated (sum of Z scores for each variable) and analyzed according to nutritional status and fitness. Results were classified by fitness terciles and analyzed by multiple regression with CMR, significance differences $p < 0.05$.

Results: 742 subjects (228 boys and 448 girls) 8.3±0.6 yrs were studied: 27.6% were overweight and 22.2% obese. Normal subjects did not differ significantly in their CMR regardless of muscular fitness. Multiple regression generated odds ratio (OR) comparing individuals with poor fitness (muscle strength & 6-minute walking) and those with better fitness was 11.7 (4-34) $p < 0.001$.

Conclusions: Results show that muscle strength and cardiorespiratory submaximal resistance, are associated with an increased CMR in school children 6-9 yrs old. Results reinforce the need to consider physical fitness in childhood in order to promote healthy growth and active living.

Key words: obesity, cardiometabolic risk, fitness, cardiorespiratory endurance, muscular strength. Funding FONDECYT Nº 1100206.

PO910

EFFECT OF INFANT AND YOUNG CHILD FEEDING PRACTICES ON GROWTH IN CAMBODIA AND MALAWI

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Background and objectives: Poor nutritional status in early infancy is associated with growth faltering, increased risk for morbidity, anemia, and mortality. This study was conducted within the IMCF research study looking at the impact of nutrition education on young childrens' nutritional status in Malawi and Cambodia.

Methods: A Cross - sectional nutritional baseline survey was conducted in Malawi in September 2011 at the beginning of the rainy season (n=1041) and in Cambodia in September 2012 during the rainy season (n=1029). A standardized questionnaire was administered in randomly selected households with children under two. Anthropometric measurements were taken from both parents and the child.

Results: Prevalence of stunting (HAZ < -2SD) among children was 39 % in Malawi and 22% in Cambodia. Exclusive breastfeeding rate among children below 6 months was 43%in Malawi and 83% in Cambodia. The children's diets were dominated by foods made from grains and little animal source foods. In this age group minimum dietary diversity was achieved by 61% of the children in Malawi and 44% in Cambodia, while 72% and 70%, respectively, had a minimum meal frequency. However, minimum acceptable diet was met by less than 50% of the children in Malawi and only 28% in Cambodia. Exclusive breastfeeding was significantly correlated with HAZ in Malawi ($r = 0.2$), but not in Cambodia. A low but significant association was also found for dietary diversity and meal frequency with height and weight.

Conclusions: The mean height-for-age-z-score was different in both countries which might be due to different exclusive breast feeding rates. The poor infant and young child feeding practices will need to be addressed within the nutrition education program using locally available foods to improve dietary diversity and meal frequency that can be followed by families, irrespective of their economic means.

Key words: breastfeeding, dietary diversity, growth.

PO911

THE USE OF PHOTOVOICE TO IDENTIFY MATERNAL DIETARY CONSUMPTION IN RURAL BANGLADESH

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Background and objectives: Maternal nutrition is associated with the survival, growth and development of the fetus. Previous formative research conducted by the lead researcher in Pirganj sub-district in northern Bangladesh identified that the male-dominant hierarchical society prevented women of different socio-economic and ethnic backgrounds from freely engaging in focus group discussions, interviews facilitated by male interviewers and other such qualitative research methods. This study aimed to better explore and thus understand maternal nutrition and its determinants through the use of Photovoice in June 2012.

Methods: A participatory research design was adopted to empower pregnant community women as they share their story and ensure a movement away from orthodox relationships between the researcher and the researched. Eight community nutrition volunteers, two supervisors and a research project coordinator participated in a one day training facilitated by the lead researcher of the project. Each community nutrition volunteer briefed and trained one to two participants (n=10) on the use of a digital camera. After a 24-hour period, cameras were collected and all pictures were printed. The community nutrition volunteers revisited the respective women, and led the participants through an in-depth interview process, pivoting around one core question, using the photos to evoke a narrative.

Results: This study identified a number of findings that reveal dietary habits and behaviours and in addition cooking practices, hygiene, household living standards, and food security.

Conclusions: The results indicate that Photovoice can be used in developing rural communities as an alternative to more commonly used qualitative research methods.

Key words: Photovoice, community nutrition, pregnant women.

PO912

PREDICTED IMPLICATIONS OF USING PERCENTAGE WEIGHT GAIN AS SINGLE DISCHARGE CRITERION IN MANAGEMENT OF ACUTE CHILD MALNUTRITION IN RURAL ETHIOPIA

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Background and objectives: Mid-upper-arm-circumference (MUAC) is increasingly used in identifying and admitting children with acute malnutrition for community based management of malnutrition (CMAM). MUAC is easy to use since it does not involve height assessment but its wider use also call for discharge criteria that does not need height measurement. This study examined how application of different percentage weight gain as single discharge criterion would have affected nutritional recovery depending on the children's MUAC at admission.

Methods: In rural areas of Wolaita, Ethiopia, non-edematous children (n=631) aged 6-59 months having a mid-upper arm circumference (MUAC) of <125 mm were identified when seeking admission at a CMAM program integrated into the primary health care system. By simulation, 10, 15 and 20% weight was added to their current weight and their predicted nutritional status by weight-for-height z-score (WHZ) at discharge was determined. Moderate and severe wasting according to WHO WHZ classification was used to define nutritional recovery.

Results: Applying the most commonly recommended target of 15% weight gain would have resulted in 9% of children with admission MUAC <115 mm still being moderately or severely wasted at discharge. All of those who predicted to remain severely wasted had <-4 WHZ at admission. A 10% of weight gain would have been sufficient to generate a similar proportion of recovery among children with admission MUAC 115-125 mm. Increasing the percentage weight gain targets in the two MUAC groups to 20 and 15%, respectively, would largely resolve wasting but likely also lead to increased program costs by keeping already recovered children in the program.

Conclusions: Use of percent weight gain as single discharge criterion poses risk of not being equitable as it is not proportionate to nutritional need and may lead to insufficient recovery among those with severest condition. Funded by Sida.

Key words: community-based management of acute child malnutrition, discharge criterion, Ethiopia.

PO913

MINERALS COMPOSITION IN BREAST-MILK OF VIETNAM MOTHERS

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Background and objectives: Milk composition may be influenced by several factors: the stage of lactation, the time of day, the stage of feeding, as well as maternal food intake. To determine concentration of compositions in Vietnamese mothers's breast-milk to find the relationship between some minerals levels in breastmilk and dietary intake factors.

Methods: A cross-sectional survey in 91 mothers to evaluate the breast-milk composition and diet-related factors of Vietnamese mother from 29 to 120 days of lactation period was carried out in Hanoi and Hochiminh cities. There are 60 indicators were assessed in Laboratory, including 10 minerals. The dietary intake were collected by the 24 hours recall. The food frequency were done by the Questionaries.

Results: The level of these 10 compositions vary in large by individual. The concentration of zinc, magnesium, has a trend of decreasing by the lactating periods. It is significant differences in the some breast milk concentrations of mineral between the mothers in Hanoi and mothers in Hochiminh: the levels of phosphor, natri, in the breast milk of Hochiminh's mothers were higher markedly than that in the Hanoi's mothers. Contrasting, the levels of kali, calcium, copper, selen in the breast milk of the Hanoi's mothers was higher than in that of the Hochiminh's mothers. There are a positive and significant relationship between the level of zinc in mother diet and the level of zinc in breast milk. The selen level in breast milk was very low.

Conclusions: The level of zinc and selen were deficiency is related with the dietary intake of Vietnamese mothers.

Key words: breast-milk composition, minerals in breastmilk, lactating mothers in Vietnam.

PO914

PSYCHOSOCIAL FACTORS AS PREDICTORS OF BODY WEIGHT STATUS AMONG MALAYSIAN ADOLESCENTS

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Background and objectives: Much effort have been made globally in trying to understand the tremendous increase in the prevalence of childhood overweight and obesity since a decade ago. This study was conducted to examine the relationship between psychosocial factors and body weight status among adolescents.

Methods: A total of 375 students comprising 32.0% male and 68.0% female students were recruited from four public secondary schools in Sibu, Sarawak. Socioeconomic and psychosocial factors were assessed using a self-administered questionnaire. Weight and height were measured using standard procedures and body mass index-for-age (BMI-for-age) was determined.

Results: The mean age of the respondents was 16.45±0.53 years old. A total of 70 students (18.6%) were found to be overweight/obese. The percentages of overweight/obese males and females were 22.5% and 16.9%, respectively. A small proportion of students (5.0%) was categorized under the thinness group. The percentages of male and female students under the severe thinness/thinness categories were 5.0% and 5.1%, respectively. Three variables found to be associated with body weight status were eating attitudes ($r = 0.178$, $p = 0.001$), body discrepancy score ($r = 0.645$, $p = 0.0001$), and perceived sociocultural pressure to be thin ($r = 0.392$, $p = 0.0001$). Using multiple linear regression analysis, two factors were found to have significantly contributed to body weight status after controlling for the other variables. The related variables were body discrepancy score ($p = 0.0001$) and perceived sociocultural pressure to be thin ($p = 0.001$).

Conclusions: Body image perception and perceived sociocultural pressure to be thin were found to be the predictors for body weight status. These factors should be taken into consideration for future intervention on body weight status among adolescents.

Key words: psychosocial, body weight status, adolescents.

PO915

YOUNG CHILDRENS' NUTRITIONAL STATUS AND INFANT AND YOUNG CHILD FEEDING PRACTICES IN CAMBODIA

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Background and objectives: Despite economic growth, Cambodia is still among the countries with high levels of chro-

nic undernutrition. A baseline study was conducted within the IMCF research project looking at the determinants of malnutrition in Cambodia.

Methods: In September 2012 a cross sectional nutrition survey was conducted in the project area of a FAO food security project in Preah Vihear and Otdar Meanchey Province in Northwestern Cambodia. Data was collected from 1029 randomly selected households with children below two years based on a standardized questionnaire, height, weight and hemoglobin measurements of both, mother and child.

Results: Mean Height-for-age-Z-score (HAZ) varied from -0.69 at the age group 0-1.5 months to -0.82 at the age group 6-8 months to -1.65 at 21-23 months. Overall prevalence of stunting was 22%. Among the children below 6 months, 83% were exclusively breastfed. By the age of 8 months 94% of the children were introduced to complementary food. In the age group 6 to 23 months minimum dietary diversity was achieved by 44%, minimum meal frequency by 70% but a minimum acceptable diet by only 28%. Only 29% of the mothers were considered as anemic compared to 61% of the children in the age group 3-23 months. A diarrhoea episode two weeks prior to the survey was reported for 37% of the children, while 73% of the mothers knew how to prevent it.

Conclusions: The exclusive breastfeeding rate for children 0-6 months was exceptionally high compared to other countries which might have delayed the decrease of mean HAZ to the older age groups. The low prevalence of children above 6 months receiving a minimum acceptable diet emphasizes the need to improve especially complementary feeding and hygiene practices which have been very poor to prevent stunting observed in the older infants.

Key words: breastfeeding, IYCF, height-for-age-Z-score.

PO916

KNOWLEDGE CAPITAL FOR FATHERS TO SUPPORT BREASTFEEDING: STEP-BY-STEP INVESTIGATIONS IN INDONESIAN URBAN SETTING

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Background and objectives: Father's role in supporting breastfeeding practice is lack of exploration in Indonesian setting.

Methods: The investigation was started by reviewing existing western literatures on such phenomenon. Two quantitative surveys among 445 nursing mothers, also 168 working and 253 non-working women were done to show if fathers played roles as perceived by mothers. Then, 13 FGDs with father-mother pairs were performed to elucidate types of father's roles in which the results were used to develop structured questionnaire for interviewing 536 father-mother pairs. Follow-up indepth interviews were done to 11 father-mother pairs who showed specific characteristics of the father's roles and its breastfeeding outcome. Furthermore, a book containing information about breastfeeding and father roles was developed. The book was tested for its benefit in improving knowledge level among 66 expectant fathers and 68 control fathers. These fathers were further intervened using text messages.

Results: Around 60% mothers with less breastfeeding difficulties admitted their spouse's engaged in discussions about child's wellbeing and helped with the household chores. Home environment especially support from father was a significant factor to influence exclusive breastfeeding for working and non-working women. One father's role found significant to breastfeeding practice was searching for information. The study estimated 60% of the fathers be exposed to breastfeeding information, 40% actively searched for information, and 20% involved in decision making of the current infant feeding practice. After book and text message interventions, the intervened fathers had increased knowledge level from 20 to 45%. Proportion of fathers who searched for information remained similar from baseline to endline, but higher than the control group.

Conclusions: Knowledge is a resource for father to strategically improve breastfeeding. Intervention must account for father's mode of information gathering which includes the mother as one entity.

Key words: breastfeeding father, working mother, book, text message, Indonesia.

PO917

SERUM CHEMERIN CONCENTRATIONS IN OBESE AND OVERWEIGHT CHILDREN BEFORE AND AFTER AN INTERVENTION PROGRAM

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Background and objectives: Chemerin is a hepatic chemoattractant protein. Recently it has been known that this molecule is also expressed in white adipose tissue from ani-

mals and adult humans. Thus, it has been hypothesized that chemerin acts as an adipokine related to obesity. The aim of this study was to analyze if serum chemerin concentrations in obese/overweight children were related to their obesity grade, and to determinate the effects of an obesity treatment on serum chemerin concentrations.

Methods: Forty obese/overweight children (25 girls, 15 boys) 8-13 year-old and their parents followed an intervention program of 11 weekly sessions of 90 min, named 'niñ@s en movimiento', designed to modify nutritional and psychological aspects, as well as lifestyle habits. Before and after the program, body weight, height and waist circumference were measured, relative body mass index (rBMI = [individual BMI/BMI at 50° percentile for age and gender /100) and relative waist circumference (rWC = [individual WC/WC at 50° percentile for age and gender /100) were calculated, and serum chemerin concentrations were assessed by ELISA. Data were analyzed using statistical paired or unpaired Student's t tests.

Results: A significant decrease in rBMI and rWC values was observed after the intervention program (P<0.001), and obesity prevalence decreased from 44% to 28% in this children group. In addition, serum chemerin concentration also decreased (64±3 vs 57±2 ng/ml, p < 0.001). Significantly higher chemerin concentrations were found in obese children when they were compared with overweight children, either before or after the intervention program (p < 0.05). No differences between both genders were found.

Conclusions: Serum chemerin concentration is directly associated with children obesity grade, and it decreases after an obesity children treatment.

Key words: chemerin, childhood obesity, obesity treatment
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PO918

MALNUTRITION IN BRASILIAN ELDERLY: EFFECT OF SENSORY CHANGES

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Background and objectives: Malnutrition in the elderly has important effects morbidity and mortality. The association between malnutrition and sensory study has been given in recent years, the impact that these problems can lead to health of the elderly. The quantity, selection and processing of food are limited by alterations of taste sensory smell, hearing and hypo salivation that causes dry mouth, is also associated with poorer nutritional indicator. The objective is to examine the association between malnutrition and sensory changes in taste, smell, hearing and xerostomy in institutionalized elderly in Rio de Janeiro - Brazil.

Methods: This cross-sectional study, data were obtained from 344 elderly residents of long-term institutions in the municipality of Rio de Janeiro, Brazil. Malnutrition has been identified through the Mini Nutritional Assessment, MNA. A questionnaire was applied to detect the reduction of self-perception of taste, smell, vision and dry mouth. Multivariate analyses by logistic regression were adjusted for age.

Results: Malnutrition was detected in 25 elderly (8.3%). The variable reduction hearing (Odds Ratio (OR): 2.14; confidence interval (CI), 95%: 0.86 to 5.31), decreased vision (OR: 1.66, 95% CI: 0.57 to 4.79) and reduction of the palate (OR: 1.81, 95% CI: 0.19 to 16.8) were more likely to malnutrition, but not statistically significant. The variable xerostomy presented three times greater chance of developing malnutrition with statistical significance (OR: 2.95, 95% CI: 1.21 to 7.19).

Conclusions: Xerostomy is significantly associated with 3 times greater chance of developing malnutrition, as well as other sensory changes showed some influence. It is important to concern not only with food quality, but also make sure that it is actually being ingested. Sensory physiological changes in the elderly and can lead to malnutrition by reducing intake, worsening the prognosis of your health.

Key words: elderly, malnutrition, nutritional assessment.

PO919

CULINARY WORKSHOPS IN HEALTH PROMOTION AND SPORTS PERFORMANCE: AN EXPERIENCE WITH BRAZILIANS ADOLESCENTS TENNIS PLAYERS

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Background and objectives: Food cooking is widely used as a nutritional intervention strategy to encourage healthy dietary changes. Our objective is to describe the experience of adopting culinary workshops as an educational tool for adolescent tennis players, aiming the promotion of healthy eating and optimal performance.

Methods: Activities were planned as part of a food and nutrition program conducted from February/2010 to December/2012 developed for a tennis competition team (10 to 18 years old), aimed to improve athletes' food knowledge, practices and behaviors. In addition to individual counseling athletes participated in group activities (n=23), using different dy-

namics. Four culinary workshops were held using cooking as structural axis of an educational method and focusing specific topics: (1) Sports beverages prepared with fruits (to encourage adequate hydration practices); (2) Healthy snacks to eat during exercise (to maintain blood glucose levels and improve performance); (3) Postexercise meals (food strategies for recovery); (4) Sensory stimulus and tasty dishes with vegetables (to improve the intake of food sources of antioxidants).

Results: The workshops presented average participation of 12 athletes. The meetings provided an important space for dialogue and sharing of knowledge and practices about healthy eating and individual strategies related to exercise performance. The nutritionist played a key role as a mediator of the discussion to improve the quality of information and to encourage food behaviors changes. The workshops were effective to address athletes' sensorial, cognitive, symbolic and procedural dimensions. Furthermore, they were essential to complement other activities of the program, especially due to the possibility of athletes understanding how to prepare and organize their own food, adequate to training sessions and competitions periods.

Conclusions: This experience shows the potential of the culinary workshop as a participatory approach to address specific issues in sport in order to promote health and performance.

Key words: cooking, food and nutrition education, adolescent health, tennis performance.

PO920

EFFECT OF A NUTRITIONAL INTERVENTION ON PHYSICAL RECOVERY – EVALUATION OF A CARBOHYDRATE-PROTEIN ISOTONIC DRINK

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Background and objectives: Optimising the recovery period between training sessions is key to maintain an optimal performance at each session. Nutrition is one of the main strategies for recovery to restore hydration status, glycogen stores and to enhance proteo-synthesis. An isotonic drink Complex Recuperation® (CR), formulated according to these targeted functions, has been tested on well-trained cyclists to evaluate its effects on performance after fatigue.

Methods: 10 well-trained cyclists (men: 22.4 ±3.2 y.o) performed 3 sessions, each separated by one week. During the first session each subject underwent a full medical check, a training on a 30 min Time Trial (TT) and the evaluation of maximal aerobic speed. During the two next sessions, after a specific protocol leading to glycogen depletion (Jentjens et al., 2001) cyclists were randomly assigned in two recovery strategies, in a cross-over design. One was a specific dose of carbohydrates and protein (CR) and the other one was a placebo (PL), to be ingested immediately after the glycogen depletion protocol, every 15 min and during 3 hours. Each of these 2 sessions was realized during 2 days, where diet was controlled. Dependant variables were a 30 min TT and an all out test to identify Maximal Muscular Cycling Power (MMCP). Subjective parameters of fatigue, perceived effort and investment were also evaluated.

Results: After CR ingestion, MMCP was maintained (+1.1%, NS) whereas significant alteration was observed after PL (-5.3%, $p < 0.05$). A similar pattern was observed for TT with a performance maintained after CR (+0.4%, NS) but decreased after PL (-3.9%, $p < 0.05$).

Conclusions: Results indicate a significant maintained performance for TT and MMCP after CR ingestion. This could be related to an adequate replenishment of the muscle glycogen stores by the carbohydrates and protein drink.

Key words: recovery, physical performance, carbohydrates, proteins, cycle.

PO921

NO EFFECT OF BINDING FOLATE RECEPTOR AUTOANTIBODIES ON MATERNAL OR CORD FOLATE STATUS IN A LONGITUDINAL PREGNANCY STUDY

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Background and objectives: "Blocking" autoantibodies prevent folate entering the cell via the folate receptor and are associated with infertility and grave developmental defects. Binding autoantibodies that bind to the epitope of the folate receptor have been described but how they affect folate transport, status or pregnancy outcome is not known.The aim of this study is to investigate the presence of binding autoantibodies during pregnancy or in the cord and their effect on maternal and cord folate status and birth weight.

Methods: 187 participants from the Reus-Tarragona Birth Cohort ("NUTCIR" phase) were studied. Plasma folate and binding autoantibodies were determined at <12, 15, 24-27 and 34 gestational weeks (GW), labor and in the cord. A multiple linear regression model (MLRM) was fitted to investigate the association between binding autoantibodies and birth weight and was adjusted for BMI, parity, smoking during pregnancy, prenatal iron and folic acid supplement use, socioeconomic level, gestational age at birth and fetal gender.

Results: 69% of the participants had binding autoantibodies during pregnancy or in the cord. Their prevalence throughout pregnancy was: <12GW (53.6%), 15GW (55.8%), 24-27GW (50.0%), 34GW (50.0), labor (48.0%), cord (51.8%). Plasma folate concentration (nmol/l) in carriers/ non-carriers [mean (SD)]: <12GW [29.02 (18.63)/ 34.40 (31.10)], 15GW [26.28 (14.97)/ 27.05 (18.46)], 24-27GW [12.99 (9.84/ 13.99 (10.39)], 34GW [10.88 (8.65)/ 10.95 (10.59)], labor [10.83 (8.39)/ 15.05 (35.14)], cord [25.03 (12.29)/ 23.11 (11.70)] did not differ. Neither did any of the studied lifestyle or obstetric variables. However, carriers were older than non-carriers: 32.4 (4.2) years versus 29.5 (4.7), $p < 0.001$. MLRM ($r2=0.466$, $p < 0.001$): binding autoantibodies during pregnancy or in the cord were associated with an average increase of 214.89 g in birth weight ($p < 0.01$).

Conclusions: Folate receptor binding autoantibodies in the mother or in the cord did not affect folate status but were associated with increased birth weight.

Key words: autoantibodies, folate receptor, pregnancy.

PO922

THE RELATION BETWEEN DIET AND ALLERGEN CONCENTRATIONS IN BREAST MILK; OVALBUMIN CONCENTRATIONS AND LACTOFERRIN LEVELS IN BREAST MILK

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Background and objectives: Regardless of the consumption of the same amount of allergen-related foods, allergens were detected in some breast milk samples while not in the others. Breast milk is a secretory fluid. Therefore, concentrations of secretory fluid could potentially be linked with the concentration of allergens in the breast milk. Thus, the total protein and the levels of one particular protein, lactoferrin, in the breast milk were measured.

Methods: The concentration of ovalbumin in breast milk was measured using an enzyme-linked immunosorbent assay (ELISA) kit, previously reported by us. The limit of ovalbumin level in breast milk is 312 ng/ml. The Lowry method was used for measuring the total protein. A Lactoferrin Human ELISA Kit was used to measure the lactoferrin levels. Therefore, we investigated cases wherein the level of ovalbumin was below or above 312 ng/ml.

Results: We found no significant difference when we compared the total protein level between breast milk with ovalbumin below 312 ng/ml and that above 312 ng/ml. When we compared the lactoferrin level between breast milk with ovalbumin below 312 ng/ml and that above 312 ng/ml, a significant difference was observed. Consequently, if the ovalbumin level in breast milk is >312 ng/ml, the lactoferrin level is high, while if the ovalbumin level is <312 ng/ml, the lactoferrin level is low ($p < 0.01$).

Conclusions: When evaluating the concentrations of ovalbumin in breast milk, the lactoferrin levels might be used as the point of reference.

Key words: Fallergen, ovalbumin, lactoferrin, breast milk.

PO923

A STUDY ON CHANGES IN FOOD PREFERENCES OF INFANTS AND THEIR MOTHERS

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Background and objectives: What is the most effective approach in trying to prevent biased nutrition in food and nutrition education (shokuiku)? The purpose of this study was to survey the food preferences of infants and their mothers.

Methods: The survey items included 21 types of foods reported to be the most disliked by infants. Inquiries were made to 720 mothers in Tokyo in 2012.

Results: The majority of those surveyed were unable to eat food items during infancy. Fifty percent of the mothers surveyed became able to eat those items by the age of 17, 15, 15, 15 years, respectively. However, the oldest age at which they became able to eat those foods was 35, 30, 30, and 30 years, respectively. Thus, the survey revealed that as people grow up, the variety of foods that they can eat broadens, but that such changes differ between individuals. It was also revealed that foods that were reported as being their mothers' favorites, such

as onions, carrots, and tomatoes, were being consumed by the infants surveyed at relatively earlier ages. Reasons for starting to eat formerly disliked foods included, in order of importance, aging (33%), modeling after their mothers (30%), and curiosity (25%); being forced to eat the food accounted for only 7.0% of those surveyed.

Conclusions: Children should not be forced to eat foods that they do not like, mothers should continue to provide an appropriate food environment with a long-term prospective. It should be kept in mind that mothers need to set a good example so that their children can model after them, and to try and draw curiosity from their children.

Key words: food preferences, nutrition education, shokuiku.

PO924

SNACKING AND INFANT YOUNG CHILD FEEDING PRACTICES IN A RURAL AREA OF NICARAGUA

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Background and objectives: Infant young child feeding (IYCF) practices are of great importance for child health. Guidelines on good practices and their assessment have been issued by international agencies. Potentially negative practices such as consumption of high fat and sugar/salty snacks and drinks are not commonly reported but may be an issue. Our aim is to describe IYCF practices complemented with information on snack consumption in a society undergoing the nutrition transition.

Methods: In rural northwestern Nicaragua household visits were made to 1371 mother and child (0-35 m old) pairs displaying the complete population of the study area. Cross-sectional data was collected from June to November 2009 using 24 h recall instruments and subsequently generating feeding indicators as recommended by WHO. In addition, information on commonly consumed snacks and sweet drinks was also collected.

Results: While breastfeeding was common (98%) in the first months of life and continued (60%) in the second year, only 34% of the 0-5 m olds were exclusively breastfed. Mixed feeding by use of powder milk (9%) and/or formula (13%) started in the first two months. Consumption of snack foods was common (22% of 4-5 m and 55% of 6-8 m). Complementary feeding was deemed acceptable for only 41% of the infants (6-11 m) due to limitations in dietary diversity (50%) and meal frequency (32%). The largest limitation (in 75%) was in consumption of vitamin A-rich fruits and vegetables. At same time consumption of snacks was high with 92% of the 24-35 m olds having consumed a snack the previous day with preference for sweet items.

Conclusions: There were limitations in practicing recommended feeding behaviors, raising concerns related to undernutrition. At the same time, snack consumption appeared high. Whether snacking may contribute to prevent undernutrition, increase overnutrition or both needs study. Funded by Sida

Key words: breastfeeding, child, diet, snacks, Nicaragua.

PO925

INFANT AND YOUNG CHILD FEEDING PRACTICES AND NUTRITIONAL STATUS IN NICARAGUA: ASSOCIATIONS WITH HOUSING QUALITY, FOOD SECURITY AND MATERNAL EDUCATION

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Background and objectives: Socio-economic characteristics such as household economic situation, food security and maternal education are critical underlying determinants for infant young child feeding and nutrition. They are commonly interrelated and their independent contribution needs to be better understood when efforts are made to improve children´s situation. In the context of a society in nutrition transition this study evaluates associations between these factors and child feeding and nutrition in rural Nicaragua.

Methods: Cross-sectional data was collected from May to November 2009 at household visits including 1371 children aged 0-35 months and their caretakers. Information on infant young child feeding and nutrition was collected using standard WHO guidelines. A validated experience-based questionnaire assessed food security, whereas housing quality served as proxy for household economic situation. Both these determinants were categorized into tertiles in analyses. Maternal education was categorized as <5 years, 5-9 years and 10 or more years.

Results: Independently, lowest level of education was associated with a higher proportion of exclusive breastfeeding (EBF) (OR for not EBF: 0.19; 95% CI: 0.07, 0.51) but, at older age, also with lower achievement of minimum dietary diversity (DD) (OR for not DD: 2.04; 95% CI: 1.36, 3.08) and lower HAZ (Beta: -0.34; CI: -0.59, -0.09). The lowest and middle levels of food security were associated with lower DD (OR for not DD: 1.47; CI: 1.05, 2.05) and lower HAZ among infants under 6 months (Beta: -0.73; CI: -1.26, -0.19). Further, housing quality was related with lower WHZ in the older children (Beta: -0.22; -0.42, -0.03).

Conclusions: In this study lower maternal education was

associated with both favorable and unfavorable outcomes, though the favorable effect on EBF may not be interpreted as causative. Lower levels of food security were systematically associated with more unfavorable outcomes. Funded by Sida

Key words: child, nutrition, food security, education.

PO926

PREDICTORS OF DECLINE IN DIET QUALITY IN OLDER AGE - FINDINGS FROM THE HERTFORDSHIRE COHORT STUDY

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Background and objectives: Poor nutrition is common in older people, but little is known about influences on food choice at this age. Dietary 'resilience' may be of importance, explaining how some older adults are able to maintain a diet of adequate quality. The objectives of this study were to identify determinants of change in diet quality over a 10-year period in a cohort of older community-dwelling adults.

Methods: At baseline (1998-2001), the diets of 222 men and 221 women, aged 59-71 years were assessed by administered food frequency questionnaire. Principal component analysis identified a 'prudent' pattern, characterized by frequent consumption of fruit, vegetables, wholegrain cereals and oily fish. A prudent diet score was calculated for each participant; the score was used as an indicator of their diet quality. Participants provided information on demographic, medical and psychosocial factors. At follow-up (2011), diet was re-assessed; prudent diet scores and change in scores from baseline were calculated.

Results: Mean (SD) change in prudent diet score over 10 years was -0.142 (1.120) in men and -0.339 (1.076) in women, indicating an overall decline in diet quality with increasing age. Change in prudent diet score was not related to social class, BMI, smoking, physical activity, marital status or number of co-morbidities at baseline. Whilst there were no associations between change in prudent diet score and the extent of social support or size of social network at baseline, there were associations with participation in social and leisure activities. In men, for a one point increase in activity, change in prudent diet score increased by 0.013 (95% CI 0.001, 0.025) p = 0.042. In women, the equivalent change was 0.018 (0.006, 0.031) p = 0.005.

Conclusions: In community-dwelling older adults, participation in social and leisure activities appears to be protective with respect to quality of diet.

Key words: diet quality, ageing, resilience.

PO927

ANTHROPOMETRIC AND COGNITIVE PARAMETERS MAY AFFECT LOW ENERGY REPORTING IN ELDERLY

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Background and objectives: Accurate assessment of energy intake is crucial for the assessment of nutritional status. Energy misreporting may result from conscious or unconscious underreporting and interviewer-related reasons. In elderly, high rates of low energy reporting exist, mainly associated with low educational level and greater body mass index (BMI). The potential role of cognitive decline has been previously discussed. Aim of the present analysis was to investigate prevalence and characteristics of low energy reporters (LERs) in an elderly Greek cohort.

Methods: The study population is located in Larissa, the largest city of central Greece. Subject selection was based on a random sampling of elderly >65 years old. So far, 760 non-institutionalized individuals were enrolled. They have undergone detailed clinical, neurological and neuropsychological assessment (including the Mini-Mental State Examination, MMSE). BMI was calculated from measured weight and height values. Dietary intake was evaluated with the use of a validated food-frequency questionnaire. Adherence to the Mediterranean Diet was evaluated through MedDietScore. The Determine Checklist was used for nutrition risk screening. Following the method of Goldberg et al participants were classified as LERs and non-LERs.

Results: 25% of the population were LERs. Compared to non-LERs, LERs had significantly lower consumption of all food groups, lower MedDietScore, lower percentage of energy from dietary fat and higher from protein. Furthermore, LERs had significantly higher BMI compared to non-LERs ($p < 0.001$), lower MMSE Score ($p = 0.02$) and, interestingly, higher Determine score ($p = 0.04$), indicating higher malnutrition risk. After adjustment for potential demographic and lifestyle confounders, lower energy reporting was significantly associated with female sex, higher BMI and lower MMSE score.

Conclusions: Measures of cognitive function may be necessary when evaluating energy intake in the elderly. This issue

needs further investigation as energy misreporting may influence the study of diet-disease relationships in this age group.

Key words: underreporing, elderly, dietary assessment.

PO928

ANEMIA CONTROL PROGRAMS AND DECREASING ANEMIA PREVALENCE IN RWANDA

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Background and objectives: In Rwanda between 2007/8 and 2010, anemia decreased from 29% to 20% in pregnant women and 48% to 38% in children 6-59 months. To better understand why anemia prevalence has decreased, we reviewed the change in program coverage.

Methods: The 2007/8 and 2010 Rwanda Demographic and Health Surveys were used to determine the change in anemia in both pregnant women and children 6-59 months and changing coverage of iron intake, malaria control, deworming, and other related programs.

Results: Only 1-2% of women and children tested positive for malaria in both surveys. Anemia in pregnant women decreased by 31% over the period with moderate and severe anemia decreasing by 33% and 93%, respectively. Sleeping under long-lasting insecticidal nets (LLINs) increased from 60% to 72%. Women consuming any iron-folic acid supplements (IFAS) increased from 41% to 73%. However, most women were receiving <60 IFAS and only 3% of women received >60 IFAS in 2010. Deworming in pregnancy increased from 18% to 39%. Anemia prevalence in children 6-59 months declined by 26% but most of the decline took place in children 24-59 months compared with children 6-23 months. Most of the decline occurred for severe anemia in both age groups. There was an increase in the consumption of iron-rich foods by children (from 8% to 20%), an increase in deworming (from 70% to 86%) with only 31% coverage in younger children group compared to over 90% in older children, and children sleeping under LLINs (from 56% to 70%).

Conclusions: This analysis shows that anemia prevalence can be decreased by increasing the coverage of anemia control programs. While there is still work ahead to increase iron intake and expand helminthes and malaria control, Rwanda has made promising strides to expand coverage of programs that will reduce anemia.

Key words: anemia, malaria, deworming.

PO929

FOOD INTAKE AND NUTRITIONAL STATUS OF PREGNANT AND LACTATING WOMEN IN SELECTED URBAN SQUATTERS AND CONCERN WORLDWIDE'S INITIATIVE IN BANGLADESH

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Background and objectives: Concern Worldwide, Bangladesh is implementing the 'Integrated Urban Nutrition Project' from 2011-2015 targeting selected urban squatters of two major cities named Dhaka and Chittagong. The project intends to integrate nutrition services into the existing Primary Health Care (PHC) system as current urban health service delivery system does not integrate nutrition as component. One of the objectives of the project is to improve the nutritional status of pregnant and lactating through utilizing nutritional services provided through existing PHC networks and improve the household income by involving women into income generation activities (IGA). IGA activities are introduced in project from December 2012. The project works in partnership with five local NGOs.

Methods: A baseline survey on household food security situation was conducted in December 2012 to understand the nutritional status and food consumption pattern of pregnant and lactating women in urban squatters. For the survey, two stage cluster sampling design were followed to select 720 women.

Results: In surveyed areas the prevalence of global acute malnutrition in pregnant and lactating mothers by MUAC using a cut-off of less than 22.0 cm was 17.4%. Of them, 8.7% were severely malnourished with MUAC below 21.0 cm. Dietary diversity score showed, 48% women consumed meal from 5 to 6 food groups 24 hours prior to survey. Compared to household level less percentage of women (HH: 27%, Mother: 18%) availed 8 or more score. Further analysis revealed women who consumed less diversified meal higher number of them were severely malnourished (45%).

Conclusions: Individual counseling and group counseling are introduced to PHC services from where mothers receive appropriate information on food intake during pregnancy and lactation. Different awareness raising programme at community and IGA are initiated at household level to improve food security situation in squatter areas.

Key words: pregnant, lactating women, nutritional status.

PO931

VIOLATION OF BMS CODE IN DHAKA CITY

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Background and objectives: Breast milk is a exclusive nutritional source that cannot be replaced by any other food, including infant formula or breast milk substitute (BMS). There are some specific clauses in the national laws to regulate the marketing practice of BMS products in Bangladesh in accordance with international regulations (Code 1984). The objectives was to find out the extent of code violation and the way violations are talking place.

Methods: In 2009, we submitted a qualitative study which was carried out in Dhaka city and that includes 6 Focus Group Discussion (FGD) and 9 In Depth Interview. Selected mothers (children aged 0 to 24 months), doctors, health workers were also interviewed.

Results: It was found that many manufacturing companies, mothers, doctors and health workers were violating codes. Manufacturing companies were violating the code by advertising. Mothers were being attracted by those advertisements and due to lack of education, knowledge and consciousness, they were violating the code. Almost every mother who participated in the study was not familiar with BMS Code. Only one mother said that she read something about the law on newspaper. And another mother said that this is the first time she heard about BMS code. Most of the health workers do not have any clear conception about BMS code. From all the participants one heard about it from a senior doctor but not properly. Doctors know about code but they are breaking the laws for some unknown reasons.

Conclusions: Though there are some codes on BMS but most of the people do not know this. Most of them are violating BMS codes, even those who are directly associated with breast feeding practice. As a result the infants are direct victims but not those who are violating the codes.

Key Words: BMS, BMS code, FGD, in depth interview.

PO932

MATERNAL HIV-STATUS, EXCLUSIVE BREASTFEEDING AND INFANT ILLNESS AND GROWTH IN THE FIRST MONTH OF LIFE IN SEMI-RURAL TANZANIA

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Background and objectives: Exclusive breastfeeding (EBF) decreases respiratory and intestinal infections during infancy, yet studies in urban Tanzania indicate the majority of women do not EBF for the recommended six months. The objective was to determine the prevalence of EBF up to month-one in a semi-rural area of northwestern Tanzania where women may have less access to commercial infant formulas, and to determine if EBF was related to symptoms of infection and growth in the infant.

Methods: Thirty-three HIV+/HIV-exposed and 55 HIV-/HIV-unexposed mother/infant dyads were followed from birth. Infant feeding and health questionnaires were administered, and maternal and infant anthropometrics were measured. Illness was defined as symptoms of diarrhea, cough, fever, vomiting, skin rash, or unscheduled hospital/clinic visits.

Results: Only 33% of mothers were practicing EBF at month one, and HIV+ mothers were 2.4 times more likely to practice EBF during this period ($p = 0.05$). The most common foods given were water, sweetened water, and gripe water. Among HIV-exposed infants, EBF reduced the risk of infant illness by 81% ($p = 0.032$). Infants who were HIV-exposed had significantly poorer anthropometrics (weight, head circumference) even if they were EBF, however, infant length and mid-upper arm circumference (MUAC) were not significantly different. Maternal body mass index (BMI) and MUAC were significantly associated with infant anthropometrics (length, weight, MUAC, head circumference), irrespective of HIV status.

Conclusions: EBF reduced the likelihood of illness in HIV-exposed infants, but despite these benefits most mothers do not EBF. If an infant becomes ill, mothers need support and education regarding the immunological and nutritional benefits of EBF even during illness. Irrespective of feeding method, HIV-exposed infants have poorer growth outcomes and may need further monitoring/intervention to improve early growth. Easy measures like maternal BMI may help identify at-risk infants.

Key words: exclusive breastfeeding, neonatal, growth, HIV.

PO933

IMPACT OF IEC SUPPORT TO MOTHERS/CAREGIVERS ON NUTRITIONAL STATUS OF CHILDREN AGED 6-8 MONTHS, LIVING IN SLUM AREA OF DHAKA CITY

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Background and objectives: Inappropriate infant and young child feeding practices are a major cause of the onset of malnutrition in young child. In terms of prevalence, number of children affected and severity of deficits, the level of undernutrition among children in south Asia in the world is relatively high. Here, one of the major reasons of faltering growth rate after 6 months onward is low quality CF practices. According to BDHS 2011the rate of appropriate complementary feeding practices is only 21%. A key component of strategies for improving child nutrition is improvement in knowledge and practices related to CF among families of children 6 to 24 months of age. Aim of this study was to see the impact of IEC support provided to caregivers on improving CF practices as well as child's nutritional status.

Methods: It was a longitudinal study of experimental design, conducted for 5 months in 2011. A baseline study was done to understand the current status. Basic information on appropriate complementary feeding practices through IEC material (e.g. flipchart, poster, leaflets) along with food demonstration and recipe trial was provided to caregivers in intervention group (n=146) while no such support were provided to caregivers of control group. Anthropometric data for both baseline and end line were collected using standard measurement tools and household data were collected from the caregivers in selected slum areas using pre-structured questionnaire. Growth rate of children were monitored for 2 months.

Results: Weight gain was significantly higher in intervention group (0.66 kg vs 0.22 kg, $p < 0.003$). WAZ had improved in intervention group compared to control group (-2.73 to -1.97 vs -2.39 to -2.34, $p < 0.003$).

Conclusions: IEC support plays a positive role on nutritional status thus such actions for knowledge and skill development should be taken under urban health programs.

Key words: IEC, CF, nutritional status, recipe trial.

PO934

DIETARY PATTERN AND DIETARY RISK OF ELDERLY PARTICIPANTS OF UNIVERSITY EXTENSION PROGRAMS IN SÃO PAULO, BRAZIL

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Background and objectives: The elderly are part of a population group that come expanding rapidly worldwide becoming potential victims of poor dietary habits of modern life. The aging can lead to difficulties in adaptation to the environment, increasing the vulnerability and prejudice the feeding process, elevating the incidence of malnutrition in the elderly. The aim of this study was to evaluate the dietary pattern and dietary risk of elderly participants of university extension programs in the city of São Paulo, Brazil.

Methods: We studied elderly of both genders, older than 60 years, suffering from one or more chronic diseases. For the assessment of dietary habits was administered a dietary screening instrument composed by 25 questions, developed and validated by Bailey (2009), based on a score that identifies nutritional risk in the elderly, besides four 24-h recall. The score was assessed according to the nutritional status observed and conducted a nonparametric statistical analysis, establishing a significance level of 5%.

Results: We evaluated 42 elderly (9.5% female and 90.5% male), 50% overwheight, and identified possible risk in 59.5% and risk in 35.7%. There was association between nutritional status and score, which means that, the higher was the body mass index (BMI) or wait circumference (WC), the lower was Bailey's score, but the difference between the groups was not significant ($p > 0.05$). We identified a low consumption of whole grains and high consumption of sweets, and the diet of elderly at risk showed less variety of vegetables and lower consumption of fish not fried, and higher consumption of cold cuts and sausages.

Conclusions: We observed a high frequency of risk and possible nutritional risk in the population, independent of the nutritional status by BMI or WC, which can be explained by inadequate dietary pattern.

Key words: elderly, dietary pattern, nutritional risk.

PO935

USE OF HOME PARENTERAL NUTRITION IN A PREGNANT WOMAN WITH BOWEL OBSTRUCTION

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Background and objectives: Despite having an experience of about 50 years of use of parenteral nutrition as a feeding way, its use in pregnancy has less experience, existing few cases in the literature. However, parenteral nutrition provides a safe and effective option to reverse maternal malnutrition and promote normal fetal growth when oral or enteral nutrition it is not possible.

Methods: 34 years old woman of 31 weeks pregnant was admitted to our hospital for intestinal malrotation secondary to pregnancy. She was treated with a conservative treatment. However, she suffered progressive loss of weight and the fetus weight was one week less than the normal for his gestational age. Because she did not tolerate enteral nutrition we started parenteral nutrition, and after teaching the management she went home with parenteral nutrition. After starting with parenteral nutrition the patient gained weight, one kilo per week, being the fetus according to gestational age. Cesarean section was planned for breech presentation at 37 week without complications. There were not metabolic or infectious complications related to parenteral nutrition.

Results: Parenteral nutrition is necessary to maintain or restore an anabolic state when oral nutrition pathways are not feasible. In the case of pregnancy, there is very little experience in using it. Between the main indications highlights refractory gravidarum hyperemesis and pathologies with malabsorption. The composition of parenteral nutrition is similar to that used in nonpregnant patients. There is no more complications observed in pregnancy compared with non pregnant women except more frequent catheter-related complications.

Conclusions: Although some obstetricians believe the risks outweigh the benefits in the use of parenteral nutrition, if during the pregnancy it is not possible feeding by enteral nutrition, parenteral nutrition has proven to be safe for the mother and children.

Key Words: parenteral, nutrition, pregnancy, intestinal malrotation

PO936

EFFECT OF RHEOLOGICAL PARAMETERS ON PUREES SENSORY ANALYSES CARRIED OUT BY INFANTS (4-24 MONTHS)

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Background and objectives: Baby food purees must be nutritionally balanced, easily digestible and energy-dense to adequately feed infants. Most of these commercial brand purees are sensory analyzed by adults, whose perceptions do not necessarily coincide with those showed by babies or infants. Concerning the sensory attributes, viscosity is one of the most important characteristics of purees, and depends on the type of puree, ingredients and proportions, thermal treatment, etc. The objective of this work was to evaluate the influence of the rheological parameters of baby food purees from the commercial brand "Naturbaby" on the sensory analysis carried out by infants (4-24 months of age).

Methods: Baby food purees were stored at room temperature during one year, analysing viscosity by means of a Brookfield OV-II viscosimeter and, in parallel, the corresponding sensory analysis by infants during the storage period. To this end, a sensory analysis protocol was developed based on hedonic scales, sensory reactions to the puree, and the "Sensory Acceptance by Infants Ratio" (SAIR), which can be used to quantify the sensory preference.

Results: Regarding viscosity, the consistency index (k) and flow behaviour index (n) were calculated for 11 different references of "Naturbaby" purees. Moreover, the effect of autoclaving and storage time on these rheological parameters was also evaluated. All references exhibit a pseudoplastic behaviour and the value of the consistence index (k) slightly increased during storage time. Sensory analysis preference performed by adults showed different trends in comparison to SAIR in most of the references.

Conclusions: Baby food purees must be sensory analyzed by infants to assess the sensory acceptance. Within rheological parameters, the viscosity of the puree can be related to the sensory acceptance by the infants.

Key words: sensory analysis, infants, viscosity, purees Acknowledgments: Torres Quevedo Program cofunded by the European Social Fund.

PO937

CHILD FEEDING ADEQUACY IS NOT INFLUENCED BY EXCLUSIVE BREASTFEEDING DURATION

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Background and objectives: Mothers of young children in Ghana believe that breastfeeding exclusively for six months impairs subsequent introduction of other foods. The current study was designed to determine whether feeding adequacy among 9-23 months old children is influenced by duration of exclusive breastfeeding.

Methods: We surveyed 300 mother-infant pairs attending child-welfare-clinic at the University of Ghana Hospital, Accra. Data collected included socio-demographic characteristics, morbidity, breastfeeding history, and maternal practices and perception on child feeding and temperament. Current child feeding was assessed using 24-hour dietary recall. Multiple logistic regression was used to identify independent predictors of child feeding adequacy.

Results: About 66% of children were exclusively breastfed for six months and only 56% were adequately fed in the in the 24 hours preceding the survey. Child feeding adequacy was unrelated to duration of exclusive breastfeeding (OR=0.73; p = 0.30). After controlling for child sex, age, and maternal education, the independent determinants of feeding adequacy included recent child morbidity (OR=0.41; p = 0.03), number of caregivers who feed child (OR=1.33; p = 0.03), and maternal perception that child does not like food (OR=0.25; p < 0.01). Child temperament was unrelated to feeding adequacy.

Conclusions: Child feeding adequacy is not affected by duration of exclusive breastfeeding. The study provides evidence to address misperceptions about exclusively breastfeeding for six months.

Key words: exclusive breastfeeding, child, dietary diversity, feeding adequacy.

PO939

IMPACT OF POMEGRANATE AND APRICOT ON TOTAL ANTIOXIDANT AND FREE RADICALS AMONG PREGNANT WOMEN

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Background and objectives: Vegetable and fruits contains considerable amounts of phytochemicals that may reduce free radicals and enhance total antioxidant levels. This study aimed at find out the effect of apricot and pomegranate on total antioxidant and free radicals levels among pregnant women.

Methods: A sample of 48 pregnant women aged 24.7±4.0 years were chosen from rural areas of Minufiya Governorate, Egypt. They were in the fifth 5th month of pregnancy, and classified into four equal groups: control group (CG) did not receive any intervention, pomegranate group (PG) received 150 g of fresh pomegranate daily; apricot group (AG) received 50 g of semi dried apricot daily; and mixture group (MG) received mixture of 75 g pomegranate and 25 g apricot daily. The intervention continued till delivery (>120 consecutive days). Mother body weight and height, hemoglobin, RBCs, PCV, total free radicals, and total antioxidants were determined at baseline and after delivery. Also, newborn weight and length were measured.

Results: the hemoglobin values at baseline of all women were below normal values and ranged from 10.0±0.2 for CG to 10.3±0.5 for AG. However, after dietary intervention it increased significantly by 22.3%, 19.4%, 16.8% among AG, MG, and PG respectively. The total free radicals decreased significantly by 52.1%, 25.3%, and 21.5% among PG, AG, and MG, respectively. Neverthess, total antioxidants increased significantly by 166.7%, 50.0%, and 51.7% among PG, AG, and MG, respectively. As well as, newborn weight of interventions groups was significantly higher than CG.

Conclusions: Egyptian pomegranate had a favorable effects since it reduce the free radicals and increased total antioxidants.

Key Words: pomegranate, apricot, antioxidant, free radicals, pregnant.

PO940

EARLY INFANT FEEDING PRACTICES IN THE PROMISE-EBF TRIAL: PROMOTION OF EXCLUSIVE BREASTFEEDING BY PEER COUNSELLORS IN THREE COUNTRIES IN AFRICA

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Background and objectives: Immediate and exclusive initiation of breastfeeding after delivery have been associated with better neonatal survival and child health, and is recommended by WHO. We report early infant feeding practices in the PROMISE-EBF trial.

Methods: The PROMISE-EBF trial was a cluster randomised behaviour change intervention trial on exclusive breastfeeding (EBF) promotion by peer counsellors in Burkina Faso, Uganda and South Africa implemented in the period 2006-2008 among 2579 mother-infant pairs. Counselling started in the last trimester and mothers were offered at least five postnatal visits. Prelacteal feeds (defined as any non-breast milk liquid given within the first 3 days), discarding colostrum, and initiation of breastfeeding later than one hour after delivery are presented by trial arm in each country. Prevalence ratios (PR) with 95% confidence intervals (CI) are given.

Results: The prevalence of giving prelacteal feeds in the intervention and control arms were: 11% and 37%, PR 0.3(95% CI 0.2-0.6) in Burkina Faso, 13% and 44%, PR 0.3(95% CI 0.2-0.5) in Uganda and 30% and 33%, PR 0.9 (95% CI 0.6-1.3) in South Africa. The prevalence of not giving colostrum were: 8% and 12%, PR 0.7(95% CI 0.3-1.6) in Burkina Faso, 3% and 10%, PR 0.3(95% CI 0.1-0.6) in Uganda and 17% and 16% PR 1.1(95% CI 0.6-2.1) in South Africa. The majority in Burkina Faso (>96%) and roughly half in South Africa initiated breastfeeding after one hour with no statistically significant differences between the groups. In Uganda, the prevalence in the intervention and control groups were: 45% and 59%, PR 0.8 (95% CI 0.7-0.9).

Conclusions: The PROMISE-EBF trial showed behaviour change with less prelacteal feeding in Burkina Faso and Uganda. More children received colostrum in Uganda, while no clear behaviour change was seen in South Africa. The high rates of late initiation of breastfeeding is worrisome.

Key words: trial, exclusive breastfeeding, peer-counselling.

PO941

IS NUTRITION IN PREGNANCY ASSOCIATED WITH NEURODEVELOPMENTAL DISORDERS IN OFFSPRING? A SYSTEMATIC REVIEW

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Background and Objectives: Schizophrenia, ADHD and autism spectrum disorders (ASD) have all been identified as neurodevelopmental disorders but their aetiology remains largely unknown. It is likely that they result from a complex interrelationship of genes and environment. A potential environmental risk for the development of neuropsychiatric disorders, with biological plausibility, is nutrient deficiency during foetal brain development. However, research into nutrition in pregnancy and neurodevelopmental disorders has been limited and the findings often inconsistent. This study aims to review the research to date which has examined the association between pregnancy nutrition and offspring neurodevelopmental outcomes.

Methods: A PubMed search was completed for studies which related to the following groups: pregnancy, nutrients, neurodevelopment, offspring and biological marker. Exclusion criteria were: non-English language, case or animal studies, no biochemical measure of the nutrient; child assessed before 3 years of age, and outcome measure not based on a clinical diagnosis or a standardised assessment of neurodevelopmental disorders. A hand-search was also conducted.

Results: Eighty-one papers were found in the initial search. Sixty-eight were excluded. A hand-search of the references yielded two papers. In total, fifteen studies were included in the review. The fifteen studies investigate the role of prenatal vitamin D (n=4), iron (n=3), folic acid (n=2), essential fatty acids (n=2), vitamin A (n=1), homocysteine (n=1), iodine (n=1), and choline, betaine, dimethylglyceine, methionine and

homocysteine (n=1). Neurodevelopmental outcome measures used include a diagnosis of schizophrenia, ADHD or ASD, or positive scores on the SDQ, CBCL or Yale Children's Inventory.

Conclusions: Thirteen (87%) of the studies report a positive association between the level of maternal prenatal nutrient(s) investigated and offspring neurodevelopment. This review suggests that there may be an association between prenatal nutritional status and neurodevelopmental disorders, particularly vitamin D, folate and iron, but further research is needed.

Key words: pregnancy, nutrition, neurodevelopment.

PO942

COMPARISON BETWEEN NUTRITIONAL STATUS, QUALITY OF LIFE, AMOUNT OF SLEEP AND FOOD INTAKE IN OLDER ADULTS OF SANTIAGO AND VIÑA DEL MAR, CHILE

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Background and objectives: To the 2010, the elderly population corresponds to over 2 million of people. The food, retirement, socioeconomic status, health status are factors that affect the quality of life of older adults.The aim of this study is to compare the nutritional status by sex, quality of life, amount of sleep and food intake in older adults of Santiago and Viña del Mar, Chile.

Methods: The older adults were assessed with the questionaries of quality of life of Pender, sleep survey, Epworth scale, food intake and anthropometry.

Results: The sample included 975 nondisabled participants (61.1% female) and the mean age was 71.9 ± 6.8 years. Women had higher body mass index (BMI) and height ($p < 0.001$) than men. With regard to quality of life, women have a better quality of life ($p < 0.001$), nutrition ($p < 0.001$), self-fulfillment ($p < 0.01$), exercise ($p < 0.001$), interpersonal support ($p < 0.01$) but higher stress ($p < 0.001$). There were no differences in the amount of sleep during the week and weekend between both groups, women had lower sleepiness measured by the Epworth Sleepiness Scale ($p < 0.05$). Finally, the men had a dietary deficiency of vitamin B2 and women were deficient in calcium, iron, zinc and vitamin B12.

Conclusions: Women have a better quality of life but poorer nutritional status and food intake.

Key words: elderly, quality of life, food intake, sleep.

PO943

IDENTIFY THE RISK FACTORS OF OVERWEIGHT ADOLESCENTS IN DHAKA CITY

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Background and objectives: Now-a–days over nutrition remains one of the major public health problems in the developing countries including Bangladesh. Adolescent overweight/obesity both during adolescence and adult life which include increased incidence of coronary artery diseases and hypertension, diabetes, obstructive sleep apnoea, esophageal reflux and gastric emptying disturbances, osteoarthritis and flat feet, psychological dysfunction, self esteem and social isolation, dyslipidaemia and overall increase in morbidity and mortality in later life. Therefore, it is important to identify the factors which are associated with being overweight. The aim of this study is to assess the risk factors of overweight among adolescents (10–19 years) in Dhaka city.

Methods: This case-control study was conducted at three Schools in Dhaka city of Bangladesh. Both adolescent boys and girls aged 10-19 years were selected for the study. Seventy-one overweight adolescent cases and 109 non-overweight controls were selected according to the classification of overweight by WHO.

Results: Overweight girls aged 10-12 years have taken 15% more energy than RDA. Overweight boys aged 12-15 years have taken 5% more energy than RDA, while overweight girls with same age group have taken 15% more energy than RDA. 15-19 years overweight girls have taken 21% more energy than energy. The study showed that overweight adolescents 6.41($p < 0.001$) times less likely to do the regular exercise compared to the normal adolescents. About 89% normal weight adolescents played outdoor games, while only 16.9% overweight adolescents played outdoor games.

Conclusions: The study showed that high energy intake was the risk factors, while regular exercise and outdoor games were the protective factors for the overweight among adolescents.

Key Words: nutritional status, energy, food pattern, physical activities, RDA.

PO944

IMPACT OF NUTRITION EDUCATION ON WEIGHT REDUCTION OF OVERWEIGHT AND OBESE ADOLESCENT GIRLS IN DHAKA CITY, BANGLADESH.

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Background and objectives: Adolescents overweight/obesity is associated with significant immediate and long-term health problem. It was hypothesized that appropriate nutrition education on overweight/obese adolescent girls can reduce energy intake; increase physical activities. The aim of this study is to reduce excess body weight of the overweight and obese adolescent girls by providing appropriate nutrition education.

Methods: It was a prospective longitudinal study with experimental (intervention) design. This study was conducted in seven schools in Dhaka city. A total of 122 female overweight and obese adolescents were studied in intervention and comparison group. The intervention group received intensive nutrition and health counseling for two months and the comparison group did not receive any intervention. Body mass index (BMI) is a simple index of weight-for-height which was used in classifying overweight and obesity. BMI for age was used to standardize the weight.

Results: After nutrition education, in the intervention group the body weight significantly decreased about 2.21 kg ($p < 0.001$) and in the comparison group the body weight significantly increased about 0.70 kg ($p < 0.001$). The body mass index (BMI) of the intervention group significantly decreased at the end of the study ($p < 0.001$). There was significant decreased in energy intake ($p < 0.001$) as well as decreased in food frequency in the intervention group after intervention period. In the intervention group physical exercise was significantly increased at the end of the study ($p < 0.001$). Nutrition education group significantly reduced the mean duration of computer game, face book using ($p < 0.001$) and watching of TV time ($p < 0.001$) compared to comparison group.

Conclusions: The nutrition intervention was highly effective on weight reduction of overweight/obese adolescent girls. This study finding showed that reduction in body weight, decrease BMI, low food consumption, change in food habits, increase physical activities of overweight/obese adolescent girls certainly possible by intensive nutrition education.

Key Words: nutritional status, BMI, food frequency, physical activities, RDA.

PO945

CLINICAL SIGNIFICANCE OF CHANGES IN ORGANS WEIGHT DUE TO THE RESISTANCE EXERCISE UNDER FASTING

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Background and objectives: In this study we have investigated the effect of exercise and nutrition on hypertrophy of skeletal muscle.

Methods: The animal used in the experimental were retired female mice. Exercise was carried out by tenotomy method. Groups were divided into four groups with five animals in each group. After the seventh day, groups of mice that ate a diet were fed for 6 days were bled and were sacrificed under anesthesia, Each plantaris muscle, the soleus muscle, the liver, spleen, kidney, and heart were removed; after that, each weight were measured by the electromagnetic scale. The no-food group began fasting the day after the start of resistance training. After five days, mice were sacrificed in a similar manner; the weight of the organs was measured in a similar manner.

Results: In this experiment, the following findings were revealed. Muscle weight increased by resistance training without the influence of the presence or absence of the meal. Hypertrophy rate was lower in plantaris muscle compared with the soleus muscle. When the meal has been ingested, resistance exercise has been found to affect the heart weight. Regardless of diet, exercise resistance is the average value; statistical difference was not observed. When resistance exercise was performed, the weight of kidney in diet group showed lower values compared to the no food group. Further, even if resistance exercise was not performed, the food group showed a statistically significantly lower value compared to the no food group. The weight of the spleen, regardless of the presence or absence of the resistance exercise, showed a low value without meals. The weight of liver was not observed the effect of the resistance exercise; we also would like to report on clinical significance of changes in organs weight due to the resistance exercise under fasting .

Key words: fasting, muscle hypertrophy, tenotomy, heart.

PO946

EFFECTS OF NUTRITION AND ENDURANCE EXERCISE ON THE DEVELOPMENT OF SKELETAL MUSCLE AND OTHER ORGAN WEIGHT

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Background and objectives: Increase of maximum oxygen uptake depends on the development of cardiorespiratory, an increase of the capillary, and development of the system by increasing mitochondrial aerobic metabolism. As basic research, we have investigated the effect of exercise and nutrition on the form and function of each organ and skeletal muscle for the mouse.

Methods: The animal used in the experiment is a retired male mice. Rotary motion device was used to endurance exercise in mice. Mice were divided into four groups: exercise + meal (A group), no exercise + meal (B group), exercise + no meal (C group), no exercise + no meal (D group). Soleus was collected and weighted on the electronic balance.

Results: As a result of the effects of meal and exercise on soleus muscle weight, the effect of the meal is strongly reflected. Difference is observed statistically compare the plantaris muscle weight of group A and group C, it is believed that the percentage difference is small, the effect of meal not greatly affected. In addition, the weight of the heart was found to be greatly affected by the diet; I'd consider future mechanism for maintaining the heart weight. Furthermore, as well as heart weight, dietary intake reflects greater kidney weight, the effect of the movement was not observed. It was found that the influence of the diet significantly reflects on the weight of the liver and pancreas. Brain weight was not statistically significant differente between all groups. This means that, after the exercise by fasting, skeletal muscle and organ weight is greatly reduced, the effect of the diet was strongly reflected. We would like to examine the effects of diet and exercise on the function of each organ and skeletal muscle compared blood components in each group .

Key words: muscle, exercise, fasting, organ tissue weight.

PO947

EFFECTS OF INTAKE OF ASPARTIC ACID MAGNESIUM (D-MG) ON THE PHYSICAL FITNESS AND BODY COMPOSITION OF HUMAN

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Background and objectives: Skeletal muscle atrophy is induced by the imbalance of minerals such as magnesium and calcium in skeletal muscle cells. Muscle atrophy was inhibited by intaking aspartic acid magnesium under inactive model of mouse. In this study, we have examined the effects of the intake of D-Mg on the physical fitness and body composition in female university students.

Methods: 18 women 21-22 years of age were enrolled in Jissen Women's University. Subjects were divided into three groups, each group was six and the D-Mg intake group, placebo intake group, and control group. Intake period is 91 days. And intake was (150 mg total) 3 tablets a day. Physical fitness and body composition were measured before and after ingestion of D-Mg. Furthermore, we investigated the (Ver.3.0) FFQg food intake frequency questionnaire (Ver.3.0). T-test was used to compare mean values between before and after ingestion. Critical ratio was less than 5%.

Results: A result of the investigation, magnesium intake was 302 mg in D-Mg intake group, 204 mg in placebo group and 171 mg in control group. There was a significant difference in the intake D-Mg group and the control group. In addition, positive correlation was found in Mg intake and the amount of change skeletal muscle before and after the study. Before and after the intake, the results of compared of the body composition in each group. Statistically significant increases were observed in skeletal muscle weight and amount of extracellular fluid. Weak positive correlation was observed between the grip and the rate of change of skeletal muscle mass in placebo group and in D-Mg group.

Conclusions: From these experimental results, D-Mg was found to increase the amount of skeletal muscle, it was not clear about the relationship between the muscle strength.

Key words: aspartic acid magnesium, skeletal muscle mass, university students, body composition.

PO948

SUPPLEMENTATION B VITAMINS IMPROVES COGNITIVE FUNCTION IN THE MIDDLE-AGED AND ELDERLY WITH HYPERHOMOCYSTEINEMIA

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Background and objectives: Recent observations showed that supplementation of B vitamins effectively lowers homocysteine levels in elderly persons with hyperhomocysteinemia But whether cognitive impairment can be improved simultaneously is still seldom studied. The aim of this study is to determine if folic acid, vitamin B6, vitamin B12 containing supplement improves cognitive function and lowers homocysteine in hyperhomocysteinemic middle aged and elderly patients.

Methods: A total of 662 volunteers from five communities and two homes for the elderly in Tianjin city, China, were recruited. 104 Eligible participants with hyperhomocysteinemia were screened and assigned to two groups according to matched age and basic BCAT scores. 57 persons were included in the intervention group (800 μg /day of folate, with 10 mg of vitamin B6 and 25 μg of vitamin B12), and 47 patients in the placebo group. The treatment period was 14 weeks. The cognitive function as evaluated by Basic Cognitive Aptitude Tests (BCAT). The serum total homocysteine concentrations were measured before and after intervention.

Results: After B vitamins supplementation, cognitive function improved in general and four cognition items scores (digit copy, Chinese character rotation, recall answer of mental arithmetic and recognition of meaningless figures as compared with those in control group ($p < 0.05$). Serum total homocysteine concentration was significantly decreased that in control group ($p < 0.05$). While serum concentrations of folate was significantly increased in the intervention group than those in control group ($p < 0.05$). No significant changes of above parameters were observed in control group before and after intervention.

Conclusions: The supplementation of folate, vitamin B6 and vitamin B12 in middle aged and elderly patients with hyperhomocysteinemia improves their cognitive function partly and reduces serum total homocysteine levels.

Key words: B vitamins, hyperhomocysteinemia, cognition, the middle-aged and elderly, homocysteine.

PO949

ANEMIA STATUS OF INFANTS 4-6 MONTHS OLD IN A RESOURCE-CONSTRAINED SETTING

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Background and objectives: It is often assumed that healthy full-term infants have adequate iron stores and hemoglobin that provides recyclable iron. Many infants <6 months in less-developed countries are iron-deficient. Yet, WHO/UNICEF recommends exclusive breastfeeding for the first 6 months while use of fortified complementary foods/vitamins-mineral supplements is only recommended after 6 months in breastfed children (PAHO/WHO, 2004). Iron supplementation in iron-deficient Honduran infants (4-6 months) showed an increase in hemoglobin (Domellof et al (2001). There is need to re-think the current supplementation programs targeting infants >6 months.The aim of this study is to determine anemia status among infants aged 4-6 months prior to a supplementation study.

Methods: Setting: Kenyan South Coast (INSTAPA Project). Hemoglobin (Hb) was measured in 219 infants (4.5-6 months old) using venipuncture blood samples (HemoCue Hb 301 System). Infants' anemia status was defined as Hb concentration <110 g/l (race-adjusted). Anemia status was further categorised as severe (Hb <70g/l), moderate (>70 - <90g/l), and mild (90 - <110g/l), respectively.

Results: Mean age was 5.64 months (SD 0.211). 79% of infants (n=173) were anemic. Overall, 82% (n=143) and 16% (n=29) had mild and moderate anemia, respectively. WHO/UNICEF recommendation on exclusive breastfeeding assumes that iron stores are adequate for the first 6 months. These findings concur with Domellof et al (2001) that showed Honduran infants <6 months were iron-deficient.

Conclusions: With 1:4 infants being anemic, the data strongly suggests a re-look at the iron status of children <6 months, so as to adjust existing guidelines on exclusive breastfeeding for the first six months. The high level of anemia begs the question whether caregivers are receiving correct contextual advice. 1 Dept. Food Science, Nutrition & Technology, University of Nairobi, Kenya 1E-mail contact: jnyathegi@yahoo.com.

PO950

DIETARY INTAKE AND NUTRITION KNOWLEDGE OF TURKISH NATIONAL FEMALE BOXING TEAM

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Background and objectives: A well planned diet is crucial for elite athletes and especially for female boxers who are known to try unhealthy methods of losing weight before the matches to compete in a lower weight category. This study aims to determine nutrition knowledge and dietary intake of national female boxing team.

Methods: The study conducted with 14 national female boxers in Turkey. Data collection was made by a 2 part questionnaire, that involves questions about nutrition knowledge in first part, and a 24 hour food consumption recall form in the second part. The top score participants can score in the first part was 125. Data were analyzed by SPSS program.

Results: The mean age of athletes was 26.4 ± 3.8 years, mean weight was 62.3 ± 11.1 kg, and mean BMI was 21.9 ± 2.7 kg/m^2. The mean score of nutrition knowledge was 112 ± 9.4. The mean amount of daily water consumption was 1635.7 ± 589 ml and most common drink besides water (64.3%) was tea (21.4%). 71.4% of the athletes did not use any dietary supplements, 14.3% of the athletes used creatine and glutamine and 14.3% of them used multivitamin daily. 50.0% of the athletes stated they consumed a hypocaloric diet and 35.7% stated they dehydrated themselves to weigh less before the matches. While athletes' daily diet compared to RDA values; energy, protein, vitamins A, D, E, K, B1, B2, B6, B12, calcium, phosphorus, iron and folate were lower than recommended. Niacin, vitamin C and dietary fiber met the recommendation.

Conclusions: Turkish national female boxers had an adequate nutrition knowledge but inadequte dietary intake. Dietary habits of the athletes should be observed closely and have them have a more adequate diet of energy, protein and essential vitamins and minerals.

Key Words: sports nutrition, boxing, female athlete, Turkey.

PO951

MICRONUTRIENT DEFICIENCY AMONG MONGOLIAN CHILDREN

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Background and objectives: The Fourth National Nutrition Survey aimed at evaluating impact of previous nutrition interventions and identifying next steps to improve maternal and child nutrition. One of the objectives of the survey was to assess the current micronutrient status of under five children.

Methods: In total, 400 households were randomly selected from each of 4 regions and capital city. Interviews, anthropometric measurements, clinical examinations and laboratory testing methods were used.

Results: Overall, 28.5% (95% CI 24.2-33.2) of children 2-59 months of age had anemia; 0.4% (95% CI 0.1-1.3) had severe anemia, 11.3% (95% CI 8.2-15.4) had moderate anemia, and 16.7% (95% CI 13.3-20.9) had mild anemia. Overall, 20.9% of anemic children and 21.6 of non-anemia children had iron deficiency. The prevalence of iron deficiency anemia in children under two years was 6.3%, which was 1.6 times more than the prevalence in 24-59 month old children (4.2%) (RR=1.6 [1.6-6.2], ¥ö2=5.8, ©£=0.01). The prevalence of rickets was 55.0% (95% CI 49.5-60.5) in the surveyed children under five years old. Serum level of 25-hydroxy-vitamin D (25[OH]D) was measured in 524 children aged 6-59 months; 21.8% (95% CI 16.4-28.4) had vitamin D deficiency, and 20.6% (95% CI 16.8-25.0) had low vitamin D reserve. 32.4% (95% CI 26.6-38.7) had any vitamin A deficiency defined by serum RBP level, with vitamin A deficiency had a moderate level of deficiency. Vitamin A deficiencies in children 6-23 months of age was 18.3 (95% CI 13.2-24.7) and in children aged 24-59 months 41.6 (95% CI 32.4-51.5).

Conclusions: Anemia is moderately prevalent among young children in Mongolia, especially it affects children under two years, persisting in high prevalence among these age group. The prevalence of vitamin D and vitamin A deficiencies children under five is high. Source of funding: The survey was funded by WHO, UNICEF and WV-Mongolia.

Key words: micronutrient deficiency, under five children, anemia, rickets, vitamin A deficiency.

PO952

INTRODUCTION OF SOLID FOODS TO INFANTS IN THE MALDIVES

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Background and objectives: For optimal health and development the WHO recommends exclusive breastfeeding until six months of age followed by the introduction of appropriate complementary foods while breastfeeding continues. The objective was to document the age and types of solid foods that are given to infants in the Maldives

Methods: A cohort of 458 mothers was recruited at the antenatal clinical at the two main maternity facilities on the main island of Male'. Written consent was obtained from mothers before the first interview. Mothers were interviewed 'face to face' at 36 weeks of gestation and again at 1, 3 and 6 months after birth. The questionnaires included demographic information about parents and infant feeding including, breastfeeding initiation and duration, introduction of different foods, and the Edinburgh Postnatal Depression Scale (EPDS). The questionnaires were translated into Dhivehi and pretested before use. Ethics approval was obtained from the National Research Committee of the Maldives and Curtin University Human Research Ethics Committee.

Results: The mean age at which solid foods were introduced to infants was 5.49 ± 0.74 months (95% CI). The most common types of first solid foods given to infants were fruits (41.6%) and cereals (30.0%). 7.0% of mothers have given yoghurt as the first food to their infants. The 'any breastfeeding' rates at 1, 3 and 6 months were 98.9 %, 95.4 %, and 90.7%. Full breastfeeding rates at 1, 3, and six months were 67.6%, 52.9%, and 29.7%. Exclusive breastfeeding rates at 1, 3 and 6 months were 26.9%, 17.3%, and 7.5%.

Conclusions: Many mothers in the Maldives introduced solid foods to their infants before six months. There is a need for more education for parents on appropriate nutritious complementary foods. .

Key words: solid food, breastfeeding, fruits, cereals, yoghurt.

PO953

APPROPRIATE FREQUENCY OF ANTENATAL VISITS AND SUPPORT FROM HUSBAND IS ASSOCIATED WITH BETTER COMPLIANCE WITH MATERNAL IRON SUPPLEMENTATION IN INDONESIA

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Background and objectives: The overall impact of large-scale maternal iron supplementation program has been limited and its effectiveness is questioned. Poor compliance of pregnant women with iron tablets consumption is one of major factors limiting the impact. This study aimed to identify factors associated with compliance of iron tablets during pregnancy in Indonesia.

Methods: The study used pooled data from the 2002/2003 and 2007 Indonesian Demographic and Health Surveys involving 16938 mothers who reported receiving or buying iron tablets during the most recent pregnancy in the last 5 years. The main outcome was compliance with taking the prescribed dose of minimally 90 iron tablets during pregnancy. Multivariate logistic regression was used to examine relationship between explanatory factors and compliance. Regression analysis was adjusted by the current age of the child from the recalled pregnancy to control for recall bias.

Results: In total, only one-third mothers consumed minimally 90 iron tablets as recommended. The odds of compliance was higher for mothers who: (a) were amongst the richest socioeconomic status (adjusted OR (aOR):1.81; 95% CI:1.57-2.08), (b) perceived no problem with access to health services (aOR:1.30; 95% CI:1.20-1.41), (c) received support from husband, i.e husband accompanied the ANC visits and had discussions with anyone on delivery-related issues (aOR:1.49; 95% CI:1.32-1.69), (d) had appropriate frequency of ANC visits (aOR:1.75; 95% CI:1.62-1.89). Mothers with their second pregnancy or more had less compliance than those with their first pregnancy (aOR:0.85; 95% CI:0.79-0.93). Except for the richest fifth quintile, household wealth quintile was not associated with compliance. Maternal education was also associated with compliance but this effect was completely explained by husband's support and appropriate frequency of ANC visits.

Conclusions: Appropriate frequency of ANC visits and support from husband increased the likelihood of pregnant women to comply with the iron tablets supplementation program.

Key words: compliance, maternal iron supplementation, Indonesia.

PO954

MILK AND DAIRY PRODUCTS: IMPLEMENTATION OF THE PROJECT APPROACH WITH SIX YEAR OLD CHILDREN

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Background and objectives: It is necessary to teach kindergarteners how milk and dairy products (MaDP) provide strong bones and healthy bodies. The kindergarten where children are spending time is an effective setting for learning nutrition and increasing preference for foods (1). The aim of this study is to strengthen awareness, knowledge and consumption of MaDP among six year old children with project approach.

Methods: This study is a project based intervention which presents a project based model implementation about MaDP. The study group was formed with (n=15) six years old children in kindergarten in Konya. With the aim of assessing project study, a hedonic scale prepared by researchers to determine MaDP consumptions with faces to represent "I like" , "just OK," and "I do not like", was applied to the children both at the beginning and end of the study. Moreover, children were asked to draw pictures related to their own knowledge and awareness. According to Helm and Katz (2001), getting started, developing and concluding of the project phases were practiced by classroom teacher.

Results: It was not only observed that the choices of children to consumption MaDP enjoying increased, there were also positive differences between the pictures children drew at the beginning and end of the projects. The teacher reported that children who participated the project gained effective experience through cooperating within the group.

Conclusions: This project was successful in encouraging children to provide a wealth of knowledge and developed positive tendency toward MaDP.

Key words: project approach, milk, dairy, kindergarten. 1. Plum, M. J. (1997) Nutrition Knowledge Assessment of Preschool Children. Virginia Polytechnic Institute and State University. Master of Science. Blacksburg, Virginia 2. Helm, J. H. & Katz, L. G. (2001). Young Investigators. The Project Approach in the Early Years. NewYork: Teacher College Press.

PO955

VISCERAL ADIPOSITY AND ITS RELATIONSHIP WITH ANTHROPOMETRIC AND BIOCHEMICAL PARAMETERS IN POST-PUBERTAL OBESE ADOLESCENTS

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Background and objectives: Visceral adipose-tissue accumulation is linked to insulin resistance, type 2 diabetes, hypertension and dyslipidemia in adults, besides being a determinant factor to increase nonalcoholic fatty liver disease (NAFLD) prevalence in obese adolescents. The aim of this study was to evaluate the relationship of visceral adiposity with anthropometric and biochemical parameters in post-pubertal obese adolescents.

Methods: Cross-sectional study with 73 post-pubertal obese adolescents: 24 boys and 49 girls. Body composition was measured by plethysmography using the BOD POD body composition system. Visceral and subcutaneous adiposity was analyzed by ultrasound. The biochemical evaluation comprised triglycerides, serum total cholesterol, LDL-cholesterol, HDL-cholesterol, plasma glucose and insulin. Insulin resistance was calculated by means of the homeostasis model assessment of insulin resistance (HOMA-IR). Participants were distributed into two groups according to visceral fat cut-off points (<3.78 cm and > 3.78 cm). A value > 3.78 cm for visceral fat indicates risk factor to develop NAFLD for Brazilian obese adolescents. After, correlation between variables of interest was assessed by using Pearson's according to gender.

Results: The prevalence of abnormal biochemical levels was high among adolescents. Hyperinsulinemia and insulin resistance were observed in 55 and 61% of adolescents, respectively. 40% of the adolescents presented risk factor to develop NAFLD. Adolescents with a value > 3.78 cm for visceral fat presented mean body mass index (BMI), abdominal circumference, triacylglycerol, insulin and HOMA-IR significantly higher than adolescents with <3.78 cm. For boys, the best correlation coefficient of visceral fat was found with the BMI ($r = 0.76$, $p < 0.001$), while for girls it was the insulin levels ($r = 0.49$, $p < 0.005$).

Conclusions: Visceral adiposity was significantly associated with BMI, abdominal circumference, triacylglycerol, insulin and HOMA-IR, demonstrating the clinical importance of visceral adipose tissue accumulation during adolescence.

Key words: visceral adipose tissue, obesity, adolescents.

PO956

INFLUENCE OF D-MG AND D-ZN INTAKE ON THE ATROGIN-1 GEAN EXPRESSION IN INACTIVITY MODEL OF MOUSE

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Background and objectives: Muscle atrophy results primarily from accelerated protein degradation and is associated with increased expression of two muscle specific ubiquitin ligases (atrogin1 and MuRF1). Recently, we demonstrated an aspartic acid-Mg(D-Mg) and an aspartic acid-Zn (D-Zn) intake inhibited muscle atrophy by tail suspension in mice. Then, we examined the atrogin1 in muscle inhibited muscle atrophy by D-Mg and D-Zn intake.

Methods: Mice were purchased from SLC Japan. They were individually housed in stainless steel cages in a temperature, humidity and light controlled room (24ºC, 60%, 12 light /dark cycle). All mice were fed the MF for 7days. The mice were divided into six groups consisting of given a control (water) group, suspension (water+suspension) group, the D-Mg drink (72 mg/l in water)group, the D-Mg+suspension group , the D-Zn drink (1.1 mg/l in water) and the D-Zn+suspension group. After the experiment, all mice were sacrificed by under anesthesia. Its skeletal muscle was collected and weighted on the Electronic balance and stored at 80ºC until analysis. We used miRNA easy Mini Kit, cDNA Archive kit, and real-time PCR of ABI 7000 Sequence Detector System to analyze changes in mRNA from skeletal muscle. Specific assays on demand for atrogin1 were from Applied Biosystems. While the soleus muscle weight decreased significantly in W group which was induced muscle atrophy as compared with W group which was not induced muscle atrophy, the soleus muscle weight in the D-Mg and D-Zn intake group which was induced muscle atrophy did not decrease. The D-Mg and D-Zn intake inhibited the atrophy of skeletal muscles by tail suspension like the former report. Atrogin-1 gene expression in soleus muscle was significantly reduced in the D-Mg and D-Zn intake group which was induced muscle atrophy as compared with W group which was induced muscle atrophy. These results suggested D-Mg and D-Zn intake inhibit protein degradation process in soleus muscle.

Key words: muscle atrophy, atrogin-1.

PO957

NUTRITIONAL STATUS OF CHILDREN AND ADOLESCENTS IN GUANGXI, 1989-2009

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Background and objectives: To understand the secular trends of growth and development among children and adolescents in Guangxi.

Methods: A multistage random cluster sampling method was used to draw the sample for the China Health and Nutrition Survey in Guangxi. A subsample of 2319 children and adolescents aged 2-18 years old was used in this study. Anthropometric data were measured with standard protocols. WHO/NCHS (2000) reference of Z scores was used to evaluate the children's nutrition status. Multivariate logistic regression models were used to examine the association between risk factors and malnutrition.

Results: Stunting decreased from 35.6% in 1989 to 7.5% in 2009 and underweight from 30.0% to 15.5% among children and adolescents during the same time period. Overweight and obesity doubled from 1.3% in 1989 to 2.7% in 2009 but still at very low level. Multivariate logistic regression showed that energy-protein deficiency was still the major risk factor of stunting and underweight, while excessive fat intake contributed to the increase in overweight and obesity.

Conclusions: Children and adolescents face the dual challenge of malnutrition and overnutrition in Guangxi. Malnutrition is still the major health concern among children but rapid increase in overweight and obesity should not be overlooked.

Key words: children and adolescents, stunting, underweight, overweight and obesity.

PO958

FEEDING PRACTICES AND ANTHROPOMETRIC STATUS IN CHILDREN (6 – 24 MONTHS) IN THE TOLON-KUMBUNGU DISTRICT OF NORTHERN GHANA

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Background and objectives: Sub-optimal breastfeeding practice during the first half year of life is an important risk factor for childhood morbidity and mortality that are compounded by inappropriate complementary feeding. This study

was aimed at assessing the relationship between child feeding practices and anthropometric status in the Northern Region of Ghana.

Methods: This cross sectional study targeted mothers with children 6 to 24 months old in the Tolon-Kumbungu district of Northern Ghana. Child feeding practices were assessed and anthropometric measurements of weights and heights/lengths of children taken with standardized equipment. WHO growth references were used to derive indicators for stunting (H/A), wasting (W/H) and underweight (W/A), respectively.

Results: All 240 children in the study were still being breastfed. However, 64.2% were put to breast within an hour after birth and only 48.3% were exclusive breastfed in the first six months of life. 91.7% were breastfed on demand but 25% ≥5 times a day. Only 79.2% were receiving complementary foods (CF). Of these, 28.4% and 37.9% were started before and after 6 months respectively. Additionally, 40.8% received CF ≥2 a day. Prevalence for underweight was 40.0%, stunting was 28.4%, whilst wasting was 16.8%. Children breastfed ≥5 times a day were more likely to be underweight, stunted or wasted. Those exclusively breastfed were less likely to be wasted. Children, who were not taking CF were significantly more than 4 times, 3 times and 8 times at risk of being underweight ($p = 0.006$), stunted ($p = 0.041$) or wasted ($p = 0.016$), respectively. Children who were timely given CF were less likely to be underweight or stunted.

Conclusions: Suboptimal breastfeeding practices in infants may be compounded by inappropriate complementary feeding in contributing to the poor nutritional status of children in Northern Ghana.

Key words: breastfeeding, complementary feeding, nutritional status, children.

PO960

CHARACTERISTICS OF BREAKFAST CONSUMPTION AMONG PRIMARY SCHOOL CHILDREN AT UNIVERSITY BASIC SCHOOL, LEGON, GHANA

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Background and objectives: Consumption of breakfast contributes to the total daily energy and nutrient intake of school age children and it is associated with improved academic performance. However, there is limited information on the breakfast habits of Ghanaian school children. The study objective was to assess the characteristics of breakfast consumption among primary school children at the University Basic School.

Methods: A questionnaire-based cross-sectional study design was used to study primary school pupils aged 8-11 years (n=180) at the University Basic School, Legon. Information was collected on the sociodemographic characteristics of the children. Additionally, the children were asked to recall all foods consumed for breakfast in the past three school days. The Chi Square statistic was used to assess sociodemographic differences between children who ate breakfast daily and those who ate breakfast less regularly.

Results: About 67.3% of the primary school children consumed breakfast daily. Factors associated with regular breakfast consumption among the children included being male ($p = 0.039$), and having a mother with salaried employment ($p = 0.013$). About 48.9% of the school children consumed cocoa beverages which were accompanied with milk, bread or egg. Foods eaten for breakfast contributed approximately one-fourth of the children's RDA for energy and more than one-third of their RDA for protein.

Conclusions: About one-third of the children did not consume breakfast. Among children who regularly consumed breakfast, it contributed significantly to their energy and nutrient intakes. Efforts to encourage regular consumption of breakfast may contribute to improved quality of diet among school-aged children in Ghana.

Key words: breakfast, school children, sociodemographic characteristics.

PO961

BIOCHEMICAL INDICES OF INFANTS FED LEGUME-CEREAL COMPLEMENTARY FOOD FORTIFIED WITH MANGO POWDER, FISH-BONE POWDER AND PALM OIL

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Background and objectives: There is a need to improve the micronutrient content of cereal:legume gruels recommended for use as complementary foods for infants in developing countries. This study investigated the biochemical indices of children aged 6-24 months fed a cereal-legume gruels fortified with fish bone powder (FBP), mango powder (MP) and palm oil (PO).

Methods: Four legume:cereal blends (70:30) made up of fermented maize and sorghum, roasted soybean, and dehulled cowpea were developed each providing 10% protein; maize-soybean, maize-cowpea, sorghum-soybean and sorghum-cowpea. These were fortified with PO, FBP, and MP and subjected to nutritional, microbiological and organoleptic evaluation. Fortified maize-soybean blend (with the best nutritive attributes), Nutrend (positive control) and unfortified maize-soybean blend (negative control) were fed to 24 children divided into

three groups of eight for 4 weeks. Food intakes were recorded and effects of the diets on biochemical parameters of the children were determined. Results obtained were compared with appropriate standards, using descriptive statistics.

Results: The protein, zinc and vitamin A contents (per 100 g edible portion) of the blends were well above the recommended values for complementary food, while calcium and iron were lower. The test diet elicited significant increases ($p < 0.05$) in the blood levels of zinc, β-carotene, vitamin A and hemoglobin at the end of feeding. For Nutrend the increase was significant ($p < 0.05$) only for vitamin A. There were no differences in the values obtained for the unfortified diet. Blood calcium levels decreased for all the diets ($p > 0.05$).

Conclusions: Fish bone was not effective in improving the calcium intake of the infants. Mango powder and palm oil improved zinc and vitamin A intakes. The inclusion of mango powder may have improved the availability of the iron present in the test diet.

Key words: mango/palm oil/ fish bone-fortified, complementary foods, legume:cereal blend, biochemical indices, infants.

PO962

ANTHROPOLOGY AND NUTRITION: EVALUATION OF THE NUTRITIONAL STATUS IN SEGOVIA´S CHILD POPULATION (3 TO 6 YEARS OLD)

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Background and objectives: In the last two decades, the prevalence of obesity among children has highly increased all over the world, even in developing countries. Biological, genetic, social and cultural influences affect in the origin and development of malnutrition (over and undernutrition). Therefore, the subject must be analyzed from a holistic perspective. Since food habits develop in early stages of life, research on early childhood makes possible the early detection of nutritional problems and also makes prevention easy. The aim of the present study is to assess the nutritional status in 3 to 6 year-old schoolchildren from Segovia (Spain) using standard anthropometric methods, as well as to find out their food and physical activity habits by the analysis of demographic, social, economic and behavioral variables.

Methods: This has been an observational, descriptive, analytical, transversal and retrospective study. The sample was made up of 144 children from a wide range of ethnic backgrounds with schooling in three different Public Schools in the town of Segovia during 2011-2012 academic year.

Results: Global prevalence of overnutrition was 17.4% (13.9% overweight and 3.5% obesity) and the prevalence of underweight was 8.3%. A higher prevalence of malnutrition was registered in female groups and there were no statistically significant differences ($p < 0.05$) between ethnic background and nutritional status, except for the 4 year-old group. Data reveal statistically significant differences ($p = 0.000$) between real nutritional status calculated by the Body Mass Index (BMI) and the nutritional status perceived by the parents.

Conclusions: In general terms, diet consumed by the sample studied was rich in proteins and fat, and low in carbohydrates, fruits and vegetables.

Key words: nutritional status, malnutrition, obesity, early childhood, standard anthropometric methods.

PO963

AGREEMENT AMONG DIFFERENT BMI CUT-OFFS PROPOSED FOR THE DIAGNOSIS OF OVERWEIGHT IN ELDERLY

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Background and objectives: There are different Body Mass Index (BMI) cutoffs for elderly in terms of changes in body composition. In elderly population attending public primary health care of the City of Buenos Aires, describe: - Nutritional Status by BMI. - Measure agreement among BMI cut-offs proposed by bibliography.

Methods: Descriptive. Transversal. Structured survey. Convenience sample over 60 yrs, both sexes, attendants to public primary care October 1-5, 2012. Variable: BMI (WHO 1998, and cut-offs proposed by Bray1988, NSI1993 and NHANESIII 2000). Data collection: Excel 2007. Statistical Analysis by SPSS 15.0. Inter-rater agreement by Kappa coefficient, p value < 0.05.

Results: n = 1144. Mean age= 69.95 ± 7.69 yrs. Male(M)= 30.2% / Female(F)= 69.8%. F= 70, 18 ± 7, 62 yrs, BMI= 29.68 ± 5.87 kg/m2. M= 69.40 ± 7.83 yrs. BMI= 28.63 ± 4.86 kg/m2.

Overweight (OW): F = 77% (WHO OW + obesity (OB); 41.4 % (NHANESIII), 50.3% (Bray1988), 63.5% (NSI1993). M = 78.5% (WHO OW + OB); 47.2% (NHANESIII), 43.2% (Bray), 60.6% (NSI). Slight- fair inter-rater agreement among WHO with the rest of cut-offs proposed ($p < 0.000$). The highest coefficient was with NSI (kappa 0.382, $p < 0.000$). Substantial inter-agreement between Bray, NSI and NHANES III (kappa 0.742, 0.703, respectively) and moderate between 0.576 ($p < 0.000$ in all cases). Dichotomise diagnosis (OW YES/NO): moderate agreement (WHO to Bray k = 0.426, to NSI k = 0.655, to NHANESIII k = 0.362, $p < 0.000$ in all cases). Among the latter three, agreement remained substantial.

Conclusions: It is fundamental considering the high prevalence of overweight by all the bibliographic references consulted in elderly population seeking public health care. It would be important to define adequate cutoffs to assess the nutritional status in this group of age.

Key words: elderly, BMI, overweight.

PO964

ANTHROPOMETRIC ASSESSMENT, RISK FACTORS AND PRESENCE OF CHRONIC DISEASES IN ELDERLY PEOPLE ATTENDING PUBLIC PRIMARY CARE .

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Background and objectives: Our city is characterized by an aging population similar to developed countries. Little information about nutritional status in this age group is available. The trend shows a high prevalence of chronic diseases risk factors such as overweight and a low level of physical activity. Objectives: In elderly population attending public primary health care of the City of Buenos Aires, describe: the nutritional status by anthropometric measurements, the presence of chronic diseases and physical activity.

Methods: Descriptive. Transversal. Structured survey. Convenience sample over 60 yrs, October 1-5, 2012. Variables: BMI, waist circumference (WC), chronic disease (CD): (hypertension (HTN), dyslipidemia (DL),diabetes (DBT)) by reference of the respondent; and physical activity (PA). Frequency counts and measures of central tendency. Confidence interval (CI) of 95%. Data collection: Excel 2007. Analysis: SPSS 15.0.

Results: n = 1144. Mean age= 69.95 ± 7.69 yrs. Male (M)= 30.2%, Female (F)= 69.8%. F= 70.18 ± 7, 62 yrs, BMI= 29.68 ± 5.87 kg/m2. M= 69. 40 ± 7.83 yrs. BMI= 28.63 ± 4.86 kg/m2. Overweight (OW): F = 77% (OW + obesity (OB)) M= 78.5% (OW + OB). WC: (M) 100.93 ± 14.97 cm. (CI = 99.33-102.53cm), 44.1% greatly increased cardiometabolic risk (WC>102). (F) 94.90 ± 14.54 cm (CI = 93.88 - 95.93 cm) 64.6% greatly increased cardiometabolic risk (WC >88). CD: HTA (M) = 70.4%, (F) = 66.8%. DL (M) = 42.6% (F) = 45.2%. DBT (M) = 33.6%, (F) = 25.3%. PA: M = 61.7%, F = 59.8%. Walking was the most frequent.

Conclusions: Consistent data with global trends. This should be considered to focus professional attention of attendants to primary level of public health care.

Key words: elderly, BMI, cardiometabolic risk, chronic diseases.

PO965

UNSKILLED WORKING MOTHERS ARE AT GREATER RISK FOR POOR CHILD PROTEIN INTAKE AND DIETARY DIVERSITY: AN INDONESIAN DHS 2002-2007 ANALYSIS

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Background and objectives: Urbanization and economic growth in low-middle income countries has led to an increase in working mothers. In Indonesia, 40% of these working mothers are typically involved in unskilled labor (eg. agricultural and informal workers). They may represent the group of care-takers most vulnerable to engage in poor feeding practices, due to their socioeconomic status and associated working conditions, such as less time for infant food preparation and limited capacity for childcare. In order to appropriately target intervention programs for child feeding, it is important to assess the role of income, education and associated factors on the ability of different types of working mothers to practice appropriate infant feeding.

Methods: This study used pooled data from the Indonesia Demographic Health Survey 2002 and 2007 involving 26803 children under two-years of age (U2). Dietary diversity was compared among non-working and working mothers based on classification of the mothers' occupation: unskilled, skilled labor and professional. Using non-working mothers as the reference group, and adjusting for socioeconomic, mother, partner, child, and dwelling characteristics, the adjusted odds ratio (aOR) was calculated for the association between occupation and dietary diversity practice.

Results: Unskilled labor mother were less likely to meet criteria for minimal dietary diversity (aOR 0.81 CI95% 0.72-0.94), especially in protein-rich animal-derived or dairy foods (aOR 0.79 CI95% 0.63-0.90), meat (aOR 0.86 CI95% 0.78-1.02) and plant protein such as legumes (aOR 0.75 CI95% 0.59-0.82). In contrast, staple foods, vegetables and fruits, were similarly provided by non-working and different types of working mothers.

Conclusions: Dietary diversity and feeding of protein-rich foods for U2 children were consistently poor in unskilled working mothers, and could lead to compromised child growth. Targeted policies and interventions are urgently needed, especially given the increasing number of this unskilled group of working mothers.

Key words: working mother, dietary diversity, Indonesia.

PO967

BREAST FEEDING, EXCEPT COMPLIMENTARY FEEDING IS NOT ASSOCIATED WITH STUNTING AT CHILDREN AGED 12-23 MONTHS OLD IN INDONESIA

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Background and objectives: Stunting among children under five year of age is highly prevalent (35.6% in 2010) in Indonesia. The nutritional status of the mother during pregnancy, the nature of food taken and the frequency and severity of illness during the first two years of life are the most important factors in stunting. The purpose of this analysis is to understand how the history of child feeding could explain stunting as an outcome.

Methods: This study is utilizing data from the National Basic Health Survey 'Riskesdas' 2010. This sample was restricted to children aged 12-23 months representative of the provinces throughout Indonesia where the information on the children's feeding habits are available.

Results: Results showed,that the prevalence of stunting among children aged of 12-23 months was very high, reaching 40.4%. Breast feeding initiation within one hour was participated by 48.1% of mothers. Exclusive breast feeding was only delivered to 19.7% babies. More than half of the babies were given pre-lacteal food or drinks, while early complimentary feeding (<6 months) was given to 68.5% babies. Logistic regression results showed children born with a low birth weight was 1.8 times more likely to be stunted; boys were 1.3 times more likely to be stunted. Time of complimentary feeding of less than six months seemed to have significantly protective effect. Finally, illness at age of 0-28 days has significant correlation to stunting.

Conclusions: These results send an alarming messages that feeding practices in infants are still discouraging and is compounded by indication that growth retardation has been started since fetal stage. Stunting is significantly correlated to the independent variables of low birth weight, gender, illnesses at age 0-28 days and age at given complimentary feeding in children age of 12-23 months.

Key words: stunting, breast feeding, birth weight, neonatal illness.

PO968

WAYS TO INTERVENE AND SUPPORT ENGAGEMENT OF OLDER ADULTS WEIGHT LOSS STUDY (WISE OWLS) ¨C MIXED METHODS PROJECT DEVELOPING AN INTERVENTION

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Background and objectives: Obesity in older people in the UK is rapidly becoming a major health concern. According to the Health Survey for England 2008, 33.1% of people aged 65 to 74 years who are not in residential care have a BMI > 30 kg/m2, of these 2.6% have a BMI >40k g/m2. In comparison in this age group only 0.7% are underweight (BMI<18.5 kg/m2).

Methods: This study conducted a rapid review of both the qualitative and quantitative literature on deliberate weight reduction in obese older adults, followed by in-depth one to one interviews. The purpose of the interviews was to ascertain older adults´ perceptions and experiences of weight manage-

ment over their life course. We also explore participants´ views around obesity and older age and whether they view weight change as necessary or possible at this stage of life. Following the first interviews and the review of the literature, the research team developed vignettes describing potential interventions which seemed most likely to be acceptable, feasible and effective. The participants´ views of these interventions were explored in a follow up interview.

Results: The emerging themes are: cultural hospitality, social roles, previous weight management experiences, personal motivators and barriers, social engagement, autonomy, and ability. In particular this group differs from the published literature in younger adults due to the accumulation of functional impairments and comorbid diseases. In addition their knowledge, life goals, attitudes to diet and physical activity differ from younger people.

Conclusions: The results suggest that successful weight loss is desirable, achievable and maintainable by those over 65, however that in order for this to happen it is essential that the participant feels a sense of ownership and control over the plan.

Key words: Obesity, weight loss, elderly, qualitative.

PO969

"AGRI-FRYING" THE CRITICAL PATHWAYS TO MATERNAL ANEMIA IN TANZANIA: BRINGING AGRICULTURE INTO THE CONCEPTUAL FRAMEWORK

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Background and objectives: Maternal anemia remains a significant public health problem in Tanzania with 15% of maternal deaths attributable to anemia. Prevalence is forty percent among women 15-49 years and 53% among pregnant women (TDHS 2010). Only 35% of women consume iron-rich foods, 4% take the minimum 90+ IFA tablets, and 27% take 2 doses of SP for preventing malaria. Maternal anemia also diminishes women's physical ability to engage in agricultural labor, reducing agricultural productivity, agricultural revenue and food security. The critical pathways to maternal anemia have long offered a conceptual framework for prioritizing evidence-based health sector interventions to address this public health problem. Our objective was to expand this framework to engage the agriculture sector in addressing maternal anemia as a public health problem and as an agro-economy problem.

Results: The resulting framework, which considered current Feed The Future program interventions in the country, helps the agriculture and health sectors to identify their respective roles in the control of maternal anemia and areas for strategic collaboration. The agriculture sector pathways lead to interventions supporting increased iron intake, for example through promotion of low-input technologies for growing, raising and processing and preserving iron-rich foods including animal source foods. In addition, agriculture extension can promote practices that reduce anemia by reducing exposure to schistosomiasis, malaria and intestinal worms. The Ag-Nu-Health Critical Pathways framework can be adjusted by country to address specific situations around malaria incidence, antenatal care programs and agriculture program activities. The framework was adapted for simple, user-friendly formats, including a wall poster or desktop reminder tool, for programmers and policy makers in the health and agriculture sectors to think and act using a multisectoral approach.

Key words: Anemia, multisectoral approach, agriculture, nutrition, health.

PO970

HIGH-IMPACT HOUSEHOLD ACTIONS TO PREVENT CHILD MALNUTRITION THROUGH AGRICULTURE PROGRAMS

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Background and objectives: Recent emphasis on nutrition-sensitive development has drawn attention to agriculture as a channel for nutrition improvement. Clear guidance for how to operationalize "agriculture-nutrition linkages", especially to improve maternal and child nutrition, is lacking. Our objective was to develop a more user-friendly framework to focus agriculture interventions to improve maternal and child nutrition through household level actions that increase access to diverse and quality foods.

Methods: A situation review was conducted to analyze ideal behaviors, current behaviors, and barriers and motivators to behavior change. The process involved reviewing agriculture, nutrition and socio-cultural research and best practices in agriculture, health and nutrition programs in three countries implementing Feed the Future programming (Bangladesh, Guatemala and Tanzania).

Results: Through this process, five categories of household agriculture-nutrition actions were identified to increase access to diverse and quality foods for mothers and children: 1. DISCUSS AND DECIDE TOGETHER: Communication strategies to promote dialogue and joint decision making between couples; 2. EARN AND BUY: Interventions to increase women's access to and control of household income, and influence

women's and men's buying practices towards the purchase of nutritious foods for their families; 3. RAISE AND GROW: Appropriate technologies and approaches to help families grow diverse nutritious crops and raise animal-source protein foods; 4. PREPARE-PROCESS AND STORE: Appropriate technologies and approaches for nutritious and safe preparation, processing and storage of food and; 5. REST AND EAT: Communication strategies and labor-saving technologies to enable women more time to rest, breastfeed, and to improve intra-household food distribution. The framework pivots around pro-nutrition social change in gender norms and family dynamics.

Conclusions: Critical action identified under each category can be assessed and tailored for the local socio-cultural context and will enable practitioners to integrate nutrition into the full spectrum of ongoing agricultural activities of farming families and households.

Key words: nutrition-sensitive development, agriculture, behavior change.

PO971

UNDERWEIGHT IS A RISK FACTOR FOR IRON DEPLETION AND IRON-DEFICIENT ERYTHROPOIESIS AMONG INDONESIAN YOUNG WOMEN

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Background and objectives: Underweight and iron deficiency among women are very prevalent in many developing countries, including Indonesia, but it is unclear whether underweight is associated with some parameters of iron deficiency. This research was conducted to investigate the association between weight status, as measured by body mass index (BMI), and iron deficiency, among the young women. Method: A cross sectional study was conducted at 9 subdistricts, 80 apparently healthy young women (age 15-26 years) were randomly selected from premarital list. Body weight and stature were measured, BMI was calculated and compare to with age-specific BMI reference values for adolescent subjects (age 15-20 years). Underweight was defined as a BMI less than 5th percentile. Venous blood sample were collected and analyzed for Hb, serum ferritin and soluble transferrin receptor (sTfR). Iron depleted is stated if serum ferritin concentration less than 12 μg/l, iron deficiency erythropoiesis (IDE) when concentration of sTfR more than 4.4 mg/l. Result: Of the 80 subjects, 23.8% were underweight. Anemia among underweight subjects is 47.4% compare to who were normal and overweight subjects (29.5%). Iron depleted (16.7%) and IDE (37.5%) among underweight are higher than who were not underweight (5.3%) and (13.2%), respectively. Subject who were underweight was approximately three times to be iron depleted (OR: 3.167; 95% CI: 0.7-14.335), and to be IDE (OR: 2.839; 95% CI: 1.113- 7.241) as were those were not underweight.

Conclusions: Iron deficiency is more prevalent among underweight young women and risk for iron deficiency approximately three times compare to who were those not underweight.

Key words: anemia, iron deficiency, iron depleted, iron deficient erythropoiesis.

PO972

EXERCISE-BASED INTERVENTION TO PREVENT EXCESSIVE GESTATIONAL WEIGHT GAIN: A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: We aimed to examine the effect of moderate-intensity exercise-based intervention performed from the 9th week of pregnancy on maternal weight gain. Methods. A total of 962 healthy gravidae were randomly assigned to either a standard care or exercise intervention group. The intervention included moderate-intensity aerobic and resistance exercises performed 3 times per week (50-55 minutes per session). Women were categorized according to their pre-pregnancy body mass index (BMI) into normal-weight (n=687) and overweight/obese (n=275) groups. Excessive gestational weight gain was calculated on the basis of the 2009 IOM recommendations. Gestational body weight gain was calculated on the basis of the pregravid weight and weight at the last clinic visit before delivery.

Results: Women in the intervention group gained less weight (adjusted mean difference 1.039 kg, 95%CI: 0.534-1.545, P = 0.00001) and were less likely to gain weight above the IOM recommendations (OR: 0.625, 95%CI: 0.461-0.847, P = 0.002) than women who received standard care. Main treatment effects by BMI category revealed that normal-weight women in the intervention group gained less weight (adjusted mean diffe-

rence 1.393 kg, 95%CI: 0.813-1.972, P = 0.00003) and were less likely to gain weight above the IOM recommendations (OR: 0.508, 95%CI: 0.334-0.774, P = 0.002) than normal-weight women who received standard care. No significant effect was observed in overweight/obese women, yet normal-weight women were less likely to gain weight above the IOM than overweight/obese women (OR: 0.247, 95%CI: 0.145-0.422, P < 0.000001).

Conclusions: Exercise of moderate-intensity performed over the second-third trimesters of pregnancy can be used to prevent excessive gestational weight gain in normal-weight women.

PO974

THE STATUS OF THIAMINE, RIBOFLAVIN AND NIACIN IN CHILDREN AGED 0~3 YEARS OLD IN URBAN AND RURAL AREAS CHINA

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Background and objectives: Vitamins, such as thiamine (B1), riboflavin (B2) and niacin, are important to children growth and development. The study aimed to investigate the current status of B1, B2 and niacin in urban and rural infants in Shandong province.

Methods: 106 urban and 290 rural Children, aged 0~3 years old, were randomly recruited from a city and a rural area in Shandong province. Urinary sample (40 ml) was collected from each one, which was adjusted to pH 4~5 with concentrated hydrochloric acid immediately. The concentration of thiamine, riboflavin and niacin in the urine was detected by fluorescence methods.

Results: The percentages of B1, B2 and niacin insufficiencies in urban infants were 1.9%, 8.0% and 9.1%, respectively, lower than those of 4.5%, 56.7% and 27.1% in rural infants. The median concentrations of vitamin B1 in urban and rural infants were 495.0 μg/g creatinine (Cr) and 420.6 μg/g Cr respectively, and levels of thiamine in urban children aged 12~ month and 24~ month in urban site were higher than those in rural area ($p < 0.05$). The level of vitamin B2 was 303.1 μg/g Cr in urban infants, higher than 70.9 μg/g Cr in rural infants in each age group ($p < 0.05$). The mean levels of nicotinic acid in urban and rural infants were 6.31 μg/g Cr and 4.22 μg/g Cr, and the nicotinic levels in children aged 6~month, 12~month, 18~month and 24~month groups in urban infants were higher than those in rural infants ($p < 0.05$).

Conclusions: There was a higher percentage of riboflavin and niacin insufficiency in rural infants. Thus, this finding should be pay attention and supplementation of these vitamins should be considered in infants, especially in rural infants. Granted by Ministry of Science and Technology, PR.China (2008BAI58B07) and DSM Fund (201208).

Key words: infants; riboflavin, thiamine; niacin; rural area.

PO975

OBESITY AND VITAMIN D INSUFFICIENCY COEXIST AMONG CHILDREN LIVING IN A MULTIETHNIC SUN-RICH COUNTRY

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Background and objectives: Malaysia, a fast developing country close to the equator, has been known to bear the dual burden of malnutrition. However, nationwide data on complete nutritional status of Malaysian children are scarce, especially in relation to blood biochemical analyses of vitamin status.

Methods: The Nutrition Survey of Malaysian Children was carried out with the aim of assessing the nutritional status in a sample of nationally-representative population children aged 6 months to 12 years. This survey is part of SEANUTS, a multi-centric study carried out among 16000 aged 0.5 to 12 years in four countries in South East Asia. In Malaysia, a total of 3542 children were recruited using stratified random sampling method, representing close to 6 million children. Measurements included body weight, height, and serum 25(OH) D concentration.

Results: Prevalence of overweight and obesity was 21.6%; which was four times higher than thinness (5.4%) and 2.5 times higher than stunting (8.4%). Nearly half the children had vitamin D insufficiency (47.5%). The presence of high prevalence of vitamin D insufficiency is linked to inadequate intake of vitamin D and lack of sun exposure.

Conclusions: These findings reveal that obesity and vitamin D insufficiency does indeed coexist among the multiethnic children of Malaysia. This implies that strategies need to tackle both sides of malnutrition and emphasise approaches for preventing overweight and obesity as well as vitamin D insufficiency.

Key words: childhood malnutrition, obesity, vitamin D insufficiency.

PO976

DIETARY CALCIUM AND PHOSPHATE INTAKE IN THE AETIOLOGY OF RICKETS IN BANGLADESH

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Background and objectives: To determine if low dietary calcium and phosphate intakes are involved in the aetiology of rickets in Chakaria, rural Bangladesh, where rickets is a major and relatively recent problem.

Methods: Newly diagnosed cases of active rickets (AR), with Thacher Score >1.5 with no other known disease, cases with bone deformities but not active rickets (BDNAR), and community controls individually matched as closely as possible for age, sex and village were studied. 24-hour weighed dietary records of all foods eaten were collected in the childrens´ homes, and coded using an HNR in-house programme and composition tables. Data were analyzed by paired t-tests.

Results: 24 AR (12M, 12F), 38 BDNAR (28M, 10F) and controls were studied. Median (range) age was 2.7 (1.3-5.9), 3.2 (1.2-5.7), 3.0 (1.0-10.0), and 3.2 (1.7-10.6) years in AR, AR-controls, BDNAR and BDNAR-controls respectively. All children were stunted and wasted. Mean±SD weight-for-age (WAZ) and height-for-age Z-scores (HAZ) (WHO 2010 Growth Standards) for AR and AR-controls were 2.9±1.1 vs -2.1±1.1($p = 0.006$), and -4.2±1.5 vs -1.9±1.2 ($p < 0.0001$). BDNAR were shorter than BDNAR-controls (HAZ: -2.7±1.8 vs -1.7±1.4, $p = 0.003$). Mean±SD calcium intakes (mg/day) were substantially lower than UK, WHO/FAO and Indian recommendations in all groups, particularly in AR. Intakes were 156±80 vs 323±249 in AR vs AR-controls ($p = 0.005$), 239±166 vs 254±221 in BDNAR vs BDNAR-controls ($p = 0.73$), and AR vs BDNAR ($p = 0.03$). Phosphorus intakes (mg/day) in AR were lower than AR-controls (321±112 vs 424±155, $p = 0.009$). Ca:P ratio (mmol/mmol) was lower in AR than AR-controls (0.58 vs 0.77, $p = 0.07$).

Conclusions: Calcium and phosphorus intakes were low in all of the study children. The extremely low calcium intakes in AR children, 50% of those of controls, suggest a possible role in the aetiology of their rickets.

Acknowledgements: UK Medical Research Council U105960371 Key words Bangladesh, calcium intake, rickets.

PO977

NUTRITIONAL STUDY OF DIET AND BODY COMPOSITION IN FUTSAL PLAYERS

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Background and objectives: Futsal (FS), also known as indoor soccer, is an intermittent high-intensity strenuous team sport played worldwide. Despite its popularity and professional competitive status there are only few scientific studies describing the physiological demands and nutritional needs of the game. The purpose of this study was to analyze body composition, spontaneous eating habits and nutritional aspects of professional futsal players.

Methods: 12 professional, male futsal players with following characteristics: (mean± SD) age 30 years (±2.69), height 179 cm (±5) and weight 78 kg (±7.32) agreed to participate in this study. Each player completed a 3-day dietary record. Energy, macronutrient and micronutrient intakes were determined using PCN-pro Program. Body composition parameters were assessed with DXA (Lunar i DXA, GE Healthcare) in order to establish the athletes profiles and their specific needs.

Results: Participants were divided into two groups whether they reached recommended intakes Burke et al (2007), (REC group) or not (NO-REC group). Total energy intake (TEI) was low (2520±440.95 kcal/day) compared to total energy expenditure (TTE): 3779±245.19 Kcal/day (33% REC; 66% NO-REC). Surprisingly none of the players meet the carbohydrate intake, accounting 39.93% of TEI (0% REC; 100% NO-REC). Protein intake was meet by less than half of the players (42% REC; 58% NO-REC) accounting 17.43% of TEI. Lipids intake accounted 40.28% of TEI, exceeds the recommended 30%.(8% REC; 92% NO-REC).Cholesterol intake exceeded the recommended also; only 1 player followed the REC<300 mg. None of the players achieved 25 g/day of fibre (100% NO-REC). Vitamin D requirements were meet by a small percentage as well (8% REC; 92% NO-REC).

Conclusions: Surprisingly most of the players did not meet energy, macronutrient neither micronutrient recommended intakes. Nutritional counselling is needed in order to correct the observed deficits guarantying recovery, performance and injury prevention.

Key words: nutrition, diet, physical activity, body composition, futsal.

PO978

EARLY CHILDHOOD PROGRAMS AND ATTAINING DEVELOPMENTAL POTENTIAL

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Background and objectives: The objective of the analysis was to explore the potential for early childhood programs to minimize the developmental gap for children from diverse socioeconomic backgrounds. This paper explores the potential benefits of attending private, public, any, or no early childhood program to growth and cognitive, socio-emotional and psychomotor skill development among children ages 0-5 in Chile. We also consider how the quality of the home environment, child age, and maternal education affect these associations.

Methods: This study uses cross-sectional data from the first wave of the Chilean Encuesta Longitudinal de la Primera Infancia (ELPI). We used multivariate linear regression to estimate the associaiton between attending an early childhood program and growth, cognitive, socio-emotional and psychomotor skill development, controlling for child health and background characteristics and assessing interactions.

Results: Children that attended any early childhood program performed slightly better than children that did not attend an early childhood program on a test of verbal intelligence. These children also showed fewer behavioral problems and improved psycho-motor development with significant interactions by program participation, home environment, maternal education, and child age. Children that attended a private early childhood program performed better than children that attended a public early childhood program on a test of verbal intelligence with interaction by home environment.

Conclusions: Early childhood programs have the potential to minimize the gap in cognitive, psycho-motor and socio-emotional development among children from various socioeconomic backgrounds. The potential for impact varies by child age, maternal education and the home environment in some situations.

PO979

EFFECTS OF DIETARY LIFESTYLE EDUCATION PROGRAM FOR ADOLESCENTS IN MIDDLE SCHOOLS: STUDY DESIGN OF A CLUSTER RANDOMIZED CONTROLLED TRIAL

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Background and objectives: We developed a food frequency questionnaire (FFQW82, Adachi et al, 2008; Watanabe, et al, 2008), and reported the effects of the classroom dietary education (DLE) based on a cluster randomized controlled trial (Yamaoka, et al, 2010). The aim of the study is to evaluate the effect of the revised version of the DLE program for adolescents based on a cluster randomized trial (CRT) in middle schools. This study explores the design of a two-arm CRT on the effectiveness of the DLE based on the preliminary survey results.

Methods: The preliminary survey was conducted in 2012 for the students of junior high schools aged 12-13 in Kumamoto Prefecture, Japan. The items used for the preliminary survey were self-rated health status, lifestyle, exercise, food intakes, BMI, etc..

Results: In total, 1182 adolescents responded the survey and analyzed the association of lifestyle characteristics on BMI and health status. Especially, indefinite complaints significantly ($p < 0.05$) related to intake of breakfast. Based on the observations, the study protocol including sample size (10 clusters in total; assumptions: 120 for each cluster, power=80%, significance level=5%, effect size=0.3, ICC=0.02) and education programs were determined. The hypothesis underlying the study is that adolescents in the DLE group might improve indefinite complaints from baseline after 6-month education compared to the control group. Effects of the intervention are expected to be measured after 6 months using a self-administered questionnaire. The primary endpoint is a change from baseline of a number of indefinite complaints. Energy and nutrients intakes by meal assessed using the FFQW82 as well as body mass index

are the secondary endpoints. Outcomes are examined using a mixed model by adjusting for baseline values and other factors.

Conclusions: The proposed study will provide practical information about the usefulness of the DLE program in school education settings.

PO980

POSITIVE UNINTENDED CONSEQUENCES IN PROGRAMS FOR WOMEN'S AND CHILD NUTRITION IN BANGLADESH: SCALING UP TIPPY-TAPS

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Background and objectives: Bangladesh has made notable progress in reducing child mortality and morbidity. However, high rates of undernutrition remain, with 41% of children <5 stunted (2011 BDHS).

Methods: In 2012, USAID's SPRING project collaborated with Bangladesh's Food Security and Nutrition Surveillance Program conducting a baseline survey of nutrition, hygiene and agricultural practices among 770 households in SPRING's intervention areas. Respondents were asked about use of soap in handwashing over the last 24 hours and unprompted responses on reasons they washed their hands.

Results: Though up to 60% of households reported hearing messages on appropriate handwashing only 12% and 40% washed their hands with soap before feeding children and after defecation, respectively. Therefore, SPRING refined its interventions targeting pregnant and lactating women, and children under two to increase positive nutrition and hygiene practices and access to diversified diet. Through advocacy, training and supportive supervision with government and non-governmental groups, SPRING promotes adoption of 'small-doable-actions' on nutrition and hygiene following life cycle approach and has provided training to 1839 health workers and 485 agriculture and community workers. SPRING established 783 Farmer Field Schools (FFS) providing low income households with access to diversified and nutritious vegetables, fruits and animal source foods. Household 'tippy-taps' were introduced to improve adoption of hygiene practices in target households. SPRING is the first project to scale up tippy-taps to rural Bangladesh. Seventy percent of trained agriculture workers report including nutrition and hygiene with making of tippy-taps in agriculture extension sessions and approximately 6000 households participating in FFS have installed tippy-taps to date. This successful and rapid adoption of practices is attributed to streamlined and practical messages given across multiple platforms.

Conclusions: Integrating tippy-taps into nutrition, hygiene and homestead food production seems a promising strategy to improve handwashing behaviors.

Key words: nutrition, hygiene, tippy-taps, agriculture, Bangladesh.

PO981

THE EFFECT OF DOWNHILL WALKING ON MUSCLE DAMAGE AND GLUCOSE METABOLISM ON THE NEXT DAY

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Background and objectives: It has been reported in animal studies, that downhill running exercise causes delayed-onset muscle damage and decreases glucose uptake into muscle compared with uphill. However, the effect of downhill walking exercise, which is a major daily physical activity for people, on glucose metabolism is not clear. Therefore, we investigated the effect of downhill walking on muscle damage and glucose metabolism on the next day of the walking in young people.

Methods: Eight healthy young men and women (age, 24.6 ± 1.6 yr) participated in this study. All subjects performed three trials (control, uphill, and downhill) in random order. In the exercise trials, uphill (+ 5°C) or downhill (- 5°) treadmill walking was carried out at a speed of 6 km/h for 30 min. On the next day, the subjects consumed glucose solution containing 75 g glucose, and we conducted analysis of respiratory metabolic performance, blood collection, and evaluation of muscle soreness.

Results: Score of muscle soreness was significantly higher in downhill (5.8 ± 1.5 score) than in uphill (0.6 ± 0.2 score) ($p = 0.014$). Plasma creatine kinase was not changed by exercise. Respiratory quotient and carbohydrate oxidation did not differ between the trials. Fasting blood glucose level was significantly low in uphill (69.1 ± 3.9 mg/dl) compared with control (80.9 ± 3.9 mg/dl) ($p = 0.045$), although this decrease was not found in downhill (75.1 ± 3.4 mg/dl). Blood glucose levels at 30 min and 60 min after glucose intake were not different between the trials.

Conclusions: Decrease of fasting blood glucose level was found on the next day of uphill walking but not downhill, suggesting that glucose uptake induced by exercise is lower in downhill than in uphill.

Key words: downhill walking, muscle damage, glucose metabolism.

PO982

MATERNAL CALCIUM SUPPLEMENTATION DURING PREGNANCY AND BLOOD PRESSURE IN RURAL GAMBIAN CHILDREN AT 3 AND 9 YEARS OLD

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Background and objectives: Reductions in population blood pressure (BP) of 2-3 mmHg decrease morbidity. Higher calcium intakes during pregnancy have been associated with lower offspring BP. More consistent effects have been reported in older children, and greater effects at higher BMI. There are no data from populations with a low dietary calcium intake e.g. The Gambia (~350 mgCa/day in adults).

Methods: Children whose mothers had participated in a randomised placebo-controlled trial (ISRCTN96502494; 1500 mgCa/day from 20 wk gestation until delivery, 525 mother-infant pairs) had height, weight, systolic (SBP) and diastolic BP (DBP) measured at 3.0±0.05 y (n=485, 48% males) and at 9.0±0.2 y (n=462, 48% males). Follow-up of all offspring was attempted. BP (DINAMAP 8100) was measured under standardised conditions. Investigators remained blinded to supplement group allocation.

Results: Data were analyzed by regression. At 3 y, mean±SD in the calcium vs placebo group was: SBP, 89.9±10.1 vs 91.8±9.7 mmHg; DBP, 54.1±8.7 vs 53.7±8.7 mmHg (p = 0.6); BMI 15.5±1.6 vs 15.6±1.4 kg/m2 (p = 0.4). Weight, height and BMI did not predict BP. SBP was 2.1±1.0 % lower (mean±SE; p = 0.03) in the calcium group; there was no interaction with BMI. Corresponding values at 9 y were: SBP, 101.1±9.2 vs 101.8±8.7 mmHg (p = 0.3); DBP, 60.6±7.3 vs 62.1±7.2 mmHg; BMI, 14.6±1.6 vs 14.6±1.4 kg/m2 (p = 0.8). Weight and BMI predicted BP independently of height (p = 0.0002 and 0.01). DBP was 2.5±1.1% lower (p = 0.02) in the calcium group. There was no interaction with BMI or weight.

Conclusions: Maternal calcium supplementation did not affect offspring height, weight or BMI at ages 3 or 9 y. There were small but significant effects on SBP and DBP, which at a population level are biologically meaningful. Follow-up studies in this cohort are ongoing during and after puberty.

Acknowledgements: Supported by UK MRC programmes U105960371 and U123261351

Key words: maternal calcium supplementation, children, blood pressure, Gambia.

PO983

CALCIUM INTAKE, MAJOR DIETARY SOURCES AND ITS ASSOCIATION WITH SOCIO-ECONOMIC STATUS IN PRIMARY SCHOOL CHILDREN IN TEHRAN

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Background and objectives: Calcium is the most limiting nutrients in the Iranian household diet. Sufficient calcium intake is crucial to support growth spurt during preteen and teenage years. This study aimed to assess daily calcium intake, its major dietary sources and the association with socioeconomic status (SES) in primary school children in the city of Tehran. Materials and

Methods: In a cross-sectional study, 501 students (244 girls and 257 boys) from grades 4 and 5 of elementary schools were selected through systematic random sampling from all districts of the city of Tehran. Demographics and SES was assessed using a questionnaire through face-to-face interviews. Ca intake was assessed using a validated 60-item semi-quantitative food frequency questionnaire, specifically designed for dietary sources of Ca. One way-ANOVA test was used to compare within-group total calcium intake in each gender and in total participants, followed by post hoc Tukey HSD test. Findings: Mean calcium intake of the children was 917.5±440.8 mg/day (girls: 901.2±447.7 mg/day; boys: 932.8±434.4 mg/day). While only 17.8% met the daily recommended intake of Ca (≥1300mg/day), the intake in 59.9% was below 75% of RDA. Main contributors of Ca in the children's diet were milk and dairy products (69.3% of total calcium intake). Only 29.8% met the food-based dietary guidelines for dairy intake (≥3 serving/day). No significant difference was observed between boys and

girls in the intake of calcium and dairy products; however, calcium intake of girls in the middle SES district was significantly lower than boys in the same district (780.3 ±44.3mg/day vs. 964.5± 48.5mg/day; p<0.05) and girls in both low and high SES districts. No significant association was found between Calcium intake of children and other socioeconomic variables.

Conclusion: Planning useful nutrition strategies for overcoming this problem seems inevitable.

Key words: Calcium Intake, Primary School children, Tehran

PO984

ANTHROPOMETRIC INDICATORS ARE ASSOCIATED WITH NONVERBAL IQ IN SOUTH EAST ASIAN SCHOOL-AGED CHILDREN

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Background and objectives:: Malnutrition during school-age years can adversely impact physical and cognitive development of children, possibly compromising the economic development, health and survival of future generations. Yet, school-aged children are often not included in nutrition surveillances. The SEANUTS was planned with the overarching aim of providing comprehensive nutrition information for children ages 0.5-12 y in four of the South East Asian countries: Indonesia, Malaysia, Thailand and Vietnam. This presentation aimed to evaluate the association between anthropometric indicators and nonverbal IQ in school aged children of the SEANUTS.

Methods: Of the 8158 school-aged children (>6 y), information relevant for this study was available for 6746 children and hence, were included in this analysis. Height-for-age (HAZ), weight-for-age (WAZ) and body mass index-for-age (BAZ) z-scores were used as anthropometric nutritional status indices. Nonverbal IQ was measured using Raven's progressive matrices (Malaysia, Indonesia and Vietnam) or TONI-3 (Thailand). Odds ratios (OR) were calculated using binary logistic regression after correcting for confounders (age, gender, urban/rural, educational level of the mother, and country). Data were weighted using age, gender and urban/rural weight factors to resemble the total primary school-aged population per country.

Results: Malnutrition is clearly an issue in this region with an underweight and stunting prevalence of 21% and 19%, respectively. The odds of having below average or poor nonverbal IQ (<89) was 2 times or more with low WAZ, BAZ and HAZ. Severe obesity (BAZ > +3SD) also increased the odds of having nonverbal IQ <89.

Conclusions: Both spectrum of malnutrition are associated with nonverbal IQ in 6-12 y children, highlighting the need for targeted programs in this age group. Effective nutrition strategies in school-aged children can have a pronounced effect on cognition and potentially, in long term, contribute positively to individual and national development.

Key words: SEANUTS, school-aged children, anthropometry, nonverbal IQ.

PO985

MODIFIED MILK WITH THE ADDITION OF SUNFLOWER OIL, SELENIUM AND VITAMIN E IN THE DIET OF COWS INFLUENCING THE HEALTH OF THE ELDERLY

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Background and objectives: The project aimed at studying the effects of the inclusion of sunflower oil, vitamin E and selenium in the diet of dairy cows which changed the milk composition affecting the health of the elderly.

Methods: 100 old people living in nursing homes received four different kinds of milk produced according to four different diets given to dairy cows for 12 weeks. There were four groups according to the diet of the cows: control diet; control diet plus selenium and vitamin E; sunflower oil diet; sunflower oil diet plus selenium and vitamin E. The elderly were separated in four groups according to each diet. The selection criteria took into consideration disease, gender, smoking habit and cognition. Analysis of fatty acid profile was measured before and after the intake of milk.

Results: Fatty acid profile was measured after and before supplementation of the dairy cow's diet. Data were analyzed for ANOVA test and total serum cholesterol was significantly different between the groups p = 0.00. The mean cholesterol

of the group that received the milk from cows with modified control diet was 176.3±31.8 mg/dl before the enrichment and after treatment 171.7±29.4 mg/dl; the group that received milk from cows in the control diet plus selenium and vitamin E was 182.1±39.0 mg/dl before and after treatment 168.7±36.8 mg/dl; the sunflower oil diet was 163.7±30.7 mg/dl before and after treatment was 153.2±29.37 mg/dl and the last treatment sunflower oil diet plus selenium and vitamin E was 170.0±24.3 mg/dl before the treatment and 155.6±24.3 mg/dl after treatment.

Conclusions: the group who received milk of dairy cows with supplemented diet with sunflower oil had difference in the total cholesterol in the serum blood when compared to the control diet before supplementation.

Key words: elderly, supplementation, antioxidants, fatty acid, biochemical blood.

PO986

THE DMC-II: A PRACTICAL, RELIABLE, AND SENSITIVE TOOL FOR ASSESSING NEUROBEHAVIORAL DEVELOPMENT IN NUTRITION TRIALS

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Background and objectives: Adequate nutrition is necessary for the rapid neurodevelopment that occurs during gestation and infancy, laying the foundation for lifelong development of cognitive, motor, and socio-emotional skills. Benefits of nutrition interventions on neurodevelopment constitute important evidence to inform nutrition policy. Assessing neurobehavioral development in field trials in low-income countries can be challenging for several reasons, including a lack of standard tests in the local language and a lack of highly trained staff. The Developmental Milestones Checklist (DMC) is a tool developed in Kenya in part to address these challenges. It provides motor, language, and personal-social scores for children age 3-24 months. The objective of the current study was to develop and evaluate an extended version of the DMC (DMC-II) for a new cultural context in the International Lipid-Based Nutrient Supplements Project in Burkina Faso.

Methods: We added and modified a number of items. We changed the administration procedure to allow flexible administration by observation as well as parent interview. We evaluated the internal reliability, inter-interviewer reliability, test-retest reliability, developmental sensitivity, and sensitivity to stunting, wasting, and underweight of the DMC-II.

Results: The internal, inter-interviewer, and test-retest reliability of the three DMC-II scores were all greater than 0.7, indicating satisfactory reliability. In 214 children age 12-24 months, each score strongly correlated with age ($r > 0.7$). In 1.123 children age 16.8-19.9 months, the scores were sensitive to stunting, wasting, and underweight. The motor score showed the largest differences between groups, with effect sizes 0.69, 0.86, and 0.80 SD for stunting, wasting, and underweight, respectively, while the effect sizes for language and personal-social development ranged from 0.28-0.40.

Conclusions: The DMC-II is a practical, reliable, and sensitive tool for evaluating neurobehavioral development in nutrition research in rural settings in low-income countries. Funded by the Bill & Melinda Gates Foundation.

PO987

NUTRITIONAL AND BEHAVIORAL FACTORS' INFLUENCE IN BREAKFAST INTAKE OF ADOLESCENTS REGISTERED IN PUBLIC SCHOOLS IN SALVADOR, BRAZIL.

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Background and objectives: Adolescents are a nutritionally and psychologically vulnerable group. In this phase, the occurrence of poor eating habits, such as skipping meals, is common and may be influenced by aspects related to behavior and nutritional status of the adolescent. The aim of this stady is to identify the influence of behavioral and nutritional consumption of breakfast for teens.

Methods: It was a cross-sectional study involving a random sample of 1494 (852 girls and 642 boys) aged 11 and 17 years and registered in public schools in Salvador, Brazil. The participants completed the Body Shape Questionnaire (BSQ) and the Eating Attitudes Test-26 (EAT-26) and Bulimic Investigatory Edinburgh (BITE). It was obtained eating habits at breakfast, demographic, anthropometric and economic information variables and information regarding the maturation stage and

body weight self-perception. The breakfast omission was considered when the student did not perform this meal less than 6 times per week. It was used descriptive analysis to characterize the distribution of studied events occurrence and Pearson chi-square test was undertaken to evaluate possible associations between selected variables. For statistical analysis it was used SPSS.

Results: Skipping breakfast occurrence was identified in 21.5% of the students. In males, the data showed that to skip breakfast was higher in obese or overweight adolescents (p = 0.024), students with abdominal obesity (p = 0.015) and dissatisfied body image individuals (p = 0.022). For females, skipping this meal was associated with adolescents feeling fat/too fat (p = 0.004), dissatisfied body image individuals (p = 0.005) and students with any symptoms of eating disorder (p = 0.000).

Conclusions: This study showed that skipping breakfast in adolescents is influenced by nutritional and behavioral factors in males and only for behavioral factors in females.

Key words: eating disorders, skip breakfast, adolescents, body image dissatisfaction, obesity.

PO988

RISK FACTORS FOR ADOPTING EXTREME WEIGHT CONTROL AMONG PUBLIC SCHOOL ADOLESCENTS OF THE SALVADOR, BRAZIL: A CONTROL-CASE STUDY.

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Background and objectives: Adopt of the extreme weight-control behaviors are especially prevalent among adolescents who are dissatisfied with their bodies and are considered to be predictors of eating disorders. This study identifies the risk factors for extreme weight-control behaviors among adolescents in public school in Salvador, Brazil.

Methods: This is a case-control study, including cases and controls matched randomly by age and nested to a cross-sectional study. This study involves 252 adolescents, 84 cases and 168 controls of both sexes from 11 to 17 years old. The variable outcome is represented by extreme weight control behaviors, integrated by following the variables: self-induced vomiting and the use of laxatives, diuretics or medications for weight loss. Co-variables included body image dissatisfaction, adoption of a restrictive diet, prolonged fasting and self-perception of body weight. The study also investigated the demographic and anthropometric variables and economic conditions of the students' families. Conditional logistic regression was used to identify risk factors for the adoption of extreme weight-control behaviors among adolescents.

Results: Among the adolescents investigated, risk factors for the occurrence of extreme weight-control behaviors included overweight (odds ratio [OR] 3.52; confidence interval [CI] 95% 1.39-8.85), dissatisfaction with body image (OR 4.33; CI 95% 2.04-9.20) and the adoption of a strict diet (OR 2.88; CI 95% 1.18-7.06).

Conclusions: The results of this study suggest that among adolescents, overweight, body image dissatisfaction and restrictive diet are the variables that predict the adoption of extreme weight-control behaviors.

Key words: risk factors, adolescents, weight loss, purging, case-control study.

PO989

RECOVERY OF BONE MASS AT WEANING IS INFLUENCED BY BREASTFEEDING, TIME SINCE MENARCHE AND POSTPARTUM PERIOD IN ADOLESCENT MOTHERS.

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Background and objectives: Recovery of lactation-induced bone loss may not be complete post-weaning in adolescents. Physiologic and nutritional factors affecting recovery have not been fully described. We aimed to evaluate, in Brazilian adolescents (n=30; 13-19 y; dietary calcium ≥600 mg/d), changes in bone mass from lactation (L) to weaning (W) and its relationship with maternal weight, height, time since menarche (TSM), breastfeeding practice (BP), return of menses, postpartum period (PP) and use of calcium (600 mg)/vitamin D (200 IU) supplementation during pregnancy.

Methods: Bone mineral content (BMC), density (BMD)

and BMD Z-score at total body (TB), lumbar spine L1-L4 (LS), total hip (TH) and femoral neck (FN) were assessed by DXA at L (20wk postpartum) and W (58wk postpartum). Bone changes from L to W were evaluated by paired t test. Associations of changes with independent variables were examined by multiple regression models.

Results: At lactation, BMD Z-scores were -0.4 +/- 1.1 (TB), -1.0 +/- 1.0 (LS), -0.2 +/- 1.0 (TH) and 0.0 +/- 0.9 (FN), and increased ($p < 0.05$) at weaning in TB (-0.2 +/- 1.2), LS (-0.5 +/- 1.1), TH (0.1 +/- 1.1) and FN (0.2 +/- 1.1). Positive associations found were: PP with changes in BMC at TB ($p < 0.01$) and BMC and BMD Z-score at LS ($p < 0.01$), TSM with changes in BMC and BMD Z-score at TB and LS ($p < 0.05$), BP with changes in BMD Z-score at TB, LS and TH ($p < 0.05$) and calcium/vitamin D supplementation with changes in BMD Z-score at FN ($p < 0.01$).

Conclusions: These results suggest that given sufficient time postpartum, bone recovery at post-weaning of adolescents is more likely to be complete in those who breastfeed and are biologically more mature. Calcium/vitamin D supplementation during pregnancy appears also to play a role. Financial support: CNPq and FAPERJ.

Key words: adolescent, bone, calcium supplementation, lactation and weaning.

PO990

PROMOTION OF ORANGE-FLESHED SWEET POTATO IN AQUATIC AGRICULTUAL SYSTEMS FOR IMPROVED FOOD AND NUTRITION SECURITY IN BANGLADESH

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Background and objectives: With the recent focus on Agriculture-Nutrition Linkages, WorldFish and its partners have expanded their activities on household pond aquaculture to include vegetable production on pond dykes and in homestead gardens. In order to increase the quantity, diversity, frequency and duration of consumption of micronutrient-rich foods -especially for women and young children- micronutrient-rich small fish are being produced together with carps in pond polyculture, and orange-fleshed sweet potato (OFSP) has been introduced. Sweet potato is not a staple food in Bangladesh; the root and leaf are consumed as vegetables. OFSP roots are rich in vitamin A and energy, and the leaves are rich in vitamin A, B and C.

Methods: OFSP was introduced to 640 households in 2011. Vines were produced and distributed for planting in October-November. Field staff and household women were trained in production. Roots were harvested in April 2012, and leaves from January to April. Vines were easily preserved by households for planting in the subsequent season. A pilot study on household utilization of OFSP was conducted.

Results: Both leaves and roots were consumed and well-liked by women and children. Young leaves were incorporated as a leafy vegetable in common traditional meals, and roots were used in dishes such mixed vegetable curry and kichuree (a one pot meal of rice, lentils and vegetables). **Conclusions:** OFSP combined with other nutrient-rich foods such as small fish increases dietary diversity and improves the nutritional value of family diets. As women are responsible for OFSP production and harvesting, they have easy access to a nutrient-rich food source, as well as potential income generation through sale, thus increasing women's empowerment. Many more households have introduced OFSP.

Key Words: orange-fleshed sweet potato, aquatic agricultural systems, Bangladesh.

PO991

THE EFFECT OF EDUCATION IN KNOWLEDGE, ATTITUDE AND PRACTICE EARLY BREASTFEEDING INITIATION IN TOWN OF PAREPARE, INDONESIA

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Background and objectives: Data Indonesia Demographic and Health Survey 1997-2007 showed a decline in the prevalence of exclusive breastfeeding from 40.2% in 1997 to 39.5% and 32% in 2003 and 2007, respectively. Riskesdas 2010 the prevalence of exclusive breastfeeding was only 15.3%. This study aimed to determine the effects of education in early initiation of breastfeeding (IMD) IMD behavior in the City of Pare-Pare.

Methods:: This research was a quasi eksperimen design with one group pretest-posttest. The samples were 143 pregnants women trimester 3 in the 6 of health centers in the Parepare city were educated using flip chart. To assess the practice IMD, it was conducted purposive sampling by selecting women who had educated and have spawned were 83 people. Data were collected through observation, questionnaires, and documentation. Data were analyzed using Wilcoxon test and chi-square test.

Results: The results showed an increase in knowledge scores were significantly before and after Education IMD at 4.38. An increase in the mean attitude scores before and after Education IMD were significantly at 3.16, there was an influence on the practice of knowledge IMD ($p = 0.000$) in which the respondents who did IMD was 93.2% had sufficient knowledge than less (33.3%) .

Conclusions: It was concluded that education can increase knowledge and positive attitude thus positive influence on the practice of IMD. It is necessary to intensive socialization of the importance of IMD in pregnant women to support successful breastfeeding.

Key words: early breastfeeding initiation, education, maternity.

PO993

INTEGRATING MATERNAL, INFANT AND YOUNG CHILD NUTRITION (MIYCN) AND FAMILY PLANNING (FP) SERVICES TO IMPROVE HEALTH AND NUTRITION IN KENYA

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Background and objectives: Birth intervals of less than two years increase risk of stunting and underweight by 10-20%. MIYCN and FP are closely intertwined and interventions in these areas have synergistic effects on maternal and child health. The MOPHS collaborated with USAID-funded MCHIP to design and pilot integration of MIYCN and FP services at facility and community levels in Bondo District, Kenya.

Methods: Formative assessments, capacity building of health workers (n=14), community health workers (n=28), and mothers (n=32) and routine collection of service statistics in intervention sites.

Results: At baseline, mothers reported that child spacing enhanced infant growth and development. While they recognized the importance of breastfeeding, exclusive breastfeeding (EBF) postnatally for six months was not widely practiced. Barriers to EBF included: associating EBF with maternal HIV-seropositivity, and misconceptions regarding nutritional adequacy of breast milk alone for the infant. Thirteen behavioural changes were identified which guided development of behaviour change messages and materials. A "one stop shop" integration model was adapted at health facilities (clients offered both services on the same day), and integrated counselling and group activities conducted in the community. Supportive supervision findings after one year of intervention, revealed a 50% increase in demand for nutrition and FP services and 80% increase in MIYCN-FP knowledge by both mothers and health care workers.

Conclusions: MIYCN–FP integration is feasible and effective. Results will be used to inform national scale up efforts.

Key Words: nutrition, family planning, integration, breastfeeding.

PO994

SOCIOECONOMIC DIFFERENCES IN FRUIT AND VEGETABLE CONSUMPTION, RESULTS OF THE DUTCH NATIONAL FOOD CONSUMPTION SURVEY-YOUNG CHILDREN 2005-2006

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Background and objectives: Fruit and vegetables are important components of a healthy diet. In the Netherlands, a fruit intake of 150 g/day and a vegetable intake of 50-100 g/day for 1 to 3 year old children and 100-150 g/day, for 4 to 8 year olds, is recommended. However, most Dutch children do not meet these recommendations. Knowledge of the characteristics associated with low fruit and vegetable consumption can assist policy makers in developing strategies and programs targeted at specific social groups, areas and/or settings for increasing the consumption of fruit and vegetables among young children. The aim of this study was to examine socioeconomic (SES) differences in fruit and vegetable consumption and to identify consumption characteristics associated with fruit and vegetable intake.

Methods: Data from the Dutch National Food Consumption Survey among young children (2005-2006; n=1.279, 2-6 yrs) was used. Differences in amount and types of fruit and vegetables, (number of) food consumption occasions by SES were examined. SES was based on income or educational level of head of household.

Results: Mean total vegetable intake was 41 g/day (SD=36). Total vegetable consumption was significantly higher in children living in high-income households than those living in low-income households (mean of 48 versus 37 g/day, respectively). Mean total fruit intake was 120 g/day (SD=84). No significant differences in total fruit intake were observed between SES groups (income or educational level). A positive association between number of consumption moments and amount of vegetable and fruit consumption was observed.

Conclusions: Mean intakes of fruit and vegetables by young Dutch children are far below the recommendations. Increa-

sing vegetable and fruit consumption should be stimulated in all young Dutch children and increasing vegetable consumption particularly in children from low-income families. Policy measures could focus on encouraging more consumption moments, not only in low SES groups but in all Dutch children.

Key words: SES, DNFCS.

PO995

EARLY ADIPOSITY REBOUND IS ASSOCIATED WITH INCREASED METABOLIC RISK AT AGE 7Y IN CHILEAN CHILDREN

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Background and objectives: Early adiposity rebound (< age 5 y; EAR) has been consistently associated with increased obesity risk, but its relationship with metabolic disorders is less clear. Also importantly, the mechanisms involved in these associations are not yet established. Therefore, we aimed to assess the association between timing of adiposity rebound (AR) and metabolic status at age 7, evaluating the potential role of total adiposity, adipose function, and biological maturation in these associations.

Methods: In 910 children from the Growth and Obesity Chilean Cohort Study (GOCS) we built BMI curves from 0-7 y and estimated the age at AR. At 7 y we measured waist circumference, glucose, insulin, triglycerides and HDL-cholesterol and a metabolic risk score based on standardized scores was constructed. At 7 y we also measured percentage of fat mass (adiposity), leptin and adiponectin (adipose functionality) and ultrasonographic bone age (maturation).

Results: We found that mean age at AR was 5 y in girls (5.19 ± 1.82 y) and boys (5.42 ± 1.70 y) and 44% of the children had EAR. EAR was associated with larger waist circumference [x :5.10 (95% CI: 4.29-5.91)], higher glucose [x: 1.02 (1.00- 1.03)], insulin resistance [HOMA-IR: 1.06 (1.03- 1.09)], and triglycerides [x: 10.37 (4.01- 6.73)], and worse metabolic risk score [x: 0.30 (0.02- 0.37)]. Associations decreased significantly when adding adiposity to the models (i.e. waist circumference: 0.85 (0.33- 1.38) and to a lesser extent when adding functionality [i.e. waist circumference: 0.73 (0.14- 1.32) and maturation [i.e. waist circumference: 0.65 (0.10- 1.20).

Conclusions: In Chilean children younger ages of adiposity rebound predict higher metabolic risk at 7 y. These associations are explained by increased maturation and adiposity dysfunction, but mostly by greater adiposity. Funding: FONDECYT # 1090252, CC has a Wellcome Trust Training Fellowship.

Key words: adiposity rebound, obesity, metabolic risk.

PO996

FEAST AND FAMINE: THE DILEMMA OF EXTREME CONTRASTS IN VITAMIN A CONSUMPTION IN THE WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: In Guatemala, vitamin A (VA) deficiency was widespread until fortification of sugar (10 µg/g) became mandatory in the 1990s. Pregnant and lactating women have a 33% and 42% higher VA requirement than women in the non-reproductive state. We examined usual intakes in two population settings in the Western Highlands of Guatemala to determine to what extent low and elevated intakes were discernible in the reproductive period.

Methods: Previous day recalls were conducted in a total of 121 women, equally divided across strata of pregnancy and lactation as well as semi-urban and urban residence. Total VA intake and its partition among preformed sources (sugar, fortified foods, animal sources) or pro-VA carotenes (plant sources) was calculated. Low VA intake was defined as <800 RE for pregnancy and <850 RE for lactation, with excessive intake (supra-UL) as >3000 µg preformed VA.

Results: The median total VA intakes (in RAE) by sub-group were: 1307 for semi-urban, pregnant women, 1021 for urban, pregnant women, 1318 for semi-urban, lactating women, and 1239 for urban, lactating women. Sugar was the main source of VA in all groups. The sugar contribution to total intake was 35.6% (semi-urban/pregnant); 46.0% (urban/pregnant); 44.1% (semi-urban/lactating); and 43.0% (urban/lactating). From the semi-urban area, 31.0 % of pregnant and 25.8% of lactating women had low VA intake; for urban subjects the proportions were 20.7% and 21.9%, respectively. Overall, 5.8% of the pooled sample had excessive VA intake.

Conclusion: Sugar fortification with VA is essential to help support an adequate vitamin intake in this population. Nevertheless, upwards of 20% still have some under-consumption of the vitamin. Paradoxically, seen concurrently on any given day is a modest incidence of intakes of preformed VA above the UL. Funded by Hormel Foods Corporation, Austin, MN

Key words: vitamin A, sugar, fortification, reproduction, Guatemala.

PO997

NUTRITION EDUCATION INTERVENTION IMPROVES NUTRITIONAL STATUS AND HEALTHCARE SEEKING PRACTICES OF PREGNANT WOMEN IN LOW INCOME SETTINGS

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Background and objectives: Nutrition related knowledge of pregnant women is one of the important factors in ensuring their optimal nutrition and healthcare. This investigation assessed the effect of nutrition education on the gestational weight gain and healthcare-seeking practices of pregnant women.

Methods: Two rural projects of Integrated Child Development Services (ICDS) scheme in low-income settings of outer Delhi were identified purposively to select 118 women (aged 18-35 years) in second trimester (13 to 24 weeks) of pregnancy. They were assigned to non-nutrition education (non-NE) or nutrition education (NE) group; and nutrition counseling was imparted though lectures, flip book and charts for a period of 12 weeks. Data relating to gestational weight, dietary intake (through one-day 24 hour recall coupled with food frequency questionnaire) and knowledge, attitude and practices (KAP) about nutrition and healthcare (using a pretested questionnaire) were gathered at enrolment and post-intervention. Birth outcome was also noted. Statistical analysis was carried out employing ANOVA and t test.

Results: At enrolment, majority of the subjects had inadequate intake of nutrients particularly energy (70%), protein (68%), calcium (70%) and iron (96%). Their KAP scores were poor (61.76 + 22.62 for non-NE and 60.57 + 1.0 for NE out of a maximum score of 140). Post-intervention, significant improvements were indicated in KAP relating to nutrition and antenatal care ($p < 0.001$) and in nutrient intake ($p < 0.05$). NE group reportedly consuming more iron supplements, undergoing more frequent antenatal check-ups and undertaking better immunization against tetanus. The gestational weight (in second and third trimesters), weight gain (in second trimester) and birth outcome ($p < 0.05$) were significantly better.

Conclusions: Effective nutrition education interventions can improve the nutrient intake, healthcare-seeking practices and weight gain of underprivileged pregnant women in low-income-settings and thus lead to better birth outcome.

Key words: pregnancy, dietary intake, gestational weight gain, knowledge, nutrition education.

PO998

ADHERENCE TO MICRONUTRIENT POWDER (SPRINKLES) AMONG CHILDREN AGED 6-59 MONTHS IN RURAL BANGLADESH

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Background and objectives: Micronutrient Powder (MNP) or Sprinkles can be sprinkled onto any semisolid food and can be given to young children to address iron deficiency anemia. The community health workers of BRAC (an NGO) known as Shasthya Shebikas (SS) sell MNP sachets during their regular household visits. The current major challenge relates to unavailability of data on adherence or real uptake of MNP by children. The objective was to assess adherence to MNP and associated factors among children aged 6-59 months in rural Bangladesh.

Methods: A cross sectional study was conducted among 78 children aged 6-59 months in Saturia Sub-district who fed with MNP supplied by BRAC SS in the past 60 days. Cluster sampling technique was used to select mothers with eligible children. Semi-structured questionnaire was used for interviews. A binary logistic regression model was developed to obtain adjusted odds ratios (OR) with 95% CI.

Results: Sample median adherence was calculated to be 65% (95% CI: 63.8-76.0). In multivariate analysis, age of mother in years (OR=0.77, 95% CI: 0.64-0.93), households belonging to poorer (OR=0.01, 95% CI: 0.00-0.19) and middle (OR=0.06, 95% CI: 0.01-0.54) wealth quintiles and mothers who prefer to feed flexibly (OR=0.04, 95% CI: 0.00-0.31) were significantly associated with high adherence. Further, for every one unit increase in visit by BRAC SS in the past 60 days, the odds of having high adherence significantly increased by 56% (OR=1.56, 95% CI: 1.16-2.08).

Conclusions: In the light of evidence from this study it is difficult to interpret whether an adherence of 65% is acceptable for a nutritional intervention within a program setup. But we do know that SS are the key to improving adherence through regular visits to households of MNP users.

Key words: micronutrient powder, sprinkles, adherence, Bangladesh.

PO999

USE OF SEVEN-DAY RECORDS TO ESTIMATE ENERGY AND NUTRIENT INTAKES IN SPANISH ADOLESCENTS: INFLUENCE OF DURATION OF RECORDING PERIOD

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Background and objectives: Three-day food records are frequently used because mis-reporting of food intake is believed to increase with recording period. The aim of this study was to describe the energy and nutrient intake in adolescents. To explore trends in reported energy intake with record period duration.

Methods: A sample of adolescents aged 13 to 18 years, from the city of Zaragoza (Spain) was recruited. In the framework of the AVENA (Alimentación y Valoración del Estado Nutricional en Adolescentes) Study, a total of 275 adolescents (107 boys and 168 girls) were studied. Data were obtained by means of a 7-day dietary record diary. Energy and nutrient intakes assessed in the first day, 3 first days and all 7 days were compared in this sample.

Results: Mean energy intake in the sample was 2005 (SD: 668) kcal. Mean energy intake in boys was significantly higher than in girls. From 7-day records, protein contributed on average 17% to the energy intake, fat 42.7% and carbohydrates 40%. Analyzing the different fatty acids, saturated fatty acids showed a contribution of 12.8%, monounsaturated fatty acids of 18% and polyunsaturated fatty acids of 5.2%. Mean intake of energy and nutrients of the assessed first day, three first days and the 7 days significantly decreased as the record period increased from day 1 to 7.

Conclusions: The studied adolescents consumed a diet high in total fat and in saturated fatty acids and low in carbohydrates. PUFAs and MUFAs intake were adequate. Observed mean intakes deviate considerably from the Spanish dietary guidelines. There was an overall trend of significant decrease of REI and the rest of nutrients from day 1 to 7.

PO1000

PREVALENCE AND DETERMINANTS OF ENERGY UNDERREPORTING IN SPANISH ADOLESCENTS PARTICIPATING IN THE AVENA CROSS-SECTIONAL STUDY

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Background and objectives: Underreporting is a major problem in dietary surveys of children and adolescents and findings should be interpreted with caution. The aim of this study was to assess the prevalence of underreporting in Spanish adolescents and to examine associations with anthropometric, psychological, cognitive, socio-demographic and behavioural determinants.

Methods: In the framework of the AVENA (Alimentación y Valoración del Estado Nutricional en Adolescentes) study, a total of 784 adolescents (46% males) aged 13 to 18 years from three Spanish cities (Zaragoza, Murcia and Madrid) were studied. Dietary intake was assessed using a seven-day estimated dietary record. Information on socio-demographic, psychological, cognitive and behavioural determinants was assessed by means of self-administered questionnaires. Weight and height were also measured. To assess underreporting we used the Goldberg criterion. Binary logistic regression was used to investigate the associations between underreporting and determinants.

Results: Rate of underreporting in the whole sample was 38%, similar in males and females. Weight was significantly related to underreporting (OR 1.05, 95% CI 1.04, 1.07), but not BMI (OR 0.66, 95% CI 0.38, 1.14). Usual breakfast consumption was inversely related with underreporting (OR 1.78, 95% CI 1.08, 2.94). Almost all covariates related to weight perception were significantly associated with underreporting: feeling too full or sick after meals (OR 1.45, 95% 1.04, 2.01), thinking of lost of control about quantity of food intake (OR 1.74, 95% CI 1.06, 2.85), having lost over 6 kilograms in the last three months (OR 4.79, 95% CI 2.08, 11.02) and thinking that they are too fat (OR 1.93, 95% CI 1.29, 2.89).

Conclusions: The prevalence of underreporting was similar in both sexes. Weight perception was a major determinant of misreporting which should be accounted for in dietary studies in adolescents.

PO1001

COMPARISON OF DAILY DIETARY ENERGY AND MACRONUTRIENTS INTAKE WITH DRI IN COLLEGE STUDENTS OF KERMAN MEDICAL UNIVERSITY,KERMAN ,IRAN

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Background and objectives: noncommunicable diseases is often related to life style including nutition. This study was conducted to compare daily dietary nutrients intake with DRI in college students of Kerman Medical University.

Methods: In this cross sectional study thirty hundred seventy five students (221 femals, 150 males, mean age 21±2.5 years) were studied. Daily intake of energy and macronutrients, fiber and cholestrol were extracted by using nutritional software N4 and compared with DRI and RDA. Data were analyzed by using student t.test.

Results: Mean daily intake of Energy (Kcal), total fat, saturated, mono unsaturated, polyunsaturated fat, carbohydrate, protein (g), cholesterol (mg) and fiber (g) in studied students were 2352±36, 93.7±1.6, 27.4±0.5, 32.5±0.58, 27.5±0.54, 305±5, 80.4±1.4,293±8.4 and 17.5±0.36, respectively. Results of present study showed that mean daily intake of energy was in the range of DRI (2200-2900 Kcal/day) for this age group. Mean daily intake of protein were higher than DRI (46-56 g/day) for this age group. Percentage intake of energy from protein was in the range of AMDR, Acceptable Macronutrient Distribution Range (10-35%). Percentage intake of energy from carbohydrate was in the range of AMDR (45-65%). Percentage intake of energy from fat was in upper level of AMDR (20-35%) for this age group. Dietary fat energy more than 30% was observed in 87.7%. Fiber intake less than 25 g/day was observed in 88.3%. Cholesterol intake more than 300 mg/day was observed in 41.9% of studied students. Percentage intake of energy from carbohydrate, fat and protein sorurces were 51%,35.3%,and 13.5%, respectively. Percentage intake of energy from protein in males was significantly higher than females ($p = 0.01$). No significant difference was noticed for the others between two groups.

Conclusions: Higher daily intake level of fat and cholesterol and lower intake of fiber may be considered as a risk factor of chronic disease in later life in these students. This finding is suggested nutritional education is necessary. Totally, a tendency to eat imbalanced diet, high fat and low fiber was observed in both groups.

Key Words: chronic disease.nutrion style, college students.

PO1002

DISORDERED EATING AND UNHEALTHY WEIGHT-CONTROL BEHAVIORS AND ASSOCIATED FACTORS IN ADOLESCENTS FROM SÃO PAULO, BRAZIL

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Background and objectives: Eating disorders (ED), ED risk behaviors and unhealthy weight-control behaviors (UWCB) are public health problems among adolescents because of their high prevalence and serious consequences to health. The understanding of the eating disorder risk behaviors and UWCB associated factors can help planning preventive and educational actions. The aim of this study was to identify the prevalence of ED risk behavior and unhealthy weight-control behaviors among Brazilian adolescents.

Methods: A cross-sectional study was conducted with 1167 adolescents, both genders, aged 13–19 years from 12 public schools in the city of São Paulo, Brazil. ED risk behavior was assessed using a simplified self-report questionnaire, UWCB by a yes/not question about specific behaviors that were not typically recommended for weight management and nutritional status by Body Mass Index (BMI). Peers, parents and media influence, body perception, body image and dieting were assessed by specific questions. The t test was used to evaluate the univariate associations and a multivariate logistic regression model was used to examine the factors influencing ED risk behavior and UWCB.

Results: ED risk behavior was identified among 12.2% of adolescents, mainly among females (72.5%, $p < 0.001$), and UWCB was prevalent in 31.9%, being 66.8% females ($p < 0.001$). Dieting was predictive to ED risk behavior and UWCB for both genders. Media influence and mothers that encourage dieting were predictive to UWCB among boys. Body satisfaction was a protective factor for ED risk behavior and UWCB and magazines reading was predictive to UWCB among girls.

Conclusions: The ED risk behavior prevalence was similar to the rates found in national researches. The UWCB were almost three times more prevalent and was found that these practices increase the chance to develop severe behaviors. ED risk behavior and UWCB prevention programmes should aim body image satisfaction, media literacy and dieting discouragement.

Key words: eating disorders, adolescent, risk.

PO1003

UNDERWEIGHT IS A RISK FACTOR FOR IRON DEPLETION AND IRON-DEFICIENT ERYTHROPOIESIS AMONG INDONESIAN YOUNG WOMEN

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Background and objectives: Underweight and iron deficiency among women are very prevalent in many developing countries, including Indonesia, but it is unclear whether underweight is associated with some parameters of iron deficiency.

Objectives: To investigate the association between weight status, as measured by body mass index (BMI), and iron deficiency, among the young women. Method: A cross sectional study was conducted at 9 subdistricts, 80 apparently healthy young women (age 15-26 years) were randomly selected from premarital list. Body weight and stature were measured, BMI was calculated and compare to with age-specific BMI reference values for adolescent subjects (age 15-20 years). Underweight was defined as a BMI less than 5th percentile. Venous blood sample were collected and analyzed for Hb, serum ferritin and soluble transferrin receptor (sTfR). Iron depleted is stated if serum ferritin concentration less than 12 mg/L, iron deficiency erythropoiesis (IDE) when concentration of sTfR more than 4.4 mg/L. Result: Of the 80 subjects, 23.8% were underweight. Anemia among underweight subjects is 47.4% compare to who were normal and overweight subjects (29.5%). Iron depleted (16.7%) and IDE (37.5%) among underweight are higher than who were not underweight (5.3%) and (13.2%) respectively. Subject who were underweight was approximately three times to be iron depleted (OR: 3.167; 95% CI: 0.7-14.335), and to be IDE (OR: 2.839; 95% CI: 1.113- 7.241) as were those were not underweight.

Conclusion: ron deficiency is more prevalent among underweight young women and risk for iron deficiency approximately three times compare to who were those not underweight.

Key words: anemia, iron deficiency, iron depleted, iron deficient erythropoiesis

PO1004

A DETERMINATION OF VITAMIN D STATUS AND INTAKE OF PREGNANT AND NON-PREGNANT SAUDI ARABIAN WOMEN IN RIYADH, SAUDI ARABIA

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Background and objectives: The objective of the present study was to determine serum 25(OH)D and PTH concentrations as well as vitamin D and Ca dietary intake in healthy pregnant (P) (n=58) and non-pregnant (NP) (n=57) Saudi Arabian women who reside in Riyadh, Saudi Arabia.

Methods: Age, occupation, skin color, smoking status, use of sunscreen, use of supplements, and sun exposure were correlated to vitamin D status. Dietary and supplement intake was also assessed.

Results: Among the participants, 75.4% (37.1% P and 38.6% NP) of the women had 25(OH)D concentrations that were below the recommended concentration [≤37.5 nmol/L (15 ng/ml)]. PTH concentrations were normal in 74.6% and high in 22.9% of the participants. Dietary vitamin D intake was low in 76% of the participants, whereas dietary Ca intake was extremely low.

Conclusions: Positive correlations were shown to exist between serum 25(OH)D concentrations and the use of supplements and the length of exposure to sunlight and skin tone. Vitamin D deficiency appears to be prevalent among P and NP Saudi women.

PO1005

ANALYSIS OF PHYSICAL ACTIVITY, NUTRITIONAL STATUS, SOY AND SOY-PRODUCT CONSUMPTION HABIT AS A DETERMINANT OF MENOPAUSAL SYNDROME IN ELDER WOMEN

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Background and objectives: Elder women gone through many changes in body composition, physiological, and psychological. One phase in women's life is menopause that occurs in older age. Menopausal syndrome has been a problem worldwide. Many researches have shown that soy-isoflavone can be a potential alternative to reduce menopausal syndrome. The objectives of this research was to analyze determinant of menopausal syndrome.

Methods: This study was a retrospective research. A population of adult and elder women participating in Life-skill Program were involved in this research. The total sample that fulfilled the inclusion and exclusion criteria was 31 menopause women. Menopausal syndrome includes menopausal symptoms, self-images, and anxiety. Multiple regression was applied to analyze the influence of physical activity, nutritional status, and the soy and soy-product consumption habit to menopausal syndrome. A logistic regression model was applied to analyze the risk factors of menopausal syndrome such as isoflavone consumption.

Results: The mean physical activity level (PAL) was 1.69 and most samples had light physical activity. Most samples were overweight (45.2%) and had an average soy and soy-product consumption (71%) that fulfilled 25% of the RDA of isoflavone consumption. The result of multiple linear regression showed that physical activity affected self-images ($r2 = 0.206$, $p < 0.05$) and soy consumption affected anxiety ($r2 = 0.198$, $p < 0.05$). Generally, physical activity, nutritional status, and soy isoflavone consumption have roles in menopausal syndrome ($r2 = 0.190$, $p < 0.05$). The result of logistic regression showed that isoflavone was a protective factor to menopausal syndrome, women consuming isoflavone >30 gr or as equal as 40 gr tempeh minimally per day had lower risk in developing menopausal syndrome (OR=0.146).

Conclusions: Healthy lifestyle that maintain nutritional status, promotes physical activity, soy and soy product consumption habit may reduce menopausal syndrome.

Key words: menopausal syndrome, elder women, soy isoflavone.

PO1006

INFANT SIZE AND BODY COMPOSITION IN RELATION TO THE INSTITUTE OF MEDICINE GESTATIONAL WEIGHT GAIN RECOMMENDATIONS

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Background and objectives: Body composition at birth may be important for later health. Effects of high or low gestational weight gains (GWG) on newborn body composition are incompletely known. The institute of medicine (IOM) provides recommendations regarding GWG for women with different body mass index before pregnancy. We investigated relationships between GWG and infant size and body composition at 1 week of age.

Methods: We measured height of 312 pregnant Swedish women who also reported their weight before conception and their gestational weight gain. Body composition of their healthy, full term, singleton infants was measured using air displacement plethysmography at 7±2 days of age. GWG less than (GWG<IOM) and higher than (GWG>IOM) the IOM recommendations were independent variables in multiple regression models with GWG within the recommendation as reference.

Results: 57, 114 and 141 women gained below, within and above the IOM recommendations, respectively. GWG>IOM was associated with higher infant weight (156 g, $p = 0.008$), fat-free mass (101 g, $p = 0.022$), fat mass (55 g, 1.1 %, $p = 0.016$-0.028) but not with longer infants. GWG<IOM was associated with shorter infants (0.9 cm, $p = 0.003$), with less weight (206 g, $p = 0.007$) and fat-free mass (152 g, $p = 0.007$), but had no effect on fat mass (g, %). When adjusted for infant length, GWG<IOM was not associated with lower weight or less fat-free mass in infants.

Conclusions: Infants born to women with GWG above the IOM recommendations were heavier and fatter than infants born to women with GWG within these recommendations. Furthermore, women with GWG below the IOM recommendations had shorter infants with less fat-free mass when compared to infants of women with the recommended GWG. The lower infant weight and fat-free mass associated with GWG below the IOM recommendation was probably due to a decreased infant length.

Key words: body composition, gestational weight gain, institute of medicine.

PO1007

COMPLEMENTARY FEEDING PRACTICES AMONG MOTHERS IN SELECTED SLUMS OF DHAKA CITY: A DESCRIPTIVE STUDY

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Background and objectives: Improper complementary feeding (CF) practice is one of the main reasons for malnutrition among Bangladeshi children aged less than two years. In this context, the study assessed the CF practices of mothers in four selected slums (Tejgoan, Rayerbazar, Beribad, and Jafrabad) of Dhaka city using the guidelines of the World Health Organization (WHO).

Methods: This descriptive study included 120 mother-child pairs from the four conveniently selected slums. A questionnaire, developed following the guidelines of WHO for CF practices, was used for collecting data.

Results: The mean (±SD) age of the children was 14.68±5.55 months. Twenty-seven (23%) mothers were exclusively breast-feeding (EBF) their children. Only 15 (16%) non-EBF mothers started CF at the recommended time, i.e. at 6 months. At 6-8 months of age, 2 (40%) of the EBF and 12 (67%) of the non-EBF mothers gave complementary foods twice a day to their children. In both the groups of 9-11 months of age, about 70% mothers gave complementary foods twice a day to their children. The frequency of CF was acceptable (3 times a day) in 13 (81%) of the EBF and 32 (56%) of the non-EBF children at 12-23 months of age. Complementary foods given by 24 (89%) of the EBF and 86 (93%) of the non-EBF mothers to their children were not adequate in energy. Feeding with psychosocial care practices was not perfect in both the groups.

Conclusions: The findings showed that, according to the WHO guidelines, the CF practices among mothers of children aged less than two years were very poor in the selected slums of Dhaka city. These findings indicate that there is a considerable gap between the recommendations of WHO and the energy intake among this group of children.

Key words: complementary feeding, WHO guideline.

PO1008

DAIRY PRODUCT CONSUMPTION AND THE NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN ACCRA, GHANA

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Background and objectives: Poor diet quality is associated with the high rate of malnutrition among young children worldwide. Dairy foods are nutrient and energy dense and hence have the potential to improve the diet quality and reduce the rate of malnutrition. Consumption of dairy products in Ghana is far from optimum and the level of intake of preschoolers is unknown. The main objective of this study was to determine the association between dairy consumption and the nutritional status of preschool children. Method: A total of 106 caregivers with preschool children between the ages of 2 to 5 years were selected from nurseries and crèches in the Accra. A semi-structured questionnaire was used to collect household socio-demographic characteristics; dietary data was collected using 24-hour dietary recall and a semi-quantitative food frequency questionnaire. Anthropometric measurements of the children were taken and WHO Anthro software was used to identify wasting, underweight and stunting; WHZ≤-2SD, WAZ≤-2SD and HAZ≤-2SD, respectively. Children identified as wasted, stunted and underweight were classified as malnourished. The relationship between dairy consumption and nutritional status was assessed using Chi-square analysis.

Results: Out of the 106 children, 9 children were underweight, 6 children were stunted and 4 children were wasted. Thirteen children were classified as malnourished. The consumption of dairy products by the preschoolers was low, about a serving/day. Among the four dairy foods (milk, cheese, yoghurt and ice cream), milk was commonly consumed. While no significant associations were found between cheese, yoghurt and ice cream consumption and nutritional status of the preschooler, lower frequency of milk consumption was significantly associated with the increased risk of malnutrition among preschoolers (p=0.004).

Conclusion: Milk intake is essential during preschool age. Efforts to encourage frequent milk consumption can reduce the risk of malnutrition in Ghanaian preschoolers.

Key words: Dairy, Preschoolers, Nutritional status

PO1009

EFFECTIVENESS OF FOLIFER SUPPLEMENTATION ALONE VS SUPPLEMENTATION IN COMBINATION TO NUTRITION EDUCATION ON BIRTH OUTCOMES OF RURAL WOMEN, INDIA

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Background and Objectives: This research aimed to find out the awareness of pregnant women regarding folifer tablets, effectiveness of supplementation alone vs supplementation in combination to nutrition education. Methodology: The study was conducted on 190 pregnant women. This was a prospective, observational study. Pregnant anemic women were enrolled at 6 to 10 weeks of gestation and followed to 6 weeks postpartum. The subjects were divided into two groups viz group I received only folifer supplementation and group II received supplementation in combination of counselling. A blood sample was obtained at enrolment, II and III trimester to determine hemoglobin levels. The Hemoglobin was measured by cyanmethemoglobin method, height and weight data was collected as per standard procedures.

Results: Mean BMI of the subjects at the time of enrollment was 21.2 kg/m2 (±9.04). Poor status of weight gain during pregnancy was found. Hemoglobin status data revealed that majority of the subjects were mild anemic (43%) through out the pregnancy. Percentage of the subjects who were taking the folifer tablets was 61%. It was found that women in group II had significant higher value of Hb than group I. Bivariate data established a positive correlation in between the maternal weight and birth weight, maternal Hemoglobin status and

birth outcome, hemoglobin status, maternal nutritional intake and birth out come. Multivariate analysis after adjustment for education, pregnancy history, iron supplementation, and height showed that drinking more than three cups of tea per day before pregnancy, consumption of clay or dirt during pregnancy and never consuming eggs or consuming eggs less than twice a week during pregnancy were significantly associated with anemia.

Conclusions: A high prevalence of anemia, poor compliance with folifer supplementation and effectiveness of supplementation in combination with nutrition education was found.

Key words: anemia, pregnancy, supplementation, birth outcomes.

PO1010

THE INFLUENCE OF DIETARY FATTY ACIDS INTAKE DURING PREGNANCY ON THE COMPOSITION OF MATURE BREAST MILK

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Background and objectives: Little is known about the relationship between maternal dietary intake during pregnancy and the fatty acids content of breast milk. The aim of the present study was to evaluate the influence of the food intake in different periods of pregnancy in the content of fatty acids of mature breast milk.

Methods: Prospective study conducted among 45 pregnant women, aged 18-35 years, who delivered at term, and were exclusively or predominantly breastfeeding their babies. Food intake during pregnancy was evaluated by 3 food recalls (24hR), one in each trimester of pregnancy, and by 2 24hR at the postpartum period. Samples of mature breast milk were collected between 5-14th weeks of lactation, and the fatty acid composition of the milk was determined by gas chromatography. Linear regression models, adjusted by post-partum BMI, were used to verify the association between maternal dietary fatty acids in each trimester of pregnancy and the content of fatty acids on human milk. Furthermore, ß1 and confidence intervals (95% CI) were de-attenuated.

Results: A positive association between EPA [β= 1.87 (95% IC: 0.54, 3.28)] and DHA [β= 0.46 (95% IC 0.21, 0.71)] content of the maternal diet from the third trimester of pregnancy, respectively, and n-3/n-6 dietary ratio [β= 0.09 (95% IC 0.02, 0.17)] on the second and third trimesters and at the postpartum period with the amount of these fatty acids on mature breast milk were found.

Conclusions: DHA and EPA content of the maternal diet during late pregnancy might influence the content of these fatty acids on mature breast milk. Moreover, the data showed a positive association between dietary ratio of n-3/n-6 fatty acids on late pregnancy and post-partum period on fatty acid composition of breast milk. Funding: FAPESP (2010/12320), FAEPA.

Key words: breast milk, pregnancy, fatty acids intake.

PO1012

STUDY ON DIET AND BODY WEIGHT IN SCHOOL CHILDREN AGED 7-14 YEARS FROM THE SOUTH REGION OF BULGARIA (THE EPODE METHODOLOGY)

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Background and objectives: There is not enough data on the dietary habits of school-age children in the South region of Bulgaria. Thereafter, the aim of our study was to examine the diet and different anthropometric parameters in school children from Kardzhali and Smolijan.

Methods: A total of 9266 school children (7-14 years old) were enrolled in the study. Their weight, height and body mass index were measured. The diet was monitored using different tools.

Results: The results showed an increase of overweight and obesity among the studied population. The diet and nutrition intake did not cover the dietary guidelines and requirements. Every third student did not regularly have a breakfast. It was established that the consumption of yoghurt and dairy products was very low, whereas the consumption of sugar and confectionery was high.

Conclusions: Our data justify the application of educational activities and tools for improvement of the diet and physical activity in school children.

Key words: diet, body weight, obesity, school children.

PO1013

EVALUATION OF DIET AND PHYSICAL ACTIVITY IN SCHOOL-AGE POPULATION IN BULGARIA (THE EPHE PROJECT)

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Background and objectives: "Healthy kids Bulgaria" is a program for prevention of health inequities in children. The program started officially in 2013 year supported by the EPODE methodology. The aim of the program is to evaluate dietary, physical activity habits as well as sleep and water consumption in children.

Methods: A total number of 125 families (children and parents) participated in the program. They were from two schools from two municipalities in Sofia. During a period of one year different activities on promotion of healthy diet and increased physical activity were organized. On a competitive principle 30 children were chosen to attend a 1-week camp on a Black sea coast. The mean age of children was 10 years. Before and after the camp they filled in questionnaires on sleep, diet, physical activity and behavioral-related knowledge. During their stay children had a five-time menu (breakfast, lunch, dinner and two middle-breakfasts) based on healthy balanced diet according to the national nutritional guidelines for their age. Children had two times per day (in the morning and in the afternoon) different physical activities. Cooking classes and lectures were given each day to the children.

Results: At the end of the 1-week camp school-age children gained knowledge on and were used to a healthy balanced diet comprising 5-a-day fruit and vegetables, fish, meat, dairy products, oats and different grains, wholemeal bread.

Conclusion: Different programs focusing on a healthy lifestyle including diet and physical activity are needed in school-age children for prevention of health inequities.

Key words: health inequities, children, diet, physical activity.

PO1014

"BECAUSE MOST MOTHERS ARE HUSTLERS": CHALLENGES OF AN URBAN POOR BREASTFEEDING MOTHER IN NAIROBI SLUMS

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Background and objectives: Poor breastfeeding practices are widely documented in Kenya. This is particularly prevalent in the urban slums, where most urban residents live. Only two percent of infants in Nairobi slums are exclusively breastfed for the six months, while 15 percent of children are not breastfed beyond one year. The aim of this study is to establish the local contexts and norms, and other factors which contribute to infant and young child feeding practices in Nairobi slums.

Methods: In-depth interviews, focus group discussions and key informant interviews were conducted in April 2012 with women, community health workers, community leaders, health care professionals, and traditional birth attendants. Interviews were recorded and transcribed verbatim; and coded and analyzed thematically in NVIVO.

Results: Lack of appropriate knowledge, hence misconceptions regarding breastfeeding influence breastfeeding practices among urban poor women. Other factors include socio-economic, socio-cultural, and medical. Women were said to often be the sole breadwinners working, regarded as hustlers. In the cash-based economy, where labor is mainly casual, maternity leave does not apply, hence women resume work shortly after delivery. Exclusive breastfeeding for six months was therefore considered impossible. Lack of food and poor diet were said to seriously affect the breastfeeding practices. Body image was seen as a key factor influencing breastfeeding behaviors as breastfeeding was associated with accelerated aging. This was particularly associated with the young mothers, who were reported to often engage in transactional sex, given few options for livelihood. Top on the list also were socio-cultural beliefs such as "chira" (curse) associated with breastfeeding; and perceived medical factors, including sore breasts and other illnesses such as HIV.

Conclusions: Interventions to promote optimal breastfeeding practices in these resource-constrained settings should aim at breaking the knowledge gap, empowerment of women and social protection measures for breastfeeding women.

Key Words: breastfeeding practices, slums, Kenya.

PO1015

DIFFERENTIALS IN RISK OF HIGH BLOOD PRESSURE IN UNDERNOURISHED AND OVER-NOURISHED ADOLESCENTS IN URBAN INDIA

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Background and objectives: Developing countries like India passing through nutritional transition experience double burden of undernutrition and overnutrition. We attempt to examine risks for high blood pressure associated with both forms of malnutrition which coexist in India.

Methods: Adolescents (9-16 yr) from schools catering to lower socio economic class (LSE; 943 boys, 1000 girls) and affluent high socio economic class (HSE; 867 boys, 1042 girls) were measured in a cross sectional study for weight, height, sitting height, body fat, skinfolds and blood pressure.

Results: High prevalence of overweight in adolescents from HSE class compared to that in LSE (24.1% vs 2.2 % in boys and 20.8% vs 3.9% in girls; $p < 0.01$ for both) conferred risk for high systolic blood pressure (HSBP) while high prevalence of stunting in LSE class (20.8% in boys and 11.8% in girls) seemed to confer risk for high diastolic blood pressure (HDBP) as skeletal growth (leg height ratio) showed significant inverse association with blood pressure levels. In LSE class, prevalence of HDBP was significantly higher than prevalence of HSBP in each quartile of BMI (also for body fat and skinfolds). Further, increase in systolic blood pressure with per unit increase of BMI, was higher in LSE class (1.99 mmHg in boys and 1.03 mmHg in girls) compared to that in HSE class (0.91 mmHg in boys and 0.52 mmHg in girls) and this was also true for diastolic blood pressure.

Conclusions: Implications of increase in BMI are more serious for undernourished children than better nourished children. Preventive strategies are required for reducing obesity among urban affluent adolescents and for reducing stunting in poor sections of the population for achieving better adult health.

Key words: blood pressure, adolescents, India, social class.

PO1016

REPRODUCIBILITY OF SEMI-QUANTITATIVE FOOD FREQUENCY QUESTIONNAIRE MODIFIED FOR MEASUREMENT OF DIOXINS AND RELATED COMPOUNDS IN DIET

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Background and objectives: Questionnaires are popularly used for assessing intake of different nutrients and toxic substances. Different methods used during food processing may influence on presence and concentration of toxic substances in food. The aim was checking the reproducibility of semi-quantitative Food Frequency Questionnaire (FFQ) that includes food processing methods for products that may contain dioxins and related compounds and assessing intake of these compounds with diet.

Methods: modified FFQ was conducted two times in two weeks interval (FFQ1 and FFQ2) on the same coke-plant workers group. The correlation was compared using Pearson´s correlation for portion sizes and frequency. Using published values of dioxins and related compounds expressed in pg of Toxic Equivalents (TEQ) per kg of body weight per day for food products an average intake of dioxins from both FFQs was calculated and compared.

Results: The portion sizes declared during FFQ2 were lower in comparison to the first FFQ while the frequencies declared during FFQ2 were higher. Correlation coefficient for more than 50% of products asked about in questionnaire was above 0.90 (60% - FFQ1, 55% - FFQ2). The average correlation coefficient for the most important products (meat prepared in different way) was 0.89. An average intake of dioxins calculated according to FFQ1 was 2.13 pg TEQ/kg bw/day and was comparable with uptake calculated on basis of FFQ2 – 1.94 pg TEQ/kg bw/day.

Conclusions: The reproducibility of answers in first and second FFQ was high, that allows to use modified FFQ as an useful tool. An average intake of dioxins did not exceed the levels of Tolerable Daily Intake appointed by WHO ranging from 1 to 4 pg TEQ/kg bw/day. The main sources of toxins in presented group were cold meats and fish.

Key words: semi-quantitative Food Frequency Questionnaire, diet, dioxins intake.

PO1017

VITAMIN D INTAKE AND FOOD SOURCES OF THE VITAMIN IN A REPRESENTATIVE SPANISH SAMPLE AGED 7-16 YEARS

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Background and objectives: Few foods are a natural source of vitamin D and these are not normally consumed, being the most common bluefish and yolk, although meat also provides significant amounts of the vitamin. Bluefish consumption should be increased taking into account that it is below than recommended (3 servings/week). Therefore, the aim of the present study is to analyze the intake and sources of vitamin D in schoolchildren aged 7-16 years.

Methods: A representative sample of the Spanish population aged 7-16 years (n = 1976) selected from ten provinces (Burgos, Cáceres, Córdoba, Guadalajara, Lugo, Madrid, Salamanca, Tarragona, Valencia and Vizcaya) was studied. Dietary data were obtained by using a 3-day food record. Vitamin D intake and the sources of the vitamin were calculated using DIAL software (1).

Results: Vitamin D intake (1.63 (0.96-3.35) µg/day) was lower than recommended intake (RI) in 85.4% of study participants and it was influenced by age (OR= 0.935; IC: 0.889-0.983; $p < 0.01$). The main sources of vitamin D were eggs (27.6%), followed by cereals (25.76%), fish (20.86%) and dairy products (12.76%). The main food group that determined vitamin D recommended intakes (RI) was fish ($r=0.734$; $p < 0.001$). Additionally, an increase of one fish serving decreased a 72.5% the odds of not covering vitamin D RI (OR= 0.275; IC: 0.222-0.340; $p < 0.001$).

Conclusions: Vitamin D intake is lower than the recommended intake in a high percentage of the studied participants. Having into account that in the average diet of Spanish children and adolescents, the contribution of vitamin D is mainly determined by fish, an increase in the consumption of this food group would be desirable, especially in 53.6% of children who do not take the minimum amount recommended. Young children merit special attention.

Key words: calcium, dairy products, insufficient intake, representative sample, children, adolescents.

PO1018

MAGNESIUM INTAKE AND ODDS OF DEPRESSION IN INSTITUTIONALIZED ELDERLY PEOPLE WITHOUT ANTIDEPRESSANT TREATMENT

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Background and objectives: Several studies conducted in animals with magnesium depletion have found that the deficiency of this mineral produces anxiety and depressive-like behaviors and that it has anxiolytic-like activity when it is administered. However, scarce human studies show inconsistent results. The aim of the present work is to analyze the relationship between magnesium intake and affective capacity in institutionalized elderly people without antidepressant treatment.

Methods: This cross-sectional study included 157 institutionalized elderly people from the Madrid region (Spain) (65-90 years of age) whose diets were recorded using a precise weighing method over seven consecutive days. Energy and magnesium intake were calculated using DIAL software (1). The participants's affective capacity was assessed using the Geriatric Depression Scale (GDS). Subjects were grouped into non-depressed (GDS≤5) and depressed (GDS>5).

Results: Magnesium intake was 240.1±44.5 mg/day and a 97.5% had intakes below that recommended. The mean GDS score was 5.25±3.57, with 44.4% of the participants with depression. Magnesium intake was higher in the non-depressed (249.1±41.6 mg/day) compared with the depressed group (228.8±46.8 mg/day) ($p < 0.01$). Additionally, participants with higher intakes of magnesium had a 2% less odds of suffering depression than those with lower intakes (OR= 0.989, IC: 0.982-0.997; $p < 0.05$). GDS score and magnesium intake were inversely related. Therefore; an increase in 1 mg of magnesium intake decreased the GDS score by 0.018 units.

Conclusions: Magnesium intake is associated with a lower odd of depression. (1) Ortega RM, López-Sobaler AM, Andrés P, Requejo AM, Aparicio A, Molinero LM. Programa DIAL para valoración de dietas y cálculos de alimentación. Departamento de Nutrición (UCM) y Alce Ingeniería, S.A. Madrid. http://www.alceingenieria.net/nutricion.htm, 2004.

Key words: depression, GDS, magnesium intake; elderly.

PO1019

EFFECTS OF IRON AND N-3 FATTY ACID SUPPLEMENTATION ON SPONTANEOUS MOTOR ACTIVITY AND ADHD-RELATED BEHAVIOUR IN SOUTH AFRICAN CHILDREN

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Background and objectives: Iron deficiency is common during childhood, while children with low consumption of fish and high intake of oils rich in n-6 fatty acids (FAs) are at risk of poor n-3 FA status. Both, iron and n-3 FAs were shown to affect cognition and behaviour. The aim of this study is to investigate the effects of iron and n-3 FA supplementation on spontaneous motor activity and ADHD-related behaviour in iron-deficient (ID) children.

Methods: In a 2x2 trial, children (n=321, aged 6-11 y) received 4/wk for 8.5 months supplements containing: 1) iron (50 mg)+DHA/EPA (420/80 mg); 2) iron+placebo; 3) placebo+DHA/EPA; or 4) placebo+placebo. Physical activity was recorded in a subsample (n=105) at baseline, midpoint and endpoint during three different time periods, namely morning class time (08h00–10h30), break time (10h30-11h00) and after-break class time (11h00-12h00). Classroom behaviour of children was assessed by Conners' Teacher Rating Scales (CTRS) at baseline and endpoint.

Results: DHA/EPA supplementation decreased morning class time activity at endpoint ($p = 0.024$). At baseline, better iron status was positively associated with activity at break time. Subjects in the group receiving both Fe and DHA/EPA showed an improvement from baseline to endpoint on the cognitive problems/inattention subscale ($p = 0.002$) of the CTRS. At endpoint, morning class time activity was positively associated with CTRS subscale scores (higher scores indicate worse behaviour).

Conclusions: These findings suggest that n-3 FA supplementation may influence ADHD-related behaviour during class time. Furthermore, the accelerometer might be a useful tool for assessing both classroom and break time activity behaviour in school children.

Key words: n-3 fatty acids, behaviour, children.

PO1020

SKIM MILK FORTIFIED WITH BUTTERMILK AFFECTS THE PLASMA PHOSPHOLIPID AND FATTY ACID COMPOSITION IN HEALTHY SUBJECTS

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Background and objectives: Milk phospholipids (PLs) are mainly present in milk fat globule membranes of buttermilk. The PLs of milk are attracting renewed scientific interest not only for its nutritional and technological value, but for the biological activities and their potential human health benefits. In recent years, there is considerable evidence that PLs are highly involved in cell metabolism due to its lipophilic and hydrophilic character and are linked to the age-related disease (cognitive ability, dementia), the inflammatory responses and chemotherapeutic activity on some types of cancer. However, to date, there are very limited data available on the PLs bioavailability after human intake of an enriched skim milk with buttermilk.

Methods: A prospective cohort study to determine the buttermilk lipid compounds absorption at different doses has been performed. Thirty healthy subjects were randomly assigned in two experimental groups to receive 200 ml or 400 ml intake of skim milk fortified with buttermilk. Blood samples were taken before and at 1, 2, 3, 4 and 5 hours following intake of the dairy product. Lipids from plasma were extracted by Folch method and thoroughly monitorized by GC-MS and HPLC-ELSD techniques.

Results: Chromatographic methods have been carried out for the analysis of plasma lipid fractions. Triacylglycerides, free fatty acids, cholesterol and PLs as well as FAMEs have been qualitative and quantitatively determined. The dietary supplementation with buttermilk induced changes of the plasma lipid profile either in the lipid classes as in the PLs profile and FAME composition.

Conclusions: Whether the beneficial effects of buttermilk supplementation may be explained by a remodelling the proportions of the plasma lipids into PLs and triglycerides, needs to be further investigated.

Key words: buttermilk, diet, phospholipids, triglycerides, plasma.

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PO1021

PROMOTING INCREASED KNOWLEDGE OF MATERNAL HEALTH AND NUTRITION THROUGH THE EGYPT SMART PROJECT: BASELINE AND TRAINING RESULTS

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Background and objectives: From 2003 to 2004, Save the Children used positive deviance (PD) methodology, which identifies and promotes healthy practices used by a few families, to improve maternal health and nutrition in Upper Egypt. As a result of this program, infants of participating mothers were two-times heavier at birth than infants of non-participating mothers. The United States Agency for International Development (USAID)-funded Maternal and Child Health Integrated Program (MCHIP) is currently implementing the Smart project in Egypt and has conducted a baseline survey and trained community health volunteers (CHWs) for the scale-up of this PD intervention to two million people in six governorates.

Methods: A baseline survey about health and nutrition knowledge and practices and the use of services was conducted with 12152 respondents in Upper and Lower Egypt. The Smart project trained 1200 CHWs, supported by local non-governmental organizations (NGOs), over a ten-day period. Pre- and post-training testing evaluated the change in CHW knowledge.

Results: The baseline study found that 99% of women received antenatal care (ANC) with 27% using public sector facilities and 73% using private sector facilities. Awareness of optimal health and nutrition practices and danger signs was limited in women and CHWs. Nearly half (49%) of women did not have information about the health risks for women and children during the pregnancy, delivery, and postnatal periods. Training made a significant difference to CHW knowledge with an increase in knowledge about optimal care and practices from 27.9% to 65.9%.

Conclusions: Baseline results showed high use of ANC services, but knowledge about optimal health and nutrition practices and danger signs was low in women and CHWs. Training of CHWs significantly improved their knowledge. Implementation of Smart over the next year will determine if this knowledge is transferred to mothers and their families.

Key words: positive deviance, maternal, nutrition, community.

PO1022

A COMPARISON OF CALCIUM AND PHOSPHORUS INTAKES IN RURAL GAMBIAN CHILDREN BETWEEN 1995-2008: AN EFFECT OF THE NUTRITION TRANSITION?

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Background and objectives: Stunting and poor growth are common in developing countries like The Gambia. Our previous studies have shown that calcium intakes of rural Gambian children are particularly low and may contribute to their poor growth. Anecdotal observations suggest that calcium intake is declining due to changes in staple foods and their accompaniments. The objective of this study isto compare anthropometric measures and calcium intakes between two cohorts of pre-pubertal children aged 8-12 years, from the same rural villages of The Gambia, separated by 13 years.

Methods: Data from 80 boys and 80 girls in 1995 (1995 cohort) and from 70 boys and 61 girls in 2008 (2008 cohort) were included. Calcium and phosphorus intakes were assessed by 2-day weighed dietary intake and using cohort-specific Gambian food composition information. Weights and heights were measured. Data presented are mean±SD.

Results: Boys in the 2008 cohort were shorter (1.29±0.08 m vs 1.32±0.07 m, $p = 0.009$) than their 1995 counterparts but not the girls (1.32±0.08 m vs 1.32±0.08 m). There were no differences in weight (Boys: 25.0±4.1 kg vs 25.5±3.6 kg; Girls: 25.5±4.2 kg vs 25.0±4.4 kg). In both sexes, there were lower intakes ($p < 0.0001$) of calcium (Boys: 256±99 mg/d vs 355±160 mg/d; Girls: 252±122 mg/d v 321±118 mg/d) and phosphorus (Boys: 558±174 mg/d vs 863±307 mg/d; Girls: 491±143 mg/d vs 807±312 mg/d) in the 2008 cohort compared with the 1995 cohort.

Conclusion: This comparative study suggests that there has been a decline in calcium and phosphorus intakes in pre-pubertal rural Gambian boys and girls, possibly reflecting changes in diet and lifestyle due to the transition towards a Western diet and lifestyle. The long term health impacts of such secular changes in mineral intakes on bone growth and development warrant further exploration.

Key Words: children, Gambia, growth, calcium, nutrition transition

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PO1023

UNBALANCED NUTRITIONAL PROFILE IN BABY FOODS ALTERS PLASMATIC CYTOKINES AND SPLEEN CELLS POPULATIONS IN MICE MODEL

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Background and objectives: Obesity is a low-grade inflammatory state characterized by increased inflammatory markers. Inflammatory cytokines can be produced by different cell types, including macrophages and lymphocytes. The aim of our study was to characterize the impact of two different types of homogenized baby foods on the spleen cell populations and in serum cytokines levels using C57BL/6J mice.

Methods: A total of 36 weaned mice were randomly assigned to three different 12-week intervention groups as follows: Group A was fed on baby food containing 67 kcal for 100 g of food, 3.6% proteins, 7.8% carbohydrates, 0.115% sodium, 2.7% fat and a balanced fatty acids profile, which proportion of saturated/monnounsaturated/polyunsaturates fatty acids (S/M/P) was 1:2:1. Group B was fed on baby food containing 87 kcal for 100 g of food, 4.2% proteins, 11.1% carbohydrates, 0.150% sodium, 2.9 % fat and an unbalanced fatty acids profile, which proportion of S/M/P was 1:2:0.5. Group C was fed on rodent chow. The spleen lymphocyte and macrophage populations and serum cytokines were analyzed by flow cytometry.

Results: Body mass index (BMI) was significantly higher in groups A and B ($p < 0.002$) compared to group C, without significant differences between them. The percentage of macrophages was only significantly higher in group B compared to group C ($p = 0.004$). Statistical differences were not found in the lymphocyte Th (CD4+), Tc (CD8+), B and cells Natural Killer populations. Higher levels of IL-6 and IL-10 were correlated to unbalanced fatty acids profile ($r=0.358$, p-value = 0.044; $r=0.471$, p-value = 0.007, respectively)

Conclusions: Our results suggest that the intake of homogenized baby food with inadequate nutritional profile might produce changes in immune system markers which could be related with problems associated with overweight. Such an effect should be further studied in human infants.

Key words: cytokines, leucocytes, baby food, animal model.

PO1024

THE RELATION BETWEEN SELF-PERCEIVED FOOD ENVIRONMENT AND FRUIT AND VEGETABLE INTAKE BY PREGNANT WOMEN

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Background and objectives: Environmental factors associated with eating behavior have received attention in the context of public health by directly affecting the health of individuals. The purpose of the present study was to evaluate the relationship between self-perceived food environment, and the adequate consumption of fruits and vegetables in pregnant women.

Methods: A cross-sectional study was conducted among 282 adult pregnant women. Fruit and vegetable intake during pregnancy was assessed by a food frequency questionnaire, and 2 dietary recalls. The multiple source method approach was applied to estimate usual fruit and vegetable intake. Self-perceived food environment was assessed by a structured questionnaire. For the present analysis, we examined the association of self-perceived food environment and the adequate intake of fruit and vegetable (400 g/daily) in logistic regression models [OR (95% CI)], adjusted by maternal age, socioeconomic class, and educational level.

Results: The mean (SD) age of participants was 28 (5) years old, and 35% reported adequate intake of fruit and vegetable during pregnancy. No association between self-perceived food environment and adequate fruit and vegetable intake was found. However, a higher meal frequency was associated with a better chance of daily adequate intake of fruit and vegetable [OR 2.01 (95% CI 1.03, 3.91) $p = 0.04$]. Moreover, the habit of buying fruit and vegetable in specialized food market was associated with the daily intake of > 400 g of fruit and vegetable [OR 1.68 (IC95% 1.01, 2.80) $p = 0.05$].

Conclusions: Our data suggests no association between self-perceived food environment and the adequate intake of fruit and vegetable among pregnant women. Funding: FAPESP (2011/03558-7), FAEPA.

Key words: food environment, pregnancy, fruit and vegetable intake.

PO1025

ASSOCIATION BETWEEN PERINATAL FACTORS AND COMPONENTS OF THE METABOLIC SYNDROME AND INSULIN RESISTANCE IN CHILDREN OF PUENTE ALTO, SANTIAGO, CHILE

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Background and objectives: we have previously studied the association of prenatal growth with metabolic syndrome (MS) components, including insulin resistance (IR), in about two thousand Chilean low-income urban school-age children (J Devel Orig Health Dis. 2012; 3(4): 237-244). We aim to ascertain with a higher sample size the influence of the above mentioned variables.

Methods: retrospective cohort study linking information on MS and IR in school-age, with perinatal records. 3325 children were enrolled in schools in the district of Puente Alto (Santiago, Chile) during 2009-2011. Anthropometry and blood pressure (BP) were assessed. A blood sample for determination of glycemia, insulinemia (quimioluminiscence) and blood lipids was taken; HOMA was calculated and a national standard was applied to select HOMA-IR cases. Cook et al standard was used to define MS. We used Pearson correlation, chi-square test and logistic regression step-by-step. Linear and quadratic associations were tested with Poisson regression.

Results: 3290 children had complete information at birth (98.9%) 52.01% women; aged 11.4 + 1 years. The prevalence of MS and IR was 7.26% and 25.47%, respectively. Logistic regression analysis showed an inverse association between birth length (BL), gestational age and birth weight (BW) with most dependent variables studied. However BW showed a direct association with the majority of the dependent variables studied. The waist circumference > 90th percentile, BP > 90th percentile and triglycerides > 110 mg/dl were associated with U-shaped BW, BL and ponderal index, respectively.

Conclusions: In this new study we could demonstrate a higher number of U-shaped associations with perinatal variables. New studies with higher sample sizes would permit to show this kind of associations and improve our understanding of the early origins of metabolic diseases.

Key Words: prenatal growth, insulin resistance, metabolic syndrome, retrospective cohort, child.

PO1026

GLUCOSE-INDUCED NEURONAL ACTIVATION DURING COGNITIVE TASK PERFORMANCE IN OLDER ADULTS DEPENDS ON GLYCEMIC-INDICATORS AND BLOOD CHOLESTEROL LEVELS: AN FMRI STUDY

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Background and objectives: Glucose ingestion by older adults enhances long-term and less consistently working memory; less is known about the neural mechanism(s) underlying these cognitive changes. We used blood oxygenation level dependent functional magnetic resonance imaging (BOLD fMRI) to test the hypotheses that glucose ingestion increases 1) cognitive performance and 2) neuronally-mediated BOLD activity in older adults, and that 3) glucose-induced alterations in task-related BOLD signaling are dependent on metabolic/vascular indicators.

Methods: Within-subject cross-over design in 13 healthy hypertensive older adults. Day 1: Collect fasting blood sample, health information, and administer neuropsychological battery to characterize cognitive function and exclude dementia. Day 2/3: Participants are counterbalanced to either a glucose (60 g) or placebo drink. Following drink ingestion, participants are scanned in a 3.0 Tesla MRI scanner during the encoding phase of a wordlist learning task and a 2-back working memory task.

Results: Cognition: There was a trend towards a greater primacy effect during a wordlist immediate/delayed recall for glucose sessions compared to placebo ($p = 0.08$), but no drink effect on 2-back task accuracy nor reaction time. fMRI: During encoding of primacy words (first 5 words in wordlist), dorsomedial prefrontal activation was stronger in the glucose compared to placebo condition even after adjusting for glucose-induced changes in cerebrovascular reactivity (CVR) (p adjusted < 0.05). In the 2-back task, there was a trend towards greater activation in pre- and post-central gyri in the glucose compared to placebo condition after adjusting for CVR (p adjusted < 0.1). Glucose-induced activations correlated negatively with HbA1c, total cholesterol, and LDL-cholesterol levels (all $p < 0.05$) for the wordlist task and fasting insulin for the 2-back task ($p < 0.05$).

Conclusions: Glucose ingestion appears to alter both episodic learning and neural activation patterns in older adults. The extent of glucose-induced alteration within regions mentioned may be associated with healthier biological blood profiles. (CIHR, NSERC, OGS)

Key words: fMRI, aging, glucose, memory, cognition.

PO1028

CRITICAL PATHWAYS AFFECTING MATERNAL ANEMIA: A ROAD MAP FOR INTEGRATED PROGRAMMING FOR NUTRITION, HEALTH AND AGRICULTURE

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Background and objectives: Maternal anemia is a significant global public health problem. In the developing world 40% of non-pregnant women and 49% of pregnant women are anemic. Although proven and cost effective solutions are known, current single sector strategies to tackle anemia are insufficient. Our objective was to identify how the health, nutrition and agriculture actors can contribute to reduce maternal anemia.

Methods: A review of literature and research about maternal anemia globally, specifically considering barriers and motivators for maternal anemia-related behaviors, provided the foundation to develop a multisectoral framework.

Results: The resulting framework helps sectors identify the role of each sector. The foundation of the framework is the basic physiological factors of anemia control: adequate iron status and pregnancy considerations. The framework delineates the type of interventions within each sector's mandate to support 1) improved iron intake, such as consumption of iron rich foods, 2) reducing iron loss, such as deworming and malaria control, 3) improving iron stores, such as the practice of family planning and 4) iron folic acid supplementation to address expanded blood volume while pregnant. The framework also includes the specific behaviors women and their families can perform and outlines the role of each sector to ensure that those behaviors happen. This framework can be adjusted by country based on specific situations around malaria incidence, antenatal care programs and the agriculture context. It provides guidance for programmers and policy makers to think and act in an intersectoral way.

Conclusions: Using the framework for planning facilitates visualizing and identifying the multiple approaches that must be in place to successfully tackle the burden that anemia places on women of reproductive age, especially pregnant and immediate postpartum women.

Key words: Maternal anemia, multisectoral approach, agriculture, health.

PO1029

INCREASE IN SALT CONSUMPTION IN CHILDHOOD IN THE NETHERLANDS; DUTCH NATIONAL FOOD CONSUMPTION SURVEY 2007-2010

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Background and objectives: High salt intake is associated with a higher blood pressure and subsequently to cardiovascular diseases. Children with elevated blood pressure often become adults with elevated blood pressure. Insight in the salt consumption in children can be used to support nutrition policy in order to improve public health. The aim of this study is to get insight in the salt consumption and its sources in childhood in the Netherlands. Method: In 2007 to 2010, a Dutch National Food Consumption Survey was conducted. Two non-consecutive 24-hour dietary recalls were collected by dieticians with the software EPIC-Soft®. In addition, information about discretionary use of salt was collected. Data on children aged 7-18 years (n=1713) in combination with the Dutch food composition database from 2011 were used to estimate the habitual salt intake among children using SPADE. In addition the intake of salt per kJ and the intake by its sources were calculated.

Results: The habitual total intake of salt was far above the Dutch recommended maximum intake (6 g/day) for most of the children; median intake was 8.2 g/day for boys and 6.7 g/day for girls. The habitual intake of salt increased with age with more than 40%; 6.0 g/day for 7-8 year-olds to 8 g/day for 14-18 year-olds. This was partly explained by increased energy intake. Main sources were discretionary use of table salt, bread, processed meat and cheese. The contribution of sauces and soups increased with age.

Conclusions: In childhood, salt intake increases with age to adult levels. This can not fully be explained by the increase in energy intake by age. At all ages, most children exceed the recommended maximum intake levels. Food reformulation and improving dietary habits in childhood, might result in lower salt intake later in life.

Key words: sodium, monitoring, children, fortified foods.

PO1030

VISUALIZING THE IMPACT OF SELECTED BEHAVIORS ON NUTRITIONAL STATUS AND THE EFFECTIVENESS OF APPROACHES TO PROMOTING POSITIVE BEHAVIORS

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Background and objectives: Optimal nutrition during the first 1000 days (pregnancy to age two) is critical to the prevention of stunting and anemia. Demand for evidence-based programming compels nutritionists to assess the evidence supporting maternal, infant, and young child nutrition practices that are promoted to prevent and reduce stunting and anemia as well as the effectiveness of social and behavior change communication (SBCC) on those practices. The SPRING Project aimed to develop an interactive web-based tool to present this complex body of evidence.

Methods: SPRING conducted a systematic literature review to consolidate the evidence on the effectiveness of SBCC approaches. At the same time, SPRING collected seminal literature recommended by experts in the field on the effect of commonly promoted nutrition practices (e.g., maternal diet, breastfeeding, complementary feeding, prevention and control of micronutrient deficiencies, and water, sanitation and hygiene) on nutritional status. Using data visualization software, SPRING then created a visual representation of these relationships.

Results: The result of these efforts is a visually appealing and user-friendly interface that succinctly synthesizes the evidence linking SBCC approaches to the adoption of high-impact nutrition practices known to protect against stunting and anemia.

Conclusions: Web-based, interactive displays of evidence improve accessibility of information, making them an important complement to traditional, report-style presentations. The display of our findings in this way draws attention to the research gaps and aids policy makers and program implementers in targeting priority nutrition practices and identifying and selecting appropriate evidence-based SBCC approaches to improving nutrition practices.

Key words: social change, behavior change, communications.

PO1031

WAIST CIRCUMFERENCE AND ITS RELATIONSHIP WITH BIOCHEMICAL PARAMETERS IN BRAZILIAN STUDENTS

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Background and objectives: The measurement of waist circumference has been considered an important tool for identifying children at higher risk of developing metabolic and cardiovascular complications. Thus, the aim of this study was to evaluate the relationship between waist circumference and biochemical parameters in Brazilian students.

Methods: Cross-sectional study with 588 students (mean age of 8.61 ± 1.36 y) of public and private schools in Garibaldi, Brazil. Socioeconomic data, waist circumference (WC) and biochemical evaluation (triglycerides, total cholesterol, low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), plasma glucose and insulin) were evaluated. Central obesity was defined as WC higher than the 90th percentile. Insulin resistance was calculated by means of the homeostasis model assessment of insulin resistance (HOMA-IR) and 2.5 was adopted as cut-off value.

Results: Of the total sample, 51.4% were male. The prevalence of central obesity was 10.5% (boys 10.0% and girls 11.0%). Regarding the metabolic profile, it was found that girls presented significantly higher concentrations of triglycerides, insulin and HOMA-IR and lower concentration of HDL-c. However, boys had significantly higher concentrations of plasma. Adolescents with WC higher than the 90th percentile presented higher prevalence of hypercholesterolemia (49.2% vs 39.6%), hypertriglyceridemia (39.0% vs 8.0%), hyperinsulinemia (10.2% vs 0.6%), insulin resistance (27.1% vs 2.3%) and inadequate levels of HDL-c (53.4% vs 32.4%).

Conclusions: WC was significantly associated with higher concentrations of triglycerides, insulin and HOMA-IR and lower concentration of HDL-c, confirming the importance of WC for identifying children at risk for the development of metabolic disorders.

Key words: Waist Circumference, abdominal obesity, child, nutritional and metabolic diseases.

PO1032

A RANDOMIZED CONTROLLED TRIAL INDICATES BENEFITS OF CELL PHONE BASED PEER COUNSELING TO SUPPORT EXCLUSIVE BREASTFEEDING IN KENYA

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Background and objectives: In Kenya, median duration of exclusive breastfeeding (EBF) is < 1 month despite high breastfeeding (BF) initiation (98%). Cell phone use is high despite widespread poverty, allowing health innovation to support the 10th Step of the Baby Friendly Hospital Initiative. We tested the effect of breastfeeding support from trained peer leaders via cell phone and peer groups on EBF at 3 months.

Methods: We randomized at third trimester low-income women attending antenatal care at a large hospital to (i) continuous cell phone based peer support (CPS), (ii) monthly peer support group (PSG) or (iii) standard of care by existing facility-based support (SOC). TPLs supported both pregnant and post-partum women randomized to CPS and PSG from late pregnancy (32-26 weeks) to 3 months postpartum. We compared EBF estimated by maternal 7 day recall of infant foods at 3 months age by intervention group.

Results: Participant flow was adequate for power (753 women enrolled, 81% of eligible; 504 infants completed, including twins, 66.6%). Both interventions were associated with a higher proportion of EBF (CPS: 89.5%, PSG: 82.6%, SOC: 78.2%, p = 0.022). Pairwise comparisons indicated EBF rates with CPS higher than with SOC (p = 0.006) and marginally significantly higher than with more logistically difficult and costly PSG (p = 0.071).

Conclusions: Cell phone based counseling may be as effective in supporting EBF as peer support group approaches in this setting, and more effective than current standard of care.

Key Words: breastfeeding, peer support, mHealth

Acknowledgements: Thanks to the participants, hospital administrators and staff. Kenya National Council on Science and Technology and University of Toronto provided ethical oversight and approval. Bill & Melinda Gates Foundation to FHI 360, through the Alive & Thrive Small Grants Program managed by UC Davis; Global Alliance for Improved Nutrition; Canada Research Chair program award.

PO1033

PROCESS INDICATORS FOR A RANDOMIZED TRIAL OF CELL PHONE BASED PEER COUNSELING TO SUPPORT EXCLUSIVE BREASTFEEDING IN KENYA

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Background and objectives: In Kenya, cell phone (CP) use is high and presents new opportunities to support breastfeeding. We examined data from a randomized intervention trial showing CP based support (CPS) increases the prevalence of exclusive breastfeeding (EBF) to identify threats to the validity of findings and evaluate quality of intervention delivery.

Methods: We randomized at third trimester low-income women attending antenatal care (ANC) at a large hospital to (i) continuous cell phone based peer support (CPS) or (ii) monthly peer support group (PSG) or (iii) standard care by existing facility-based support (SOC=control). We analyzed participant flow and process indicators to assess the quality of delivery of CPS and PSG interventions and potential biases at enrolment and through dropout.

Results: There was no difference in dropout by baseline CP access (p = 0.119) or intervention allocation (p = 0.673).

Among participants with CP, women allocated to each group shared many characteristics, except hours worked outside the home (4.7, 4.0, 3.6 h for CPS, PSG, SOC; p = 0.036), and unemployment (40.4%, 54.3%, 56.1% for CPS, PSG, SOC; p = 0.023). Among women without CP, there was no difference in baseline indicators by intervention allocation except those allocated to PSG reported less frequent prior prenatal care (2.4 vs 2.7 times; p = 0.039).

Conclusions: Indications that cell phone based counseling is potentially as or more effective in supporting EBF than other approaches are unlikely to be attributable to poor quality of delivery of alternative intervention, unanticipated bias at allocation or differential dropout.

Key Words: breastfeeding, peer support, mHealth

Acknowledgements: We thank the participants and hospital staff. Kenya National Council on Science and Technology and University of Toronto provided ethical oversight. Bill & Melinda Gates Foundation to FHI 360, through the Alive & Thrive Small Grants Program managed by UC Davis; Global Alliance for Improved Nutrition; Canada Research Chair program.

PO1034

INFANT MEDICATION, ILLNESS AND GROWTH IN A RANDOMIZED CONTROLLED TRIAL OF EXCLUSIVE BREASTFEEDING SUPPORT IN KENYA

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Background and objectives: In Kenya, cell phone (CP) use is high and allows health innovation to support exclusive breastfeeding (EBF). We examined data from a randomized intervention trial showing CP based support (CPS) increases the prevalence of EBF to identify any associations with infant medication, illness and growth.

Methods: We randomized at third trimester low-income women attending antenatal care (ANC) at a large hospital to (i) continuous cell phone based peer support (CPS), (ii) monthly peer support group (PSG) or (iii) standard of care by existing facility-based support (SOC=control). TPLs supported both pregnant and post-partum women randomized to CPS and PSG from late pregnancy to 3 months postpartum. We compared indicators of infant care, illness and growth at 3 months age by intervention group.

Results: Mothers allocated to CPS were not significantly less likely to give medicine, vitamins or minerals (37.3% vs 47.4% and 46.4% for PSG, SOC; p = 0.132), report any infant illness (21.6% vs 29.5%, 30.7% for PSG, SOC; p=0.137) or diarrhea (11.1% vs 12.7%, 10.6% for PSG, SOC; p=0.814), or return to work by 3 months postpartum (61.7 cm vs 61.4 cm, 61.4 cm for PSG, SOC; p=0.418). CPS infants did not differ in mean length or weight (6.26 kg vs 6.09 kg, 6.18 kg for PSG, SOC; p = 0.262).

Conclusions: Cell phone based peer support is not associated with large differences in infant medication, illness and growth at 3 months postpartum.

Key Words: breastfeeding, peer support, morbidity, growth

Acknowledgements: Thanks to the participants, hospital administrators and staff. Kenya National Council on Science and Technology and University of Toronto provided ethical oversight and approval. Bill & Melinda Gates Foundation to FHI 360, through the Alive & Thrive Small Grants Program managed by UC Davis; Global Alliance for Improved Nutrition (GAIN); Canada Research Chair program award.

PO1035

NUTRITIONAL STATUS AND FEEDING/NUTRITION PRACTICES OF CHILDREN AND WOMEN IN THREE DISTRICTS OF INDONESIA

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Background and objectives: Around 4 out of 10 Indonesian children under-five are stunted. Effective interventions to address undernutrition are known. It relates to improved

young child and maternal nutrition and enhancement of hygiene practices. The study aims to provide baseline information regarding the nutritional status of young children and pregnant women and its key determinants to provide further guidance to nutrition programme and foster a multisectoral and integrated approach to reduce undernutrition.

Methods: A cross-sectional study involved children 0-35 months of age (n=2023) and pregnant women (n=463) randomly selected in three districts with different living conditions. A standardized questionnaire was used to collect data on socio-demographics and potential determinants of nutritional status. Child weight and length/height was measured while mid-upper arm circumference (MUAC) was assessed among women. Hemoglobin was measured with Hemocue in all women and sub-sample of children (n=670).

Results: Among children, stunting rate was 30%, wasting 9%, underweight 21%, anemia 59%. About a third of pregnant women were undernourished and 45% anemic. Only 41% of children 0-23 months were fed as per the WHO recommendations. The situation was worst among children 6-11 months old (22%). Better child feeding practices was associated with a lower proportion of stunting (30% vs 24%, $p < 0.01$) and of anemia (71% vs 59%, $p < 0.01$). Also, stunting tended to be associated with worm infestation, educational level of the caregivers, household access to a healthy environment and its socioeconomic level. Similar associations were observed among women.

Conclusions: The nutritional status of children and pregnant women is of concern. Results reiterate the existence of poor child feeding practices, particularly among children 6-11 months. The involvement of other sectors but health is also imperative.

Key words: stunting, children, women, nutrition, feeding practices The study was carried out with the financial assistance of the European Union and UNICEF.

PO1036

RATIO OF MICRONUTRIENT INTAKE FROM ANIMAL TO NON-ANIMAL SOURCE FOODS AND LINEAR GROWTH OF 1-5 YEARS OLD CHILDREN IN INDONESIA

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Background and objectives: Many <5 years old children in Indonesia experienced linear growth retardation. Poor diets leading to inadequate intake of micronutrients is among prominent causes of linear growth retardation. Foods from animal sources are of better quality than from plant sources in supplying micronutrient and protein because of higher content and better bioavailability. This study aimed to investigate the ratio of micronutrient intake from animal to non-animal source foods in relation to linear growth of children 1-5 years old.

Methods: The one-year longitudinal study was conducted in periurban area of Bandung City among 4 groups of children: 12-23 mo (n=57), 24-35 mo (n=56), 36-47 mo (n=58) and 48-59 mo (n=56). Children had measurement of anthropometry (body weight and length/height) and dietary intake (2 repeated 24-hour recall) every 16 weeks. General characteristics and other observations were collected at baseline and endline.

Results: Almost all but one child had animal source foods intake; the most frequently consumed were milk (83.7% including breastmilk), eggs (58.6%) and meat/fish/poultry (49.3%). Milk, particularly in the from of liquid and/or powder, had high contribution to the micronutrient intake. Ratio of micronutrient intake from animal to non-animal source foods differs significantly across age group but not across observation. The median ratio of animal to non-animal source foods for vitamin A, calcium, iron, and zinc were 5.8, 1.6, 0.6, and 2.3, respectively and intake of micronutrient above the median tended to be associated with higher height-for-age z-score at endline.

Conclusions: The study reemphasizes the importance of animal source foods, including milk, in children linear growth. The precise ratio of micronutrient intake from animal to non-animal source foods to benefit linear growth warrant further exploration.

Key words: micronutrient, ratio animal to non-animal, children. Acknowledgement: The study received financial support from Sari Husada and Nutricia of Indonesia.

PO1037

EATING HABITS CONCERNING FATS IN DIET OF POLISH AND AMERICAN MEDICAL COLLEGE STUDENTS, COMPARISON

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Background and objectives: The long-term ingestion of a fat-rich diet causes severe health problems. Studying on medical college gives a basic dietetics knowledge and during studies eating patterns are evolving, unfortunately often not in positive relationship. The aim is the comparison of eating habits among Polish (P) and American (A) medical students on the fourth year.

Methods: The brief Block Screening Questionnaire was conducted. 172 students (96 P: 74 women, 22 men, and 76 A: 32 women, 44 men) assessed eating frequency of products containing saturated fats. Methods used in study had a self-scoring format thus chosen frequency was exchanged into points that

summed up classified the diets into 3 categories: high fat intake; elevated intake; proper intake. S statistical significance was checked using t-Student test. For all students body mass index (BMI) was calculated.

Results: Polish women had the highest percentage of underweight, while the highest percentage of overweight and obesity had American men (P: women-34% of underweight and 1% of overweight and obesity; men: 14% and 32%; A: women-16% and 6%; men: 0% and 39%). There were no differences between average eating frequency among students but in case of particular products statistically important differences were noticed. Polish students ate more often ($p < 0.05$) butter, sausages, full-fat milk and sweet, greasy cakes. High fat intake was noticed for Polish men, whereas proper intake was found among American women (P: women-3% of too high fat intake, 34% of slightly elevated and 64% of proper fat intake; men-36%, 45% and 18%; A: women-6%, 22% and 72%; men-9%, 39% and 52%).

Conclusions: Uptake of fats for majority is placed within proper range, but especially for polish men too high. There is a positive correlation between high BMI value and high points score.

Key words: food frequency questionnaire, medical students, eating patterns.

PO1038

COMPARISON OF EATING HABITS CONCERNING FRUITS, VEGETABLES AND FOOD FIBER IN DIET OF POLISH AND AMERICAN MEDICAL COLLEGE STUDENTS

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Background and objectives: The physicochemical and biological properties of dietary fiber have important implications in human health. Food fiber should be consumed with everyday portion of fruits, vegetables and grain products. The aim is the comparison of eating habits between Polish(P) and American(A) medical students on the fourth year.

Methods: The Block Screening Questionnaire was used for assessing eating frequency of products containing food fiber among 172 students (96 P: 74 women, 22 men; 76 A: 32 women, 44 men). Method used in study had a self-scoring format, thus, chosen frequency was exchanged into points that summed up classified the diets into 3 categories: low intake of food fiber; moderate intake that could be enriched; desirable intake. Statistical significance was checked using t-Student test. For all body mass index (BMI) was calculated.

Results: For majority BMI value was in normal range, though Polish women had the highest prevalence of underweight, while American men had the highest prevalence of overweight and obesity had (P: women-34% of underweight and 1% of overweight and obesity; men: 14% and 32%; A: women-16% and 6%; men: 0% and 39%). Differences between average eating frequency between nations were not significant but for particular products statistically important ($p < 0.05$) differences between nations were found. Americans significantly ate more often fruits and vegetables in contrast to legume plants chosen by Polish students. The desirable score of questionnaire had Polish women but low intake was common (P: women-46% with low intake, 53% with moderate and 1% with desirable intake; men-68%, 32% and 0%; A: women-78%, 22% and 0%; men-82%, 18% and 0%).

Conclusions: Uptake of fiber-rich products for majority can be classified as low, almost nobody achieved desirable food fiber intake. There is a correlation between underweight of Polish women and low uptake of food fiber.

Key words: questionnaire, students, eating patterns.

PO1039

STUNTING AND IRON DEFICIENCY ARE ASSOCIATED WITH LOW PRESCHOOL DEVELOPMENT SCORES IN A RURAL INDIAN COMMUNITY

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Background and objectives: Stunting and anemia are common problems among young children in low-income countries. The objective is to examine how stunting, anemia, and iron deficiency relate to preschoolers' development in a low-income, rural setting.

Methods: Enrolled 328 preschoolers age 27-59 mo. (mean=37.2, SD=6.3) from Anganwadi Centers in rural India. Measured anthropometry and calculated stunting (HAZ <-2SD), wasting (WHZ<-2), and underweight (WAZ<-2) using WHO standards. Venous blood used to measure biomarkers for iron deficiency (ID) (serum transferrin receptor (sTfR)>2.5 mg/L and ferritin<12 μg/l), anemia (hemoglobin (Hb)<11 g/dl), and inflammation (C reactive protein (CRP)>10 mg/l). Child development (fine motor, receptive /expressive langua-

ge, and visual reception) measured with Mullen Scales of Early Learning, and household assets measured by maternal report. Multiple linear regression (MLR) equations, adjusted by age, household assets, inflammation, and clustering of Anganwadi Centers, used to estimate how stunting, ID, and anemia relate to child development.

Results: 39% of the preschoolers were stunted, 19% wasted, and 44% underweight; 66% had ID (based on sTfR 62% and/or ferritin 41%), 49% were anemic. In MLR analyses, stunting and anemia were significantly negatively associated with all child development measures: e.g., receptive language: stunting (â=-0.20; CI: -6.90, -2.05), anemia (â=-0.14; CI: -5.31, -0.56). Adding ID measures to the models, sTfR was significantly negatively associated with fine motor (â=-0.14; CI: -7.93, -0.55), receptive language (â=-0.14; CI: -6.04, -0.55), expressive language (â=-0.14; CI: -5.14, -0.70) and visual reception (â=-0.12; CI: -5.94, -0.09); anemia was reduced to non-significance.

Conclusions: Stunting was associated with low preschool development, emphasizing the importance of adequate nutrition early in life. STfR, an early biomarker of ID, was a more sensitive indicator of low developmental scores than anemia, suggesting a need to ensure adequate iron intake early in life.

Key Words: iron deficiency, child development, preschool, stunting. Support: Mathile Institute & Micronutrient Initiative.

PO1040

NUTRITIONAL STATUS AT BIRTH AND BLOOD PRESSURE IN CHILEAN YOUNG ADULTS: IS THERE AN AMPLIFICATION WITH AGE?

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Background and objectives: There is an association between birth weight (BW) and chronic diseases and this association increases with the increment of body mass index (BMI). Nevertheless it is not known if this effect changes with age. The Objective of this study was to asses if there is an amplification of the effect between BW and blood pressure in a follow up of adults.

Methods: Cohort study in the Valparaiso Region of Chile. Information of BW was get from birth registers in the Hospital of Limache city and they were evaluated at age of 22 to 28 (first survey, n=1234) and 32 to 38 years (second survey, n=782). Multiple linear models were fit to see the effect of BW and systolic (SBP) and diastolic blood pressure (SBP) in each evaluation, adjusting by sex and BMI in adult age. The second model considered the ponderation effect of attrition.

Results: Mean BP was 114.5/72.1 mmHg in the first and 120.3/74.8 mmHg in the second evaluation. In the first assessment there was a significant decrease of SBP for each Kg of increment of BW (β= -3.073, CI -4.884 to -1.263, p= 0.001). In the second evaluation, was a similar effect (β =-2.825, CI= -4.427 to -1.223, p= 0.001). An inverse effect was also observed with DBP in the second evaluation (β = -1.326, CI=-2.567 to -0.086, p=0.036). These effects were found only when sex and BMI of adult were considered in the model. In this period there was an increment of BMI of 2.7 points.

Conclusion: There was an inverse association between BW and BP in the two assessments, but there wasn't an amplification of the effect in the follow up of 10 years.

Key words: Cohort study, blood pressure, birth weight

PO1041

POST-PARTUM HIGH-DOSE VITAMIN A SUPPLEMENTATION TO IMPROVE VITAMIN A STATUS OF MOTHER AND INFANT: THE ROLE OF TIMING AND INFLAMMATION

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Background and objectives: Vitamin A deficiency is responsible for almost 0.6 million child deaths/year. Improving vitamin A status of lactating mothers after delivery seems an obvious strategy to improve vitamin A status of mother and infant. Maternal high-dose vitamin A supplementation soon after delivery was recommended but recently cancelled by WHO as the efficacy was unclear. The present study investigated effects of inflammation and timing of the maternal high-dose vitamin A supplementation post-partum on vitamin A status in mothers and newborns.Methods. In a randomized, double-blinded placebo-controlled trial, 400 pregnant women were randomly assigned at 28–32 weeks gestational age, to receive 200000 IU vitamin A within 1 week after delivery (WK1) or 6 weeks post-partum (WK6). Vitamin A in breastmilk and plasma, and inflammation (CRP and AGP) were measured at several time points during the first 6 months post-partum. Results. Retinol concentrations during pregnancy and 6 months post-partum were strongly correlated (r=0.53, p < 0.001). Prevalence of vitamin A deficiency in mothers 6 months post-partum was low (4.3% and 2.2% for WK1 and WK6, respectively), but high in infants (46.2% and 42.4% deficient and marginal status,

respectively). Breastmilk vitamin A concentrations were deficient in 5% of the women first week post-partum, but increased to 28% of the women 6 months post-partum and tended to be higher in the WK1 compared to the WK6 group (24% and 32%, respectively, $p < 0.10$). Inflammation, retinol and hemoglobin concentrations in mothers, and mother-infant retinol concentrations were related ($p < 0.01$ for all).

Conclusions: Lactation caused depletion of vitamin A stores in mothers, resulting in a high prevalence of vitamin A deficiency in infants 6 months post-partum. Inflammation was not only an important determinant of plasma retinol concentrations, but delivery-induced inflammation may also result in reduced effectiveness of the post-partum high-dose vitamin A supplement.

Key words: vitamin A, post-partum, inflammation.

PO1042

MATERNAL MILK CALCIUM CONSUMPTION IMPROVES BIRTH SIZE IN RURAL INDIA

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Background and objectives: Studies in single generation highlight role of dairy calcium in modulation of body composition and obesity. There are hardly any intergenerational studies on this asset of dairy calcium. Pune maternal nutrition study (PMNS) investigated the influence of maternal size and nutrition in pregnancy on fetal growth. During current analysis we specifically studied the association of maternal calcium consumption with birth size.

Methods: PMNS was conducted in six villages near Pune. Nutritional status (anthropometry, dietary intakes-recall, FFQ) measured in 797 pregnant women and birth size data on 633 full term newborns is analyzed.

Results: Mothers were short (151.9±5.1 cm) and underweight (41.7±5.1 kg) and had low energy, protein and calcium intakes at 18wks of gestation (1763.1±504.5 Kcal, 45.5±14.3 g, 720.0±298.1 mg, respectively). Primary sources of calcium were cereals, pulses (60%) while ~10-15% was from GLV and milk. At birth mean weight (BW) and length were low (2665 g, 47.8 cm). Mothers having milk calcium (milkCa) intake in the highest tertile (32-220 mg/d) had lower suprailliac skinfold thickness, fat mass and higher lean mass and gave birth to children with larger birth size (BW 2595 vs.2660 g, length 47.3 vs 47.9 cm, $p = 0.05$ both) than mothers in lowest milkCa tertile (0-2 mg/d). These effects were stronger in undernourished mothers (Pre-pregnancy BMI<25 kg/m2) At 18wks, in spite of having body fat above median (>26%) mothers consuming low milkCa (0-2 mg/d) gave birth to babies with smaller size in comparison to mothers consuming high milkCa (BW 2570 vs 2748 g, length 47.5 vs 48.6 cm), perhaps due to fact that mothers with low milkCa consumption could not spare the body fat for fetal growth.

Conclusions: In view of our findings milk can be a simple and easy solution for improving birth size in rural undernourished mothers.

Key words: fetal growth, birth size, dairy, calcium, India.

PO1043

IMPACT OF NUTRITION EDUCATION ON PREGNANCY WEIGHT GAIN AND BIRTH OUTCOME

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Background and objectives: Pregnancy weight gain and birth weight of newborn mortality in Bangladesh. We have analyzed the effect of nutrition counseling during the third trimester of pregnancy on weight gain, birth out come and breastfeeding.

Methods: The study was conducted in Maternal Care and Health Training Institute (MCHTI), Azimpur, and Mariestopes clinic, Bashbari, Dhaka. Monthly nutrition education was given to 155g pregnant women for last 3 months until delivery while the similar number of women selected randomly were given routine service. Body weight was measured monthly and within 24 hours after delivery. Breastfeeding practice was observed for 1 month after delivery.

Results: Body weight at the end of intervention was 59% higher in the intervention group compared to the comparison group (8.60 vs 5.38 kg, $p = 0.011$). The mean birth weight of babies born to the intervention group was19% (0.49 kg) more than babies born to comparison group (2.98 kg vs 2.49 kg, $p < 0.001$). In the intervention group, 2.7% babies were LBW compared to 44.7% in the comparison group ($p < 0.001$). Birth weight was positively associated with intervention, initial body weight of pregnant women, total weight gain during pregnancy and frequency of intake of khichuri ($p < 0.001$). Initiation of breast-feeding within 1 hour of birth was 86% in the intervention group compared to 56.7% in the control group ($p < 0.001$).

Conclusions: The showed 59% more weight gain, 94% reduction in low birth weight and 54% increase in early initiation of breastfeeding compared to the comparison group.

PO1045

NUTRITIONAL PROBLEMS RELATED TO CALCIUM INTAKE IN CHILDREN WITH LACTOSE INTOLERANCE

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Background and objectives: Lactose intolerance (LI) supposes some limitations on dairy consumption which could condition a lower calcium intake. The objective of this study is to analyze this hypothesis.

Methods: A Spanish sample from 5 Spanish cities (A Coruña, Barcelona, Madrid, Sevilla and Valencia) was studied and it included 505 children (259 males) aged 8-13 years. Dietary data were obtained by using a 3-day food record. A sanitary questionnaire was applied in order to know diseases of the participants, including those that suffered from LI.

Results: Those children with LI (1.39%) had a lower dairy consumption (1.42±0.85 servings/day) in comparison to those without LI (2.59±0.94 servings/day) ($p < 0.001$), although their consumption is correctly focused on cheese and yogurt consumption (1.06±0.69 vs 0.90±0.85 servings/day in children without LI, NS). No significant differences were observed in the consumption of other food groups between children with or without LI. However the lower milk consumption observed in children with LI in comparison to those without LI (0.37±0.61 vs 1.19±0.57 servings/day, respectively) conditions a lower calcium intake (635.1±213.8 vs 941.3±221.7 mg/day, respectively) ($p < 0.001$). Calcium recommended intake (RI) contribution was lower in the LI group (58.3±25.5%) in comparison to those without the disease (85.6±28.0%) ($p < 0.05$). 74.1% of healthy children and 100% of children with LI had calcium intakes below those recommended by Department of Nutrition (2011) (and 54.4% and 84.9% had calcium intakes below the EAR, respectively) (IOM, 2010).

Conclusions: Children with LI need specific guidelines regarding the consumption of dairy that they should consume (cheese, yogurt, milk without lactose, etc.) and regarding the consumption of calcium enriched food or calcium supplements, in order to cover the RI of the mineral, because a high percentage of these children has inadequate intakes.

Key words: children, calcium, dairy, lactose intolerance

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PO1046

INTAKE OF VITAMIN K AS MODULATOR OF INSULIN RESISTANCE IN A GROUP OF SPANISH SCHOOLCHILDREN

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Background and objectives: Vitamin K is involved in blood coagulation and bone maintenance, but can also suposse a benefit in glucose metabolism. Therefore, the aim of this study is to assess vitamin K intake and analyze their association with indicators of insulin resistance in schoolchildren.

Methods: 573 children (264 boys and 309 girls) of 8-13 years were studied. Dietary intake data was obtained using 3-day food records. Insulin resistance was estimated by the homeostasis model assessment (HOMA-IR): insulin (mU/ml) x glucose (mmol/l)/22.5.

Results: Considering the dietary reference intakes (DRI) of the Institute of Medicine (2001) (55 and 60 mcg/day in children of 8 years and older, respectively), the intake of vitamin K obtained (103.3±49.3 mcg/day) represents a 172.3±82.1% of the DRI, but 17.6% of schoolchildren failed to meet the DRI. Regarding the involvement of vitamin K in glucose metabolism is observed that schoolchildren with vitamin K intake above 1 mcg/kg/day have a significantly lower value of HOMA-IR (1.22±0.85) than those schoolchildren who have a lower intake of vitamin K (4.4%) (2.18±1.25) ($p < 0.001$). Using the logistic regression analysis and considering the influence of gender and age, it is observed that the risk of having a value of HOMA-IR higher to the P75 (1.63) is lower when the intake of vitamin K is 1 mcg/kg/ day or higher (OR=0.997 (0.995-0.999), $p < 0.05$).

Conclusions: The 17.6% of the schoolchildren have intakes of vitamin K lower than the DRI, moreover, those with lower intake of vitamin K have higher values of HOMA-IR. Therefore, future studies should focus on the analysis of whether a higher consumption of the vitamin may help in some cases of insulin resistance.

Key words: children, vitamin K, insulin resistance

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PO1047

CAN COMPLEMENTARY FEEDING BEHAVIOR CHANGE INTERVENTIONS ACHIEVE IMPACT AT SCALE?

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Background and objectives: The WHO Global Strategy on Infant and Young Child Feeding (2003) emphasizes that providing sound and culture-specific nutrition counseling to mothers of young children will help ensure that local foods are prepared and fed safely in the home. Complementary feeding behavior change communication has been identified as an effective intervention to improve infant and young child nutrition (Bhutta et al., 2008). Our objective in this study was to examine evidence concerning impact, cost-effectiveness, scalability and sustainability of behaviour change interventions (BCI) to improve infant feeding practices and growth.

Methods: We conducted a literature review to identify components associated with BCI's impact on nutritional status. We reviewed efficacy and effectiveness intervention trials published since 1999, by searching PubMed, EBSCO, Popline, Google Scholar and relevant review articles. Studies were included if they reported on the development and components of the intervention and provided data on the impact for children aged six to 24 months, in developing countries, using the outcomes of anthropometric change, nutritional intake, or change in targeted behaviors.

Results: Most programs utilized formative research to create clear and practical messages to enable behavior change. They combined multiple approaches such as counseling and social support. A few innovative programs utilized adult learning techniques while others mirrored commercial marketing techniques with social marketing. Many of the interventions aimed for sustainability through integration with the health system; however, they faced challenges where health systems were weak and health workers lacked capacity. Most studies reviewed programs of limited size and rarely reported cost-effectiveness or scalability potential.

Conclusions: There is evidence for impact of BCI on growth and infant feeding practices under program conditions. There is very limited reported evidence for cost-effectiveness, sustainability or bringing these programs to scale.

Key words: infant and young child nutrition, behavior change interventions, complementary feeding, scale-up.

PO1048

LIFE COURSE STAGES AND TRANSITIONS ASSOCIATED WITH WEIGHT GAIN IN OBESE MEN

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Background and objectives: Since complex human behaviour is at the root of obesity, it should also be studied on a micro-level, taking social context and specific relationships with food and roles of others across the life course into account. This study aimed to explore and describe in the obese man stages, transitions and the role of others in the life course, directing food trajectories and the experience of the self.

Methods: A qualitative, phenomenological approach was used, combining symbolic interactionism and life course perspectives to create a holistic view of obesity. Fourteen obese white South African men retrospectively described experiences of being obese through three individual, in-depth, unstructured interviews. ATLAS ti was used for data analyses by using codes and creating families and networks. Themes were identified and described.

Results: Three themes emerged: the meaning of food, the sadness of obesity, and coping with obesity. The obese man's eating habits were shaped by others, like his mother (childhood and adolescence), and his spouse, friends and work colleagues in young adulthood (around 30). Indulgence in eating was for the anticipated pleasure it brought. Transitions like marriage and career changes influenced food and weight trajectories with negative consequences for their self-experience. Overweight bodies gave rise to distressing physical constraints and emotional experiences of sadness. Regardless of numerous coping strategies, participants were not totally able to handle their plight. It actually deteriorated and impacted negatively on well-being.

Conclusions: Interaction with significant others during specific life stages is important in the development of food trajectories. Childhood is the stage at which the obese man learned food behaviour and attached meaning to food.

Key words: obese men, life course, trajectories, significant others, self.

PO1049

LEVEL OF ANEMIA AMONG ADOLESCENT GIRLS IN TRIBAL INDIA

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Background and objectives: India is the second most populous country in the world with 22.5 percent, adolescents. Adolescent girls need micronutrients to meet the body's increased demand for iron especially during menstruation. Pregnant adolescents who are underweight or stunted are more likely to experience obstructed labor and other complications. Anemia weakens women's ability to survive childbirth, makes them more susceptible to infections.

Methods: A cross sectional survey for anemia detection was conducted with a sample size of 709 adolescent girls from three blocks of Udaipur. Levels of anemia were defined as mild, moderate and severe. Reference values for anemia detection were taken as per Indian standards. Hemoglobin (Hb) level in g/dl as per RCH-II: Normal-Above 12 g, Mild-10.0-11.99 g, Moderate-8.0-9.99 g, Severe-below 8.0 g.

Results: Collectively from three blocks, 79% of adolescents found anemic (mild anemic - 48%, moderate and severe anemic-31%). The mean value of Hb for three blocks is 10.6 with 1.47 standard deviation, which indicates adolescents suffering from anemia. Out of three blocks, comparatively Jhadol block had higher anemia as it had only 9% girls with normal Hb and 49% adolescents moderately and severely anemic.

Conclusions: Anemia is highly prevalent in adolescent girls, especially girls who belong to tribal area. Strategies to reduce anemia of the adolescent girls are need of the hour in both the government and interventions supported by development agencies.

Key words: anemia, adolescent girls, India.

PO1050

A LONGITUDINAL STUDY OF IRON STATUS FROM PREGNANCY TO POSTPARTUM PERIODS

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Background and objectives: Iron deficiency anemia often occurs during pregnancy. However, pregnant women may possibly occur the hydremia because physiological blood is diluted due to an increase in circulating plasma volume and thus hemoglobin (Hb) concentration and hematocrit (Ht) level are relatively decreased. Therefore, it is very important for pregnant women to discriminate between iron deficiency anemia and hydremia.

Methods: 103 Japanese women (aged 31.7 ± 3.7 years) at 5-12 weeks of pregnancy were recruited from an antenatal clinic in Yokohama between November 2010 and March 2011. Collected data included anthropometry and obstetric measurements, with or without administration of iron, and blood samples at the first trimester, second trimester, last trimester, delivery and the first postpartum month.

Results: Maternal red blood cell count, Hb concentration, Ht level and serum iron concentration were significantly decreased at the second trimester, last trimester and delivery compared to the first trimester. However, in the first postpartum month, they were recovered to the same levels as the first trimester. Ferritin concentration was significantly decreased during pregnancy, and did not recover in the first postpartum month. The prevalence of maternal anemia (Hb < 11 g/dl, Ht < 33% (WHO)) was 4.9% at the first trimester, 41.7% at the second trimester and 53.4% at the last trimester. However, MCV and MCH fell within the criterions (MCV: 79.0-100.0 fL, MCH: 26.3-34.3 pg) in most of the subjects. In this study, low-birth-weight baby and preterm baby were only three and one, respectively. Therefore, it was suggested that not only women with iron deficiency anemia but also a number of women with hydremia, due to a physiological blood dilution, were estimated as maternal anemia.

Conclusions: There was the possibility to overestimate maternal anemia because of a physiological blood dilution.

Key words: pregnancy, iron deficiency anemia, physiological blood dilution.

PO1051

MEDITERRANEAN DIET ADHERENCE AND RISK OF FRACTURES IN OLDER PERSONS: RESULTS FROM THE THREE-CITY STUDY

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Background and objectives: The Mediterranean diet (MeDi) has well-known health benefits on the risk of mortality and several age-related diseases. However, the potential effect of a Mediterranean-type diet on the risk of fractures is unclear. The aim was to investigate prospectively the relationship between adherence to the MeDi and the risk of fractures in older persons.

Methods: The study sample consisted of 1482 subjects, aged 67 years and over, enrolled in the Three-City study in 2001-2002. The outcome of interest was incidence of self-reported hip, vertebral and wrist fractures. Over 8 years of follow-up, 155 individuals reported a fracture at any of the three sites. Adherence to a Mediterranean-type diet was assessed at baseline by the MeDi score, a 10-point Mediterranean-diet scale, based on food frequency questionnaire and a 24 h recall. Multivariate Cox regression were performed to estimate risk of fractures according to MeDi adherence.

Results: In analyses adjusted for age, gender, physical activity, energy intake, education, marital status, BMI, self-reported osteoporosis, osteoporosis treatment and calcium and/or vitamin D supplements, each additional unit of MeDi score was associated with a non-significant increased risk of fracture (HR=1.10, IC95% 0.-,99-1.-,21). Among MeDi components, a high consumption of fruits (>2 servings/day) and a low consumption of yoghurts (<1 serving/day) were significantly associated with a doubled risk of fracture of the hip (HR=1.95, IC95% 1.04-3.-,66) and the wrist (HR=1.98, IC95% 1.-,22-3.-,21), respectively. An inverse U-shaped association between alcohol intake and risk of fracture at any site was observed (HR high vs moderate=0.61, p for trend 0.03).

Conclusions: A diet closer to the MeDi is not associated with a decreased risk of fractures. This dietary pattern, characterized by a low consumption of dairy products and a high consumption of fruits, may not be considered as universal healthy dietary pattern.

Key words: Mediterranean diet, fracture, aging.

PO1052

ADEQUACY OF FOLATE INTAKE DURING PREGNANCY: THE ROLE OF FLOUR FORTIFICATION AND DIETARY SUPPLEMENT

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Background and objectives: The folate during pregnancy plays a relevant role in preventing some adverse effects on maternal and fetal health. The aim of the present study was estimate the adequacy of folate intake contained naturally in foods, and the role of the flour fortification on the adequacy of the nutrient among pregnant women. Additionally, the dose of folic acid supplement recommended internationally was simulated to evaluate if the nutritional requirements during pregnancy would be achieved.

Methods: Prospective study conducted among 82 adult pregnant in Ribeirao Preto, Brazil. Food intake was assessed by 3 dietary recalls during pregnancy and the adequacy of the nutrient was evaluated by the Estimated Average Requirement (EAR) as the cutoff point. The planning approach for the homogenous groups was used to simulate the effect of the dose of folic acid supplement.

Results: It was found that 100% and 94% of pregnant women reported inadequate dietary intakes of dietetic folate and folic acid, from fortification, respectively (EAR < 520 μg). Considering a dose of 0.4 mg/day of the folic acid supplement, it was observed that 99% of pregnant women had their nutritional requirements achieved.

Conclusions: High proportion of pregnant women had diets with inadequate folate content, and the fortification of wheat and corn flour had little impact in improving the availability of this vitamin. The dose of folic acid supplement recommended by international organizations, added to the content of dietary folate, was adequate for the pregnant women evaluated.
Funding: FAPESP (2011/03781-8), FAEPA.

Key words: pregnancy, food intake, folic acid, dietary supplements.

PO1053

DIET QUALITY DIFFERENCES IN URBAN AND RURAL ADOLESCENTS AND SOCIOECONOMIC ASSOCIATED FACTORS. A TUNISIAN STUDY

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Background and objectives: Diet quality (DQ) is an important determinant of adolescent's health and should be assessed regularly in order to identify nutritional problems. The aim of this study is to assess DQ of Tunisian adolescents in urban and rural areas and identify socioeconomic associated factors.

Methods: Cross-sectional study (2005) concerned a clustered random sample (1019 adolescents, 15-19 y). Dietary intake assessed by a validated semi-quantitative frequency questionnaire (134 items). DQ estimated by Diet Quality Index International (DQI-I) global (/100) and component scores. Socioeconomic characteristics of the parents, lifestyle behaviour and

anthropometric measurements (weight, height) were recorded. The DQ scores examined according to socioeconomic factors. Adjusted relationships performed using logistic regression (good DQI-I (>60/100) vs poor).

Results: DQI-I was higher among urban (58.2(0.4)) vs rural adolescents (56.6(0.5), p = 0.014) but not different by gender in both areas. The variety, adequacy and balance sub-scores were higher in urban area. Inversely, the moderation sub-score was higher in rural area (p = 0.0002). The frequency of good DQ was higher in urban (40.7%) vs rural area (31.5%; p = 0.049). Contrarily to urban area, in rural area, the DQI-I was higher when the education level of the mother was secondary or more: 59.1(1.3) vs 56.4(0.5), p = 0.039; among adolescents of middle economic level households: 58.8(0.7) vs 57.3(1.7) for higher and 55.9(0.6) for lower, p = 0.0004; adolescents were at school (57.3(0.6)) vs others: (55.7(0.6), p = 0.019). After adjustment on BMI, perceived stress, low physical activity and sport's practice, DQI-I was higher for those having a working mother in urban area (OR:1.8(1.0-3.2), p = 0.045) and adolescents of middle economic level households vs low level in rural area (OR:2.0(1.2-3.3), p = 0.006).

Conclusion: Tunisian adolescents had a moderate DQ but higher in urban vs rural area. Dietary strategy for improving DQ should consider the socioeconomic context in urban and rural areas.

Key words: diet quality, socioeconomic factors, adolescents, Tunisia.

PO1054

METABOLOMIC STUDY OF THE EFFECT OF ANTIMETHANOGENIC TREATMENT ON RUMEN METABOLISM AT EARLY LIFE OF GOAT KIDS

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Background and objectives: The aim of this work was to study whether intervention with an antimethanogenesis compound (bromochloromethane, BCM) in early life of kids has an impact on rumen metabolism later in life.

Methods: Eighteen doe goats giving birth to two kids were used. Nine does were treated with BCM (D+) from birth of kids to 8 weeks. The other 9 does were not treated (D-). One kid per mother in both groups was treated with BCM (k+) while the other was untreated (k-), resulting in four experimental groups: D+/k+, D+/k-, D-/k+ and D-/k-. Rumen samples were collected from kids at weaning (8 weeks), a month after (when the treatment ceased) and 3 months later. Extracted samples were split for analysis on GC/MS and LC/MS/MS platforms.

Results: Valerate and acetate increased with time in all k- after weaning. In contrast, the time-dependent increase in valerate was less steep in k+ group after weaning. Treatment of does had an effect on phospholipase activity in kids after weaning. The most apparent effects of the maternal treatment of pre-wean kid rumen content was observed in medium chain fatty acids (MCFA C6-C14), which were greatly elevated in D+ kids. This effect for C9 and C11 MCFA, was mainly driven by the large increase in MCFA levels in kids from D+/k- group. Although MCFA would be mainly derived from maternal milk before weaning, many of these MCFA differences persisted 4 months after wean. Most of the differences did not match between D+ and D-, possibly suggesting additive effects of the doe and kid treatment on the global metabolic profile of ruminal content.

Conclusions: Our results suggest that a modulation of the rumen microbial colonization at early life, including the influence of the mother, caused differential metabolic profile that persisted after weaning, regardless of the post-wean treatment.

Key words: bromochloromethane, early life, metabolism, offspring, rumen.

PO1055

EFFECT OF ANTIMETHANOGENOGENESIS TREATMENT ON RUMEN METABOLIC PROFILE OF LACTATING GOATS.

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Background and objectives: Bromochloromethane (BCM) is one of the most effective methanogenesis inhibitors when fed to ruminants as reduces methane production by interfering with the cobamide-dependent methyl transferase step of methanogenesis. Our group has recently reported the effectiveness of using BCM in dairy goats on rumen fermentation and methane emissions. However, the effects on the rumen metabolism as a whole have not been investigated yet. The aim of this study was to study the effect of treating goats with an antimethanogenic compound (BCM) on changes on rumen metabolism.

Methods: Eighteen goats giving birth to two kids were used. Nine goats were treated with BCM (G+) after kids were born and over 8 weeks. The other 9 goats were not treated (G-). Rumen samples were collected at weaning. The extracted samples were split for analysis on GC/MS and LC/MS/MS platforms.

Results: Rumen content was a very metabolite-rich sample (473 named biochemical). The experimental treatment affec-

ted levels of amino acid, lipid and carbohydrate metabolites. Levulinate, a keto acid from complex carbohydrates, N-acetylmethionine, derived from protein breakdown or amino acid acetylation, pyridoxate, a B6 metabolite, and indoleacetate, a tryptophan metabolite, were lower in G+. Benzoic acid, generated from metabolism of phenylalanine and polyphenols, was also lower with BCM. Another phenylalanine product, phenethylamine, was elevated in rumen content of G+ animals. By contrary, ciliatine, which can serve as a source of nitrogen, carbon and phosphorous when degraded by bacteria, was elevated with the BCM treatment. Glycolysis intermediates were lower in BCM treated animals. Guanosine and cytosine, were higher and urate was lower in G+ goats. Palmitoyl ethanolamide was lower and oleic ethanolamide trended to be lower in animals fed BCM. GABA was elevated with BCM.

Conclusions: The inhibition of methanogenesis by BCM involves a substantial shift in different metabolic pathways in the rumen.

Key words: bromochloromethane, metabolism, rumen.

PO1056

HELMINTH INFECTIONS AND MICRONUTRIENTS IN SCHOOLCHILDREN: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background and objectives: Helminth infections and micronutrient deficiencies are both highly prevalent in developing countries. Neither condition typically causes overt disease but they do lead to indirect morbidity and impaired physical and cognitive development. We aimed to systematically review current evidence on the relationship of helminth infections with micronutrient status in schoolchildren worldwide.

Methods: We included both observational studies and RCTs. We used random effects meta-analysis 1) to estimate cross-sectional associations between helminths and micronutrient status; 2) to estimate anthelminthic treatment effects on micronutrient status, and 3) to estimate effects of micronutrient supplementation on helminth (re)infection.

Results: Meta-analyses of observational studies showed a significant association between helminth infections and serum retinol (SMD (standardized mean difference) -0.30 [-0.48;-0.13]) but not serum ferritin (SMD 0.00 [-0.7;0.7]). Conversely, meta-analyses of anthelminthic RCT studies did show a positive effect on ferritin (SMD 0.14 [0.08;0.20]) but not on retinol (SMD 0.04 [-0.06;0.14]). We did not find enough studies to pool data on other micronutrients besides ferritin and retinol. When evaluating helminth (re)infection rates in micronutrient supplementation studies, only multi-micronutrient interventions showed a modest protective effect (OR 0.77 [0.61; 0.97]).

Conclusions: We found significant associations between helminth infections and micronutrient status in schoolchildren. Our results showed distinct associations with either serum retinol or serum ferritin. More evidence is needed to further unravel the interrelationship between helminth infections and micronutrient status.

Key words: helminth, micronutrient, children.

PO1057

TRENDS OF COMPLEMENTARY FEEDING INDIATORS IN CHILDREN AGED 6-23 MONTHS IN TANZANIA FROM 2004-50 TO 2010

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Background and objectives: Sub-optimal complementary feeding practices are associated with poor nutrition status and contribute to high mortality rates among young children in many developing countries. The aim of this study was to determine trends in complementary feeding indicators among children aged 6-23 months in Tanzania from 2004-05 to 2010.

Methods: The study was a secondary analysis of cross-sectional data from the 2004-05 and 2010 Tanzania Demographic and Health Surveys. These surveys used a multi-stage cluster sample of 10312 in 2004-05 and 10300 in 2010 from eight geographic zones in Tanzania. The sample consisted of 4755 infants aged 6-23 months in both surveys. All statistical analyses were performed using Stata 10.0. Differences in prevalence estimates in complementary feeding indicators were expressed as percentages comparing between the two surveys periods using a chi-square to test the significance of differences at $p < 0.05$.

Results: The percentage of children aged between 6-8 months who received soft, semi-solid or solid foods increased significantly from 77% in 2004-05 to 92% in 2010. The prevalence of minimum dietary diversity was low (40%) in 2004-05 and remained unchanged (38%) in 2010. Similarly, the prevalence of minimum meal frequency decreased significantly from 45% in 2004-05 to 34% in 2010 ($p < 0.001$). The prevalence of minimum acceptable diet decreased significantly from 19% in 2004-05 to 14% in 2010.

Conclusion: Tanzania has made significant progress in increasing the proportion of infants aged 6-8 months who receive soft, semi-solid or solid foods as determined by the 2004-05 and 2010 surveys but minimum dietary diversity, minimum meal frequency and minimum acceptable diet fall short of WHO recommendations. Findings from this study should help public health researchers and policy makers to reflect, plan and evaluate actions needed to support and encourage appropriate complementary feeding practices.

Key words: complementary feeding; dietary diversity; meal frequency; acceptable diet.

PO1058

MATERNAL WORKING CHARACTERISTIC IS ASSOCIATED WITH CHILD UNDERWEIGHT IN URBAN MIDDLE-CLASS FAMILIES OF INDONESIA

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Background and objectives: Children undernutrition is seen alongside the rise of middle class communities and increased women's participation in the workforce. Few studies explored the relationship between maternal employment and child malnutrition amongst the emerging middle class in developing countries. This study aims to assess whether maternal employment characteristics and having a non-maternal caregiver were associated with child underweight in an urban area of Indonesia.

Methods: The study was designed as a case-control study involving 288 (109 cases and 179 controls) children aged 12-36 months. Cases were mild to moderately underweight children, while controls were normal weight children. The data collection methods consisted of anthropometry measurements and structured interviews pertaining to socio-demographic characteristics of the families, maternal employment characteristics and availability of caregivers, feeding practices, child illnesses in the preceding 2 weeks and support for mothers and caregivers.

Results: Mothers working outside the home for less than 20 hours per week (informal work) was associated with 6.04 higher odds (CI = 1.20–30.57, $p = 0.030$) of their children being underweight, compared to mothers working outside the home for more than 40 hours per week (formal work), adjusted for child care arrangement and child characteristics, suggesting that mothers with secure income and a formal occupation conferred an advantage for child nutritional status. Having non-maternal caregiver was not significantly associated with child underweight.

Conclusions: The mechanism of positive impact of formal working mothers on child nutrition in Indonesian urban middle class communities may be through the stable care arrangement in the absence of mother and the increased women's income spent on child resources. Nutrition and child health policy responses should be directed to provision of alternative high standard child care arrangements for dual-working parents in Indonesia and other developing countries.

Key words: child care practices, women employment, child underweight, Indonesia.

PO1059

TRENDS OF BREASTFEEDING INDIATORS IN TANZANIA FROM 1999 TO 2010

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Background and objectives: Optimal breastfeeding practices are important to protect against child mortality, and morbidity, and promote optimal growth and development of young child in low- and middle-income countries. Our aim was to examine trends in breastfeeding indicators among children aged 0-23 months in Tanzania between 1999 and 2010.

Methods: The sample included 7603 children aged 0-23 months from Tanzania Demographic and Health Survey data from 1999 to 2010. We examined trends in breastfeeding indicators, which were defined using 2008 World Health Organisation recommended methods. Differences in prevalence estimates in breastfeeding feeding indicators were expressed

as percentages comparing between the three surveys periods using a chi-square to test the significance of differences at $p < 0.05$.

Results: Only 59.0 % of mothers initiated breastfeeding within the first hour of birth in 2004/5 and this was reduced to 46.1% in 2010. Prevalence of exclusive breastfeeding in infants aged 0-5 months was 31.8%, 41.3% and 49.9% in 1999, 2004/5 and 2010, respectively. The proportion of infants (0-5 months) who were "predominantly breastfed" declined significantly from 59.8% in 1999 to 16.8% in 2010. More than 91.0% of mothers breastfed up to 1 year in all surveys but the proportion decreased to 57.2% , 55.5% and 51.1% in 1999, 2004/5 and 2010, respectively, for children at 2 years of age.

Conclusions: Tanzania made significant improvements, regarding exclusive breastfeeding for six months and continued breastfeeding up to 1 year, from 1999 to 2010. There was a significant decline in early initiation of breastfeeding within one hour after birth and continued breastfeeding up to two years from 2004/5 to 2010. These findings highlight the need for effective nutritional programs to promote early initiation of breastfeeding and continued breastfeeding of infants up to two years.

Key words: early initiation of breastfeeding, exclusive breastfeeding, predominant breastfeeding, continued breastfeeding, Tanzania.

PO1060

A STUDY OF DIETARY AWARENESS OF MOTHERS AND THEIR INFANTS

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Background and objectives: In recent year, the number of people affected lifestyle-related disease has been increasing in Japan. It is thought that provide adequate dietary education is necessary from childhood to prevent lifestyle-related disease. The purpose of this study is to built up a brand-new program for nutritional education in childhood, we surveyed some questionnaires for mothers.

Methods: The participants in this survey were 19 mothers in Toyama city, Japan. We surveyed mothers of children who go to kindergarden. (n=19)

Results: About 80 per cent of mothers and about 90 per cent of their infants surveyed stated that they enjoy a meal. In Japan, before eating you say 'gitadakimasu' and after you have finished you say 'ggochisosama'. Dining manners observed about 80 per cent of mothers and their infants. They can learn dining manners 'hitadakimasu' and 'ggochisosama' in the home.

Conclusions: 0 per cent of mothers surveyed that they do not know nutrient requirement necessary for family. Though, about 60 per cent of mothers surveyed stated that they think intake necessary nutrients in a day.

Key words: dietary education, lifestyle-related disease, dietary awareness.

PO1061

EFFECTS OF QUERCETIN SUPPLEMENTATION AND EXERCISE ON MITOCHONDRIAL BIOGENESIS IN RAT MUSCLE

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Background and objectives: Quercetin increase muscle fatigue resistance by inducing muscle mitochondrial biogenesis as observed after 7 days of 12.5 mg/kg to 25 mg/kg supplementation in mice. But no ergogenic effects were found after 6-wk quercetin ingestion in both sedentary and exercised rats. Thus, the aim of the present study was to test if chronic quercetin intake is able to enhance mitochondrial biogenesis in sedentary and exercised rats.

Methods: Male Wistar rats were randomly allocated into quercetin exercised (n = 9), quercetin sedentary (n = 8), no-quercetin exercised (n = 8), no-quercetin sedentary (n = 8). Treadmill exercise training took place 5 days a week for 6 weeks. Quercetin groups were supplemented (25 mg/kg of quercetin) via gavage on alternate days. All rats were anesthetized with pentobarbital and were bled by cannulation of the aorta 48h after the last exercise. Muscle was immediately collected and stored in liquid nitrogen. Gene expression of different genes (peroxisome proliferator-activated receptor coactivator 1, PGC-1α; NAD(+)-dependent histone deacetylases, SIRT-1) was quantitatively assessed by real-time PCR using α-actin as the normalizing gene. Mitochondrial content was estimated as the ratio between copy numbers of mtDNA vs nuclear DNA (αactin).

Results: Both exercise ($p < 0.05$) and quercetin ($p < 0.001$) supplementation increased PGC-1α mRNA levels. Quercetin supplementation during exercise abolished ($p < 0.001$) the quercetin induced increase ($p < 0.001$) in SIRT1 mRNA expression. Moreover, the combination of exercise and quercetin supplementation caused lower ($p < 0.05$) mtDNA content when compared to exercise alone.

Conclusions: Quercetin supplementation do not alter skeletal muscle mitochondrial DNA content in sedentary rats. However, the combination of training and quercetin supplementation compromise exercise induced SIRT1 mRNA expression and possibly compromised mitochondrial DNA content.

Key words: quercetin, exercise, mitochondrial biogenesis.

PO1062

EFFECTS OF QUERCETIN SUPPLEMENTATION AND EXERCISE ON PGC-1 ALPHA AND SIRT1 IN RAT BRAIN

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Background and objectives: Quercetin is thought to increase brain mitochondrial biogenesis as observed after 7 days of 12.5 mg/kg to 25 mg/kg supplementation in mice. This effect was associated with an increased running time to fatigue. However, in a previous study, we found no ergogenic effect of quercetin neither in sedentary nor in exercised following 6-wk of quercetin intake. Thus, the aim of the present study was to test the hypothesis that long-term quercetin supplementation will not increase PGC-1α or SIRT1 in the brain of neither sedentary nor exercised rats.

Methods: Male Wistar rats were randomly allocated into quercetin exercised (n = 9), quercetin sedentary (n = 8), no-quercetin exercised (n = 8), no-quercetin sedentary (n = 8). Treadmill exercise training took place 5 days a week for 6 weeks. Quercetin groups were supplemented (25 mg/kg of quercetin) via gavage on alternate days. All rats were anesthetized with pentobarbital and were bled by cannulation of the aorta 48h after the last exercise. Muscle was immediately collected and stored in liquid nitrogen.. Gene expression of different genes (peroxisome proliferator-activated receptor coactivator 1, PGC-1; NAD(+)-dependent histone deacetylases, SIRT1) was quantitatively assessed by real-time PCR using α-actin as the normalizing gene.

Results: The exercised groups showed a quercetin-induced 98% decrease ($p = 0.003$) in PGC-1α and a 194% decrease ($p < 0.01$) in SIRT1. Quercetin supplementation during exercise inhibits the expression of exercise-induced SIRT1 and PGC-1α in the brain.

Conclusions: Long-term quercetin intake is able to enhance mRNA levels of some genes related to mitochondrial biogenesis in brain, as previously described. However combination of exercise and quercetin compromise these gene-related adaptations.

Key words: quercetin, exercise, brain; PGC-1α; SIRT1.

PO1063

FAT MASS INDEX (FMI), LEAN MASS INDEX (LMI) AND APPENDICULAR MUSCLE MASS INDEX (AMMI) IN PROFESSIONAL FUTSAL PLAYERS.

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Background and objectives: Futsal (FS) is a relatively new sport and there are no many studies about anthropometry and body composition of futsal players. This sport demands great mobility and players undergo a lot of changes along the match (accelerations and shorts sprints are performed). In this discipline is necessary to have an adequate strength. It seems interesting to determinate the amount of muscle and its distribution along the body through the valoration of different indexes, which have not found a wide application yet. The aim of this study was to determine the values of Fat Mass Index (FMI), Lean Mass Index (LMI) and Appendicular Muscle Mass Index (AMMI) in professional male futsal players.

Methods: Twelve professional male futsal players were included, and all of them agreed to participate in this study. After being subjected to whole body densitometry by dual X-ray absorptiometry, fat and lean body mass together with other parameters, FMI [fat (kg)/height (m)2], LMI [lean (kg)/height (m)2] and AMMI [arms and legs musculature (kg)/height (m)2] were calculated. Diet was recorded using 3-day records and nutrient intake was estimated using these data. The results were compared with the reference values from the NHANES and with the ones published by Schutz et al 2002.

Results: Considering FMI (mean: 3.69 kg/m^2), all of them had normal values, lower than the average for young men (4 kg/m^2). LMI's mean was 19.-,41 kg/m^2, higher than P50 18.-,9 kg/m^2. And finally AMMI's mean was 9.64 kg/m^2, supposing high values the ones over 9 kg/m^2.

Conclusions: We proposed the use of height-normalized indexes: LMI, FMI and AMMI in futsal players to avoid the

ambiguities that would be generated when these components are reported as percentages of body weight and/or by absolute weight.

Key words: futsal, anthropometry, muscle, body composition.

PO1064

ACCEPTABILITY OF SALADS IN SCHOOL MEALS CONSUMED IN REAL CONDITIONS IN THE MUNICIPALITY OF MURCIA, SPAIN

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Background and objectives: Hedonic evaluation of vegetables in school meals is limited, but necessary to optimize the consumption and contribute to improving of dining services. SENSOCOLE is a sensory evaluation project in school canteens, which has explored user´s preferences. The aim of this study is to evaluate user's preferences for salads served at school cafeterias and the real consumption.

Methods: Descriptive study of hedonic acceptance of food (7-point scale) by 8-12 y school cafeteria users. Participated 10 schools of Murcia City during a week, 5 in spring and 5 in autumn season of 2012; 515 salads were evaluated. School menu included a salad as garnish; the amount served and the remains of salads were weighed to estimate real consumption. Statistical differences were fixed at $p < 0.05$.

Results: 18% of the salads were not consumed; 86% included only fresh vegetables and 14% other components: tuna, egg or nuts. The overall hedonic grading of the salads was 5.14 (median 5), no difference with that included other components and only 16% had negative evaluations. Difference was observed in autumn 5.36 (median 6) and the spring rate of salads 4.71 (median 5) ($p < 0.05$). 66% of users leaving more than half of the quantity served in spring and 49% in autumn. The same trend was observed with second cycle users 5.31 (median 6) than the third 4.93 (median 5) ($p < 0.05$). No differences by sex had observed. The average consumption is 23.-,84±19.83 grams, which represents a third of the recommendation for fresh vegetables in school meals. No differences by school year and sex. Differences between seasons, being higher in autumn (26.81±21.6) compared to spring consumption (17.27±13.04) ($p < 0.05$).

Conclusions: Salads are highly valued but its consumption is low, indicating the need for sensory and nutritional education with vegetables in the school environment.

Key words: hedonic assessment, vegetable preference, school meal, Murcia.

PO1065

HOME ENTERAL NUTRITION SUPPORT IN SPANISH CHILDREN. DATA FROM THE PAEDIATRIC HOME ENTERAL NUTRITION REGISTER (NEPAD). TEN YEARS OF FOLLOW-UP.

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Background and objectives: To the best of our knowledge, the NEPAD registry is the only registry in the world with exclusively pediatric data. The objective was to analyze the results of the NEPAD (Spanish Pediatric Home Enteral Nutrition) registry.

Methods: Recompilation and analysis of the data from January 2003 to January 2013.

Results: 1314 children (51.3% males), 1440 episodes, from 28 hospitals were included. The median age of Home Enteral Nutrition (HEN) was 1.37 years (y) (IQR: 0.5-5.2). Diseases were classified into eleven groups, being neurological disorders the most frequent (31%). 90% of the children received tube feeding support. The first enteral access was nasogastric tube (NGT) in 52.7% of the cases followed by gastrostomy (G, 35.7%). Overall, a cyclic administration method was used in 62.7% of the cases, 8.4% received continuous infusion and 28.9% only bolus feeding. 71.6% used peristaltic pumps. The type of diet provided by tube was only enteral formula in 76% of the patients. The most common formula (43%) was paediatric polymeric. Only 32 patients (2.5%) received parenteral nutrition simultaneously. Nutritional support had concluded in 65% of episodes. The median duration was 0.4 y (IQR 0.13-1.5). 35% of the episodes are still open; their median duration is 3.3 y (IQR 1.95-6). Analysis of the data obtained with respect to disease groups revealed highly significant differences.

Conclusions: Numerous chronic diseases benefit from HEN. The modalities vary according to the underlying disease, being the neurologically impaired children the major population. Cyclic infusion is the most frequent administration method. Most patients use peristaltic pumps and complete formula. The main reason for HEN interruption was transition to oral feeding.

Key words: home enteral nutrition; gastrostomy; jejunostomy; enteral tube feeding; enteral registry.

PO1066

USE OF DEUTERIUM OXIDE TO MEASURE BREAST MILK INTAKE AMONG INFANTS BORN TO HIV NEGATIVE AND HIV POSITIVE MOTHERS

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Background and objectives: The World Health Organization recommends exclusive breast feeding for the first six months of life and continued breastfeeding up to two years. However, in many societies mothers practice mixed breast feeding. In Tanzania, breast feeding is commonly practiced but only small proportion of infants are exclusively breastfed and there is limited information on the quantity of milk consumed. The objective of this study was to determine breast milk intake among infants born to HIV negative and HIV positive mothers.

Methods: This was a longitudinal study. Eighty five mother-infant pairs attending Reproductive and Child Health Care clinics were recruited and followed up at 6 and 9 months post-delivery. Maternal and infant anthropometric measurements were taken. Breast milk intake was measured using the dose-to-the mother deuterium-oxide technique. Saliva from mother-infant pairs were collected and analyzed for deuterium enrichment by using Fourier Transform Infrared Spectrometry (FTIR) following standard procedures outlined by International Atomic energy Agency (IAEA).

Results: At three months post-delivery, the mean breast milk intake was 756±185 and 730±196 grams per day for in-

fants born to HIV positive and HIV negative mothers respectively. There was no significant difference in breast milk intake between infants born to HIV positive and those born to HIV negative mothers (p = 0.56). Exclusive breast feeding based on isotope technique was 20% at three months and 8.5% at six months post-delivery.

Conclusion: Breast milk intake at three months was within the normal range both among infants born to HIV positive and HIV negative mothers. Only few mothers (20%) at three months and (8.5%) at six months were practicing exclusive breast feeding, majority were practicing mixed breast feeding.

Key words: breast milk intake, HIV negative, HIV positive mothers, exclusive breast-feeding.

PO1067

INFLUENCE OF GINGER AND CINNAMON INTAKE ON INFLAMMATION AND MUSCLE SORENESS ENDUCED BY EXERCISE IN IRANIAN FEMALE ATHLETES

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Background and objectives: Ginger rhizomes (rich in gingerols, shogaols, paradols and zingerone) have been used in Asia for the treatment of asthma, diabetes, and pain, and have shown potent anti-inflammatory attributes. Common spices such as Cinnamon (including cinnamic aldehyde and cinnamyl aldehydeis) are used in food and many studies have focused on its anti-inflammatory components. Intense exercise can result in an inflammatory response to cell damage and also muscle soreness. The efficacy of dietary ginger and cinnamon as anti-inflammatory agents and their effectiveness in reducing muscle soreness has been investigated in limited studies on humans. Therefore, we have studied the effects of dietary ginger and cinnamon on inflammation and muscle soreness in Iranian female taekwondo players.

Methods: Sixty healthy, trained women, aged 13-25 years, were enrolled in the six weeks investigation and randomly categorized into three groups (cinnamon, ginger or placebo) and received 3 g of ginger, cinnamon or placebo powder each day, depending on the group they belonged to. The IL-6 level and Likert Scale of Muscle Soreness were evaluated at the beginning and the end of the study and compared among the groups.

Results: Forty-nine of the participants completed the six-week intervention. There were no significant changes in the IL-6 cinnamon and ginger group when compared with the placebo group, whereas, there was a significant fall in muscle soreness in the cinnamon group and placebo ($P < 0.1$) and ginger group and placebo ($P < 0.01$).

Conclusions: Administration of ginger and cinnamon in athlete women for six weeks did not show any significant change in the IL-6 level, but showed a decrease in muscle soreness in the cinnamon and ginger groups.

Key words: Athletes, cinnamon, ginger, inflammation, muscle soreness

PO1068

QUERCETIN SUPPLEMENTATION DOES NOT ATTENUATE EXERCISE PERFORMANCE AND BODY COMPOSITION IN YOUNG FEMALE SWIMMERS

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Background and objectives: Quercetin is a health-enhancing antioxidant bioflavonoid. This flavonoid occurs in variety of natural fruits and vegetables such as apple, cranberry, onion, broccoli, and teas. Many studies have shown that quercetin has possible positive effects on exercise performance. The aim of this study is the evaluation of effects of quercetin supplementation on VO2max and exercise performance in female athletes.

Methods: This study was done on 26 young female swimmers. Participants were assigned in to groups and supplemented orally for 8 weeks with either Quercetin (Solaray®, USA, Inc) or placebo (dextrose). Before and after intervention, athletes performed a continuous graded exercise test (GXT) on an electronically braked cycle ergometer (Lode, The Netherlands) to determine VO2max and time to exhaustion (TTE).

Results: Participants in the quercetin group consumed higher energy and protein and lower carbohydrates and fats. There was no significant differences in VO2max, TTE, lactate, and body fat between pre- and post-supplementation neither in the placebo group nor in the quercetin group.

Conclusions: It is concluded that quercetin supplementation (1000 g/day) for 8 weeks in female athletes didn't show any significant association with exercise performance.

Key words: Performance, quercetin, swimmers

PO1069

DIETARY BEHAVIORS AND NUTRITIONAL ASSESSMENT OF YOUNG MALE ISFAHANI WRESTLERS

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Background and objectives: Young athletes have more nutritional needs than other adolescents because of physical activity and physical development. Optimal athletic performance results from a combination of factors including training, body composition, and nutrition. Despite the increased interest in nutrition and use of dietary supplements to enhance performance, some athletes might be consuming diets that are less than optimal. In wrestling it is common practice to optimize one's body composition and body weight prior to a competition season. This often includes a change in dietary intake or habits.

Methods: Twenty-eight wrestlers, between the ages of 17 and 25 years, participated in this study. Dietary intakes of micro and macro nutrients were collected by face-to-face interview, structured food frequency questionnaire (FFQ). Dietary intake of energy, carbohydrates, fats and proteins and micronutrients was evaluated.

Results: Mean intakes of energy, carbohydrates, proteins and fat were higher than recommended dietary allowances (RDA). The mean intakes of all vitamins and minerals were higher than the RDAs in these wrestlers, except for vitamin D, biotin, zinc, iodine, chrome and molybdenum.

Conclusions: On the basis of our results, nutritional education should be given to these subjects and their families for promoting healthy eating habits.

Key words: Athletes, dietary behavior, nutritional status, wrestlers

PO1070

EFFECT OF EIGHT WEEKS OF QUERCETIN SUPPLEMENTATION ON EXERCISE PERFORMANCE, MUSCLE DAMAGE AND BODY MUSCLE IN MALE BADMINTON PLAYERS

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Background and objectives: Quercetin is a bioflavonoid which occurs in many food items. Some previous studies on quercetin showed inconsistent results on exercise performance, muscle damage and body muscle in athletes. The aim of this study was to determine the effects of eight weeks of quercetin supplementation on exercise performance, muscle damage indices and body muscle in badminton players.

Methods: This placebo-controlled, double-blind clinical trial was conducted on 26 badminton players for eight weeks. The subjects were randomly assigned to one of two groups to receive daily quercetin (1000 mg) or placebo (1000 mg dextrose). VO2 max and time to exhaustion (TTE) for measuring performance and body fat percentage (BFP) were measured before and after intervention. Plasma samples were obtained for the determination of plasma lactate before and after intervention.

Results: Lactate concentration, body fat percentage and VO2 max did not show any significant difference ($p > 0.05$) after eight weeks of supplementation with placebo and quercetin between two groups and within one group. There was a significant increase in TTE after intervention in the quercetin group ($p < 0.05$) but a significant change was not observed in the placebo group ($p > 0.05$).

Conclusions: The current study shows that intake of quercetin may improve endurance exercise performance but may not reduce the body fat percentage.

Key words: body mass, exercise performance, muscle damage, quercetin.

PO1071

EVALUATION OF QUALITY OF LIFE OF INSTITUTIONALIZED ELDERLY AFTER RECEIVING MODIFIED MILK

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Background and objectives: The inclusion of sunflower oil, vitamin E and selenium in the diet of lactating cows could increase the quality of life for seniors supplemented with modified milk and bring benefits for their health. The objective of this study was to assess the change in quality of life of institutionalized elderly fed for 12 weeks with modified milk.

Methods: Both sex individuals, over 60 years, and that live in a long stay house were recruited. The volunteers were divided into 4 groups corresponding to the type of milk supplemented. Modified milk was obtained by the cows, which were also separated into 4 groups constituting: cows fed with control diet (I); cows fed with control diet plus vitamin E + selenium (II); cows fed with control diet with sunflower oil (III) and cows receiving sunflower oil + vitamin E + selenium (IV). The addition of nutrients to each group enhanced the nutritional value of the milk. Each volunteer received, daily, three milk preparations (250 ml). The evaluation of the quality of life of the elderly was performed by the SF-36, which was applied before the start of the experiment and 12 weeks after supplementation.

Results: A total of 30 individuals were assessed: 9 of group I, 6 of group II, 7 of Group III and 8 of Group IV. A statistical analysis by mixed effects model showed no significant difference in the quality of life in any of the intervention groups, p = 0.5981 (I), p = 0.7606 (II), p = 0.8291 (III) e p = 0.8953 (IV).

Conclusions: Performing a preliminary analysis on quality of life, it was not observed any change in the elderly before and after supplementation.

Key words: elderly, milk, quality of life.

PO1072

EATING DISORDERS IN CHILDREN STUDENTS OF A SÃO PAULO PRIVATE SCHOOL ANSWER THE STANDARDIZED QUESTIONNAIRES (EAT-26, BITE AND BES QUESTIONNARIES)

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Background and objectives: The great importance assigned to body image nowadays influence the identity and relationships of children and adolescents, who are constantly exposed to unrealistic and health-detrimental standards of beauty, often leading to unattainable body image ideals that result in eating disorders, disabilities, feelings of frustration and self-image issues. This study aims to evaluate the presence of eating disorders in preadolescents and adolescents from 6th grade to the last year of high school whose presented risks of developing eating disorders. in a school in the State of São Paulo,

Methods: A transversal study analyzed the answers of 191 schoolchildren, from ages 11 to 18, attending a private school in the State of São Paulo. Each child answered 3 standardized questionnaires, the Eating Attitudes Test (EAT-26), the Bulimic Investigatory Test Edinburgh (BITE) and the Binge Eating Scale (BES).

Results: The results showed a tendency to engage in binge eating among children from 6th to 8th grades. A higher prevalence of anorexia and bulimia was detected in subjects attending high school. Overall, 29.5% of the sample presented risk of developing anorexia, 26,2% risk of developing bulimia nervosa, 5.2% risk of binge eating and 1.1% severe bingeing.

Conclusion: It is possible that globalization contributes negatively by spreading poor eating habits among the population, thus making eating disorders more frequent. More studies focusing on childhood pathological eating behaviors are warranted to devise preventive strategies and to teach better coping skills in the face of social and media influences.

Key words: eating disorders; adolescents; eating behavior.

PO1073

A FORMATIVE ASSESSMENT OF COMPLEMENTARY FOODS AND FEEDING PRACTICES IN THREE REGIONS OF GHANA

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Background and objectives: Infant and child feeding practices starting from birth are crucial and can impact immediate and long term nutritional status. This study was conducted to understand the major issues associated with complementary feeding, health and food security in the Upper West, Greater Accra, and Central regions of Ghana.

Methods: The study was a qualitative assessment involving one rural, one urban and one peri-urban community. Assessment tools included key informant interviews and focus group discussions. Individual interviews were conducted with mothers with children aged 6-24 months of age, community health workers, regional directors (Nutrition) and District Health Service Directors. Focus group discussions were held with village elders and mothers with children aged 6-24 months. Data were collected on infant feeding practices, food security, health and sanitation, infant and young child nutrition issues, complementary feeding practices and use of specific complementary foods. Responses from study participants were recorded, transcribed and reviewed to identify specific themes. Analysis was done based on themes.

Results: Fifty six respondents participated in the study. Health officials all agreed that the main nutrition problems in infants and children 6-24 months were underweight due to poor feeding practices after 6 months of age. There is no specific complementary feeding program targeting prevention of malnutrition in children aged 6-24 months. Lack of proper hygiene and sanitation were major issues. Mothers reported exclusive breast feeding at least until 6 months of age, with total breast feeding period ranging 18-24 months. At 6 months of

age, the most common complementary food given by mothers in all three regions is koko (fermented maize dough porridge).

Conclusion: Breast feeding until 6 months of age was a common practice. Most complementary foods were cereal-based. Interventions that will promote appropriate complementary feeding practices are needed.

Key words: complementary foods, child feeding practices, nutritional status.

PO1074

DIETARY DIVERSITY AS AN INDEX OF INFANT NUTRITION, HEALTH, AND DEVELOPMENT IN RURAL INDIA

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Background and objectives: Dietary diversity is required during the second half of infancy to meet the high nutrient demands caused by rapid physical and neurological growth. This study examines how caregiver report of infant dietary diversity is related to infant nutrition, health, and developmental status in rural areas of Andhra Pradesh, India.

Methods: A semi-quantitative food frequency questionnaire was developed and administered to 497 caregivers of infants (6-12 month). Dietary diversity was defined as the number of different types of food items consumed per week (scale, 0-28). Infant anthropometry (measured weight and length) and biomarkers for iron deficiency (ID:ferritin <12 µg/L or sTfR >2.5 mg/l) and inflammation (CRP >10 mg/l) were collected. Stunting (HAZ <-2), wasting (WHZ <-2), and underweight (WAZ <-2) were computed using WHO standards. Home stimulation (HOME Inventory), motor, language and visual reception (Mullen Scales of Early Learning) and socio-emotional status (Brief Infant-Toddler Socio-Emotional Assessment) were assessed. Multivariable linear or logistic regression models, adjusting for infant age, home stimulation, household assets, and maternal education were examined.

Results: Among infants 6-8 months, the mean dietary diversity score was 2.8 ± 2.6 (range, 0-15), among infants 9-12 months, it was 6.3 ± 3.3 (range, 0-17). In multivariable regression models, dietary diversity was negatively associated with stunting (OR=0.88; CI: 0.81, 0.96), iron deficiency (sTfR:OR=0.93, CI:0.86,0.99), and inflammation (CRP:OR=0.93; CI: 0.87, 0.99); and positively associated with visual reception (B=0.43; CI: 0.18, 0.68), fine motor (B=0.54; CI: 0.24, 0.84), and expressive language (B=0.56; CI: 0.27, 0.84). Dietary diversity tended to be associated with emotional competence (B=0.13: p = 0.07), but not associated with wasting, underweight, ferritin, gross motor or receptive language.

Conclusion: Caregiver reports of low infant dietary diversity are suggestive of negative health, nutrition, and developmental indicators among a sample of low-income families in rural India, even after adjusting for confounders. Support: Mathile Institute & Micronutrient Initiative

Key words: dietary variety, infant nutrition, development.

PO1075

DIETARY INTAKES AND EATING HABITS OF ELITE ATHLETES IN SERBIA: ARE THEY FOLLOW THE CURRENT SPORTS NUTRITION STANDARDS?

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Background and objectives: Adequate nutrition has been recognized as very important factor for good health, conditioning and performance in athletes. Therefore, the purpose of the present study was to assess dietary intakes and eating habits of elite Serbian athletes and to compare them with sports nutrition standards.

Methods: Data were obtained from 58 male athletes between January 2011 and January 2012. Sixteen were soccer players, 12 were basketball players, 13 were kayakers, 8 were judokas and 9 were wrestlers. Participants completed anthropometric measurements and dietary intake, energy expenditure, energy balance, carbohydrate, protein, fat, vitamins and minerals were recorded.

Results: Mean energy and carbohydrate intakes were below recommended values, with 34.5 % of the participants meeting their energy needs. Seventy-two percent of the participants fai-

led to consume the minimum amount of carbohydrates that is required to support training. Fat intake (expressed as % of total calorie intake) of the kayakers was higher than recommended, while the mean protein intake of all participants was within the optimal range (1.2-2.0 g/kg). All the groups of athletes had adequate dietary intake of iron, magnesium, vitamin C and vitamin B12. Only kayakers consumed adequate amount of calcium. Intake of fibers, vitamin B6, vitamin A and vitamin E for all the groups was below the recommended values. All the groups of athletes showed an excess of sodium and insufficient consumption of potassium.

Conclusions: The results of the present study demonstrated that the majority of athletes do not have a good nutritional status for the intake of a carbohydrates, fibers, vitamin B6, vitamin A, vitamin E and potassium. It is therefore suggested that effective dietary intervention measures, including educational programs on proper food selection and eating habits, are needed to improve the nutritional status of the athletes.

Key words: energy intake; micronutrients; nutritional status; athletes.

PO1076

EFFECTS OF ASTAXANTHIN SUPPLEMENTATION ON DNA STABILITY AND PARAOXONASE 1 ACTIVITY IN YOUNG SOCCER PLAYERS

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Background and objectives: The carotenoid astaxanthin (Asx) is naturally found in variety of aquatic organisms, such as microalgae, crustaceans and fish. Asx possesses antioxidant, free radical–scavenging and anti-inflammatory properties and also reported to afford benefits to human health. Thus, the purpose of the current study was to determine the effect of Asx on oxidative DNA damage and paraoxonase 1 (PON1) activity in young soccer players while following their habitual dietary intake and training program.

Methods: Sixteen players were assigned in a double-blind fashion to Asx and placebo group. Blood samples were obtained before and after 90 days of supplementation. We used comet assay to investigate leukocyte DNA stability. The results were presented as DNA score and percent of cells with medium and high damage. We also determined PON1 activity in serum (using two different substrates: paraoxon and diazoxon), total sulphydril groups content (SH) and redox balance.

Results: DNA score and percent of cells with medium and high damage decreased significantly in both groups of soccer players after 90 days of training period ($p < 0.05$). The significant main effect of supplementation ($p < 0.05$) on PON1 activity toward paraoxon was observed. The PON1 activity toward diazoxon increased in Asx group after 90 days ($p < 0.01$), but not in the placebo group. SH groups content rose from pre- to post-supplementation period only in Asx group (supplementation and training, $p < 0.05$). Redox balance decreased significantly in response to the regular training, regardless of treatment group (training, $p < 0.001$).

Conclusions: Regular soccer training can have a protective effect against oxidative DNA damage and oxidative stress in young athletes, probably through upregulation of their antioxidant defenses. Asx supplementation had a beneficial effect in improving PON1 activity toward paraoxon and diazoxon, as well as total SH groups content in young soccer players.

Key words: soccer, oxidative stress, DNA damage.

PO1077

ASSOCIATION BETWEEN FAT INTAKE DURING PREGNANCY AND GESTATIONAL DIABETES

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Background and objectives: Few studies have evaluated the association between dietary intake during pregnancy and the occurrence of gestational diabetes. The aim of the present study was to evaluate the quality/quantity of fat intake during pregnancy and to observe whether this is associated with gestational diabetes.

Methods: A cross-sectional study was conducted among 800 healthy adult pregnant women. Food consumption was evaluated by a validated 85-item food frequency questionnaire (FFQ). The FFQ was administered between the 24th to 28th weeks of pregnancy. Gestational diabetes diagnosis was based on the International Association of Diabetes and Pregnancy Study Groups criteria (fasting plasma glucose ≥ 92 mg/dL, or 1-h glucose ≥ 180 mg/dL, or 2-h glucose ≥ 153 mg/dL). For the present analysis we examined the association of energy adjusted tertile of fatty acids intake during pregnancy and the occurence of gestational diabetes in multiple logistic regres-

sion models [OR (95% CI)], adjusted by maternal age, BMI, and energy intake.

Results: The mean (SD) age of participants was 28 (6) years old, and 19% had gestational diabetes. The mean (SD) saturated, monounsaturated, and polyunsaturated fatty acids intake estimated were 30 (17), 23 (13), and 12 (7) g/daily, respectively. Pregnant women classified in the upper tertile of saturated fat intake were more likely to develop gestational diabetes [OR 1.63 (IC 95% 1.01, 2.64)], when compared with women classified into the lower tertile. No associations between monounsaturated fatty acids intake [OR 1.17 (IC 95% 0.73, 1.87)], and polyunsaturated fatty acids intake during pregnancy [OR 0.88 (IC 95% 0.55, 1.38)] and gestacional diabetes were found.

Conclusion: Our data suggest that high intake of saturated fatty acid in early pregnancy is associated with a higher chance of developing of gestational diabetes. Funding: CAPES, CNPq (472221/2010-8).

Key words: gestational diabetes, food intake, fatty acids.

PO1078

PROTEIN INGESTION ENHANCES WHOLE BODY NET PROTEIN BALANCE AFTER PHYSICAL ACTIVITY IN HEALTHY CHILDREN

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Background and objectives: Physical activity is vital for normal musculoskeletal growth and development. Dietary protein ingestion after physical activity enhances whole body protein balance and can increases gains in lean mass in adults but its effects in children have yet to be investigated. We aimed to determine the impact of graded intakes of dairy protein on whole body protein synthesis (S), breakdown (B), and net balance (NB) over 9 and 24-h recovery periods after physical activity in healthy children.

Methods: Under 24-h dietary control, thirteen (7 males, 6 females) recreationally active children (11±1 y; 39.3±5.9 kg; mean±SD) consumed an oral dose of [15N]glycine prior to performing 45 min of physical activity (3x5 min running; 3x10 min cycling). Immediately after exercise, isoenergetic beverages containing a variable amount of protein (Control, C: 0 g/100 ml; Low Protein, LP: 0.75 g/100 ml; High Protein, HP: 1.5 g/100 ml) were consumed in a randomized, double blind, crossover fashion.

Results: Post-exercise protein intakes were 0.18±0.03 and 0.32±0.07 g/kg for LP and HP, respectively. S and B were significantly greater over 9 h as compared to 24 h with no differences between conditions. Consistent with the anabolic effects of exercise and feeding, NB was also greater over 9 h as compared to 24 h in all conditions (main effect time, $p < 0.001$). Over the early 9-h recovery period, HP was greater ($p < 0.01$) than LP and C with a trend ($p = 0.075$) towards LP being greater than C. NB was positive over 9 h for all conditions but only over 24 h for HP.

Conclusions: Dietary protein enhances net protein balance in children during recovery from activity; however, larger protein intakes (~0.32 g/kg) are required to maintain a positive protein balance over an entire 24-h period. Strategies to enhance net protein balance, and potentially musculoskeletal growth and development, in children should include the ingestion of high quality protein after physical activity.

Key words: children, protein, exercise, growth, muscle.

PO1079

NET POSTPRANDIAL PROTEIN UTILISATION OF 15N-LABELLED LAMB HYDROLYSATE IN OLDER ADULT HUMANS

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Background and objectives: Ageing is associated with metabolic and physiologic changes that may contribute to alter dietary protein digestibility and utilisation. In this study we evaluated the postprandial protein utilisation of 15N-labelled lamb hydrolysate in older adult humans.

Methods: Lamb meat was uniformly labelled with 15N in order to differentiate between endogenous and exogenous nitrogen fractions in blood and urine samples. Protein labelling was achieved by feeding lambs a diet formulated with 0.8 % 15N urea (10% enrichment) for 115 days. The final enrichment level of the lamb meat was 0.5 atom % excess. Sixteen healthy older adults (mean age = 71.0 ± 0.3 y) ingested 15N-labelled lamb hydrolysate (320 mmol N) in a balanced meal. Urine and serum were collected for 8 h following ingestion. The 15N-enrichment was determined in the serum amino acids and urea and in the urinary urea and ammonia fractions.

Results: The postprandial distribution of dietary N was 5.8 ± 0.9 % (of the ingested amount) in urinary urea and ammonia, 7.8 ± 0.8 % in body urea and 7.6 ± 0.7 % (of the ingested amount) in serum protein 8 h after the meal. The biological value of the lamb hydrolysate was 86.2 ± 1.5 % considering a true ileal digestibility of 98.4 %. The dietary nitrogen was highly utilized with a net postprandial utilisation of 84.5 ± 1.4 %.

Conclusions: The results demonstrate that the lamb hydrolysate is a dietary protein source that is highly utilised in the older adult human.

Key words: net postprandial protein utilisation (NPPU), hydrolysate The authors acknowledge Meat Biologics Research Limited (MBRL) for funding, Dr D Pacheco, AgResearch, New Zealand, for the 15N-labelled lamb meat and Dr A Awati, DuPont Industrial Biosciences, The Netherlands, for the true ileal digestibility data for the lamb hydrolysate.

PO1080

PRE-PREGNANCY BODY MASS INDEX AND MATERNAL WEIGHT GAIN ARE INDEPENDENT PREDICTORS OF NEWBORN BIRTH WEIGHT

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Background and objectives: Pre-pregnancy maternal weight, gestational weight gain and other maternal factors may influence pregnancy outcomes, especially birth weight, which is a contributing factor toward infant mortality, morbidity and child development. This study aimed to investigate the relationship between maternal characteristics including pre-pregnancy body mass index (BMI, kg/m2), parity, weight gain (kg), gestational age at delivery (wks) and their newborns and birth weight (BW, grams).

Methods: Healthy pregnant Thai women participated in the intervention study at Ramathibodi hospital, Bangkok. They were interviewed for pre-pregnancy weight and parity using a questionnaire. Pre-pregnancy BMI was calculated. Weight of mothers and newborns at delivery and gestational age were obtained from the hospital record.

Results: Three hundred and eighty singleton pregnant women with mean age of 30 years old and median baseline gestational age of 11 weeks were recruited in the study. Two-third of the women had normal pre-pregnancy BMI (BMI 18.5-24.9 kg/m2), while 17% were underweight (BMI <18.5 kg/m2) and 15% were overweight or obese (BMI ≥25 kg/m2). The mean newborns´ birth weight was 3.107±451 g and only 7% of the newborns were low birth weight (BW <2500 grams). When comparing the distribution of pregnant women by pre-pregnancy BMI group, about 40% gained weight appropriately. Stepwise multiple regression analysis showed that pre-pregnancy BMI (β=20.37, $p < 0.001$), parity (β=63.44, $p = 0.001$), weight gain (β=18.6, $p < 0.001$) and gestational age at delivery (β=159.18, $p < 0.001$) were positive predictors of newborns´ birth weight.

Conclusions: Maternal characteristics during pregnancy are significant predictors of their babies´ birth weight. Our findings suggest that in order to reduce low birth weight, weight counseling prior to pregnancy and weight gain monitoring during pregnancy may be beneficial.

Key words: pre-pregnancy body mass index, weight gain, gestational age, maternal characteristics, birth weight.

PO1081

BREASTFEEDING AT 3 MONTHS IS ASSOCIATED WITH LOWER RISK OF ADIPOSITY AND LIPID METABOLISM ALTERATIONS AT 4 Y OF AGE

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Background and objectives: Evidence of the relationship between breastfeeding and risk of obesity and cardiometabolic alterations later in life is inconclusive. Objective. To evaluate the association between breastfeeding at 3 mo with adiposity and markers of lipid metabolism at age 4 y.

Methods: Study subjects were offspring of women who participated in POSGRAD, a double-blind, randomized, controlled trial in which Mexican women were supplemented with 400 mg/d docoxahexaenoic acid (DHA) or placebo from mid-pregnancy to parturition. Breastfeeding status at 3 mo. was classified as exclusive (EBF), predominant (PBF), mixed (MBF) and non-breastfeeding (NBF). Anthropometric measurements and markers of lipid metabolism from non-fasting blood were obtained at 4 y. Analysis. We analyzed the data as a cohort, with adjustment for group assignment. Adjusted means of adiposity and cardiometabolic indicators by type of breastfeeding were estimated using multiple linear regression models adjusted for sex, age, treatment, socioeconomic level and time since last food (for lipid metabolism markers).

Results: Among 593 children, prevalence of breastfeeding was EBF=14.7%, PBF=16.4%, MBF=52.0% and NBF=16.9%. Relative to NBF children, EBF children had lower [means (95%CI)] abdominal circumference [EBF 52.2 (51.4, 53.0) vs NBF 53.5 (52.7, 54.33) cm; $p < 0.05$], sum of subscapular and triceps skinfolds [EBF 14.5 (13.7, 15.3) vs. NBF 15.9 (15.1 vs 16.6) mm; $p < 0.05$], total cholesterol [EBF 155 (149.1, 160.7) vs NBF 165 (159.5, 170.8) mg/dl] and LDL cholesterol [EBF 78.6 (73.4, 83.8) vs NBF 88.2 (83.2, 93.3) mg/dl] at 4 y. PBF children had lower Body Mass Index [PBF 15.0 (14.7, 15.3) vs NBF 15.6 (15.3, 15.9) kg/m2; $p < 0.05$] and triglycerides [PBF 98.7 (88.7, 109.7) vs MBF 111.3 (105.0. 118.0) mg/dl] than the NBF group.

Conclusion: EBF and PBF at 3 mo were associated with lower risk of adiposity and lipid metabolism alterations at 4 y of age.

Key words: breastfeeding, adiposity, lipid metabolism alterations.

PO1082

PREVALENCE AND RISK FACTORS OF ANEMIA IN LACTATING WOMEN IN CHINA

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Background and objectives: World Health Organization recently estimates that over 40% of pregnant women and ~30% of non-pregnant women are anemic globally. The purpose of the study is to identify which subgroups of lactating women had a higher risk of anemia in China.

Methods: Lactating women were recruited for Chinese Human Milk Project in Beijing, Heilongjiang, Yunnan, Gansu and Shandong. Venous blood was collected and hemoglobin was measured by using Hemocue 301 for lactating women from 1 to 11 months postpartum (n=1523).

Results: The prevalence of anemia (defined <120 g/L after adjusting altitude) was 0.9 % in Beijing, 6.3% in Heilongjiang, 9.2% in Yunnan, 45.6% in Gansu and 7.4% in Shandong for these lactating women. The potential risk factors for anemia (16.6%) included the location of residence, prenatal anemia and postpartum duration. Compared to the lactating women living in Shandong, the adjusted odds ratio for anemia was 15.2 [7.3, 31.7] and 0.13 [0.02, 1.07] for those living in Gansu and those living in Beijing, respectively. The prevalence of anemia was similar between those living in Shandong and those living in Heilongjiang and Yunnan. Prenatal anemia was associated with 1.92 [1.23, 3.01] times higher odds of being anemic postpartum. With every 1 month increasing postpartum, lactating women had 0.94 [0.89, 0.99] lower adjusted odds ratio for being anemic.

Conclusion: Lactating women living in Gansu, with prenatal anemia and with shorter postpartum duration had greater risk for anemia.

Key words: anemia, lactating women, China

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PO1083

COMPARISON OF STUDENT'S DIET FOCUSING ON N-6/N-3 POLYUNSATURATED FATTY ACIDS BETWEEN IOWA STATE UNIVERSITY (ISU) AND UNIVERSITY OF HYOGO (UH).

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Background and objectives: Omega-3 Polyunsaturated fatty acids (n-3PUFAs) may be beneficial in preventing chronic diseases. Japanese traditionally eat much more fish than meat. However, the Japanese diet has become more westernized in recent years, especially in Japanese youth. The objective of this research was to study the differences in student diets between Iowa State University (ISU) and University of Hyogo (UH), focusing on fat intakes, and specifically n-6 and n-3 PUFAs intakes.

Methods: We analyzed 3 day dietary records of meal and a lifestyle questionnaire (living style, eating habit, and frequency of several food choices etc.). Energy and nutrients intakes were calculated using the Japanese software HealthyMakerPro and by the American software Food Processor, respectively. The nutrient intakes and questionnaire were analyzed using SPSS for Windows.

Results: Daily intakes of energy and nutrients were expressed as values per kg body weight. Intakes of energy, total fat, saturated fatty acids were not different between ISU and UH students. Cholesterol intake in ISU students (2.91± 1.78 mg/day/kg) is significantly lower than that in Japanese students (4.90± 2.20 mg/day/kg, $p<0.05$). The intake of n-3 PUFAs in UH students (1.36± 0.70 g/day) is significantly higher than in ISU students (0.78± 0.51 g/day, $p<0.05$). There was no significant difference in the intake amount of n-6PUFAs between ISU and UH. The ratio of n-6/n-3PUFAs (10.2) in ISU students is higher than the ratio in UH students (6.1). There was a significant difference between ISU and UH in the frequency of both fish and oily fish intakes ($p<0.05$).

Conclusions: The diets of Japanese youth are moving closer to that of American youth, but some cultural differences persist (fish intakes frequency) between ISU and UH.

Key words: n-6/n-3PUFAs, dietary intake, fish intake, japan, USA, college students

PO1084

ANEP IN BANGLADESH: ENABLING INFORMED NUTRITION CHOICES AND GREATER ACCESS TO NUTRITION FOODS

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Background and objectives: In Asia low income families often suffer from poor access to healthy foods and low ability to make good nutritional choices. The Agriculture and Nutrition Extension Project (ANEP) has been supporting vulnerable families to make healthy food choices in the south of Bangladesh and the Nepal plains since January 2012. The ANEP aims to sustainably raise agricultural productivity, promote effective market linkages and nutritional awareness to improve the nutritional behavior of poor rural and urban households. ANEP is a partnership between International Development Enterprises(iDE), World Fish, CIMMYT, IRRI, Save the Children, CODEC, CEAPRED, and BES and is funded by the European Union(EU).The project seeks to reach 16000 vulnerable households such as those with pregnant-lactating mothers, adolescent girls and children up to 5 years of age directly and 30000 households through value-chain.

Methods: This paper is based on baseline(October'12), formative research (December'12) and program data collected from three rural sub-districts and urban slums of Barisal.

Results: From both baseline and formative research, it was evident that food diversity was lower in urban slums then rural sites. The adolescent in the urban area have scored very poor (99% scored below 20) in nutritional knowledge scoring test. In its first year ANEP delivered some 308 urban nutrition sessions reaching 2500 HHs (with 99% female participation) in Bangladesh. Among the rural beneficiaries 300 demonstrations have been set up across the aquaculture, field crop and vegetable sectors. ANEP has developed and trained over 100 local service providers(LSPs) to make technology services available to small-holder farmers.

Conclusions: The baseline data suggests that using targeted nutrition education in combination with agricultural inputs and rural-urban market linkages delivers synergies which can improve nutrition behaviors amongst the most vulnerable.

Key words: agriculture, nutrition, rural-urban linkages.

PO1085

GESTATIONAL HYPERTENSION; RISK FACTOR; DIETARY INTAKE

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Background and objectives: We have previously shown that pregnancy induced hypertension (PIH) is associated with hypertension in a later period after delivery. Diet plays an important role in the development of hypertension, but the association of maternal diet with their future development of hypertension in PIH has not yet been studied. The present study was undertaken to dietary factor(s) is (are) involved in the association between GH and later life hypertension.

Methods: The study design had both a cross- sectional and retrospective component. A total of 140 women (age, 32.4±8.1 y, and BMI 25.1±4.1, kg/m2, M±SD) with a previous history of PIH in any pregnancy were included. Clinical and anthropometric parameters were measured by standard techniques, lipids were measured by enzymetic colorimetric method, Systolic blood pressure 130 mmHg or diastolic blood pressure 90 mmHg were taken as cut-off values for hypertension. Dietary intakes were assessed by Food Frequency Questionnaire (24 hr recall methods).

Results: A total of 140 women [age in years 32.4±8.1 y and BMI 25.1±4.1 kg/m2, (M±SD)] with a previous history of GH in any pregnancy were included. 49 Subjects (35%) developed hypertension over duration of 5 to 12 yrs. Total energy intake was higher in Htn [kcal, 2175.7±399.6] as compared to non-Htn [1239±483] subjects. The higher energy was contributed mainly by carbohydrate sources from rice (g/day, 582.1±6 vs 239±71.9). On logistic regression analysis, Htn showed a strong positive association with past history of PIH and total energy intake and Carbohydrate intake when the effects of age and BMI were adjusted.

Conclusion: Women with past history of PIH have more chance of developing hypertension and it may have an association with increased energy intake from carbohydrate sources.

Key words: gestational hypertension; risk factor; dietary intake.

PO1086

NUTRITIONAL STATUS ASSOCIATED WITH SOCIO-DEMOGRAPHIC VARIABLES AND FOOD SECURITY AMONG CHILDREN: A STUDY IN DISADVANTAGED RURAL BANGLADESH

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Background and objectives: Nutritional status of children in hilly, coastal and river-flooded areas remains unreported those are the most vulnerable disadvantaged communities. To develop a national policy for solving the nutritional problem of children in these areas, this study was undertaken to investigate nutritional status of children and its association with their socio-demographic variables and food security status.

Methods: A cross-sectional study was conducted in three different ecological zones, (river flooded, hilly/forest and coastal). Ten percent of the aggregate households in selected fifteen villages were interviewed. Three anthropometric indicators, viz, stunting, underweight and wasting were measured among 156 children aged 24-59 months and BMI was calculated among 246 children aged 60-119 months. Six child-referred questions were used to construct food security scale. Binary logistic regression analyses and Chi-square test were used.

Results: The prevalence of severe underweight, wasted and stunted among children aged 24-59 months were 44.9%, 31.7% and 14.1%, respectively, whereas 17.5% and 47.2% among children aged 60-119 months were severely stunted and underweight, respectively. Underweight was 41% less likely among boys as compared to girls. Children whose family had 3-4 children were 3 times more likely to be underweight than the children whose family had 1-2 children. Three anthropometric measures of child malnutrition were significantly associated with level of mother's education. High proportion of stunted, underweight, wasted children and children having lower values of BMI were food insecure.

Conclusion: Children of the studied population are at high risk of malnutrition. Effective motivational program should be taken to limit 2 children per household and increase female education including nutritional knowledge. Nutrition Rehabilitation Program for the children under 5 years and free nutritious food for school going children during school hour in rural disadvantaged areas of Bangladesh should be formulated and implemented.

Key words: anthropometric, children, nutritional status.

PO1087

A PAST HISTORY OF GESTATIONAL HYPERTENSION IDENTIFIES WOMEN AT RISK FOR HYPERTENSIVE DISEASE AND ASSOCIATED WITH DIET

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Background and objectives: We have previously shown that pregnancy induced hypertension (PIH) is associated with hypertension in a later period after delivery. Diet plays an important role in the development of hypertension, but the association of maternal diet with their future development of hypertension in PIH has not yet been studied. The present study was undertaken to study dietary factor(s) involved in the association between gestational hypertension (GH) and later life hypertension.

Methods: The study design had both a cross-sectional and retrospective component. A total of 140 women (age, 32.4±8.1 y, and BMI 25.1±4.1, kg/m2, M±SD) with a previous history of PIH in any pregnancy were included. Clinical and anthropometric parameters were measured by standard techniques, lipids were measured by enzymatic colorimetric methods, systolic blood pressure 130 mmHg or diastolic blood pressure 90 mmHg were taken as cut-off values for hypertension. Dietary intakes were assessed by food frequency questionnaire (24 hr recall methods).

Results: A total of 140 women [age 32.4±8.1 y and BMI 25.1±4.1 kg/m2 (M±SD)] with a previous history of GH in any pregnancy were included. 49 Subjects (35%) developed hypertension over duration of 5 to 12 y. Total energy intake was higher in hytpertensive (Htn) [kcal, 2175.7±399.6] as compared to non-Htn [1239±483] subjects. The higher energy was contributed mainly by carbohydrate sources from rice (g/day, 582.1±6 vs 239±71.9). On logistic regression analysis, Htn showed a strong positive association with past history of PIH and total energy intake and carbohydrate intake when the effects of age and BMI were adjusted.

Conclusion: Women with past history of PIH have more chance of developing hypertension and it may have an association with increased energy intake from carbohydrate sources.

Key Words: gestational hypertension; risk factor; dietary intake.

PO1088

THE EFFECT OF INTERMITTENT ANTENATAL IRON SUPPLEMENTATION ON INFANT OUTCOMES IN RURAL VIETNAM: A CLUSTER RANDOMISED TRIAL

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Background and objectives: The currently recommended maternal iron-folic acid (IFA) supplementation given daily in pregnancy in developing countries has had limited effectiveness in reducing anemia due to poor compliance and variable availability. We assessed the effect of daily IFA supplementation, compared with intermittent dosing of IFA or multiple micronutrients (MMN) during pregnancy, on maternal and infant outcomes in a rural province of Vietnam.

Methods: A cluster randomised controlled trial was conducted in Hanam Province. Pregnant women less than 16 weeks gestation (n=1258) residing in 104 communes, were randomly assigned to take either daily IFA, twice weekly IFA, or twice weekly MMN.

Results: At baseline, mean hemoglobin was 12.33 g/dl (SD 1.23), with an anemia prevalence of 12.6%. Prevalence of ferritin deficiency (2%), folate deficiency (1.2%) and B12 deficiency (0.2%) were low. More than 90% of women were iodine deficient. There was no difference in birthweight in infants of women receiving daily IFA, compared to twice-weekly IFA (p = 0.27) or twice-weekly MMN (p = 0.11).

Conclusions: A variety of antenatal micronutrient deficiencies are common in this setting, although ferritin, folate and B12 deficiency are not prevalent in early pregnancy. Twice weekly iron-folic acid is an effective alternative to daily iron-folic acid supplementation during pregnancy in rural Vietnam.

Key words: antenatal; iron and micronutrient supplementation; irthweight.

PO1089

MATERNAL VITAMIN D DEFICIENCY AND INFANT OUTCOMES IN RURAL VIETNAM

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Background and objectives: Vitamin D deficiency during pregnancy has been shown to result in significant adverse health outcomes for the mother and infant. Here we describe the prevalence of vitamin D deficiency during pregnancy in a rural setting in Vietnam, and assess the impact of this deficiency on neonatal and infant outcomes during the first 6 months of life.

Methods: Serum 25-hydroxyvitamin D concentrations of 960 pregnant women in Ha Nam province Vietnam, were measured at 32 weeks gestation, and infants were monitored until 6 months of age. Participants were part of a double-blind cluster randomized trial where pregnant women had been randomised to one of three micronutrient regimes.

Results: Eighteen percent (176/960) of women had serum 25-hydroxyvitamin D concentrations less than 50 nmol/L during late pregnancy. A reduced risk of preterm birth with higher maternal 25-hydroxyvitamin D concentration was observed. (Odds Ratio 0.78 per 20 nmol/L increase in vitamin D concentration, 95% CI 0.61 to 0.99).

Conclusions: Low 25-hydroxy vitamin D levels during pregnancy are of concern in rural Vietnam, and are associated with important neonatal and infant health outcomes. Strategies to increase vitamin D levels in pregnant women in this setting should be considered.

Key words:vitamin D; pregnancy; infant health.

PO1090

ANTENATAL AND EARLY INFANT RISK FACTORS FOR IMPAIRED INFANT GROWTH DURING THE FIRST 12 MONTHS OF LIFE IN RURAL VIETNAM

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Background and objectives: Adverse conditions occurring during early life may lead to long-term consequences for a child's future growth and development. We determined which factors occurring during pregnancy and the first six months of life were associated with impaired infant growth at 12 months of age, in rural Vietnam.

Methods: This observational cohort study was conducted in rural Ha Nam province, Vietnam. Participants were infants born of women who had been previously randomised to one of three micronutrient regimes during pregnancy, as part of a double-blind cluster randomized trial. Infant growth and nutritional status during the first 12 months of life were assessed and maternal and early infant factors associated with impaired infant growth were determined. Primary outcomes were height for age z scores, and prevalence of stunting at 12 months of age.

Results: At 12 months of age, 9.2% of infants were stunted, and mean height for age z score was -0.74 (SD 0.97). Multivariate analysis demonstrated factors associated with stunting at 12 months of age were male sex, maternal height less than 145cm, maternal education, and maternal body mass index.

Conclusions: Measures to reduce stunting in childhood should be targeted at increasing female education, and improving maternal nutritional status during pregnancy.

Key words: Growth and development; Pregnancy.

PO1091

THE RELATIONSHIP BETWEEN HOUSEHOLD FOOD SECURITY AND CHILD GROWTH IN BANGLADESH: DOES THE DEPTH OF DEPRIVATION MATTER?

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Background and objectives: Standardized perception-based food security measures seek to quantify food insecurity across cultures. In pursuit of this goal, reduced measures focusing only on the most severe indicators, such as going to bed hungry or going for a day and night without food, have been promoted as these elements correlate better across countries. However, no research has yet attempted to relate elements of the various depths of food insecurity to child growth or examine the mechanism through which these affect child growth.

Methods: Seasonal, cross-sectional data from two years of the Food Security and Nutrition Surveillance Project was aggregated (six surveillance rounds), resulting in a data set of 20507 mother and child pairs. The relationship of individual and composite indicators of food insecurity to child feeding and growth was examined using multivariate regression and child feeding practices were tested for mediation between household food insecurity and child growth.

Results: Child feeding practices differed by household food security status as did child growth outcomes. In addition, children in food secure households were found to have better growth outcomes even after accounting for child feeding practices and household dietary diversity. The elements of food insecurity that were not mediated by child feeding practices were the less severe conditions (worrying about obtaining food, eating less preferred food, and eating only rice).

Conclusions: Security is a requirement for mental and physical health. As such, the relationship between food security and the nutritional status of adults and children was not completely captured by examining the relationship between food insecurity and food choices. Furthermore, though useful as a cross country tool, studies within a culture should seek to include "milder" indicators of food insecurity and these have real implications for household well-being.

Key words: food-security, child-growth, well-being, IYCF .

PO1092

FOOD BELIEFS AMONG DIABETIC PREGNANT MOTHERS IN BANGLADESH

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Background and objectives: Pregnant mothers with diabetes, especially in developing countries, are particularly prone to suffer from dietary imbalances due to superstitions and irrational beliefs and practices. The aim of the study was to explore the existing beliefs and practices related to food intake during pregnancy among a group of Bangladeshi diabetic pregnant mothers.

Methods: One hundred diabetic pregnant mothers (age in yrs, M±SD, 30±4) were purposively selected from the OPD of BIRDEM (the tertiary care hospital of the Diabetic Association of Bangladesh). Majority of them were literate (96%). An interviewer-administered questionnaire was used to explore the beliefs and practices about the time of intake and the nature of food.

Results: 43% of the pregnant mothers believed that food should not be taken during the 'call for prayer' and 91% of these mothers practiced it. For 'eclipse' the percentage of such kind of belief was much higher (80%) and 90% of these mothers practiced it. With varying proportion for particular fishes 44-58% respondents believed that some fishes should be avoided due to the increased movement of child, fetal malformation and disease. Many of them (93%) actually practiced it. Twenty eight percent had adverse beliefs about duck, 78% about pineapple, 4% about blackberry nd 8% had misbeliefs about coconut. The corresponding percentages for practice were 82%, 99%, 75% and 50%, respectively. Mentally and physically abnormal child (like eye spot with pineapple, black skin with blackberry and white eyes with coconut), different kinds of child illness and threat of abortion were among the reasons for misbeliefs about food.

Conclusions: There are a number of nonscientific beliefs and prejudices among diabetic pregnant mother of Bangladesh regarding the intake of food. Educational awareness program should be needed for eliminating misbelieves during pregnancy.

Key words: beliefs, diabetes, pregnant mother.

PO1093

ASSOCIATION OF TELEVISION VIEWING AND DIETARY BEHAVIOR WITH OVERWEIGHT AND OBESITY IN PRIMARY SCHOOL CHILDREN OF DHAKA CITY

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Background and objectives: Childhood obesity is a major risk factor for cardiovascular disease and also increases risk for future diabetes. In a developing country like Bangladesh, televisions have become a important household item, particularly, TV advertisements may have a great impact on dietary behavior on children. The aim of the present study was to assess the possible association between dietary behaviour and television viewing with overweight or obesity in Bangladesh urban primary school children.

Methods: A cross-sectional study was conducted 1200 primary school children. Data were collected from Dhaka City. Participants (age 6-13 years) were randomly collected on the basis of predefined scoring. Subjects were classified as underweight (<90.99%), normal (91-110%), overweight (111-120%) and obese (> 120%), if their weight-for-height values were within the ranges of the recommended median values. Duration of television viewing was categorized as <60 min/day and >60 min/day. Dietary history was taken by specific food frequency questionnaire. Univariate and Multivaiate regression models were used as appropriate.

Results: The substantial number of overweight and obesity was found to be 31% in the study subjects. Mean fat intake was significantly higher in overweight and underweight groups ($p = 0.008$) compared to the normal group. About 13.6% overweight and 18% obese children watched television more than 60 minutes. A significant positive correlation ($r= 0.106$, $p = 0.04$) of junk food intake with overweight and obesity and significant correlation ($r= 0.292$, $p= 0.001$) was found between TV viewing with weight for height. In logistic regression analysis, overweight and obesity were associated with TV viewing ($p < 0.001$) and junk food taking ($p = 0.02$) when the effects of other confounders (sex, age, parent's education, parent's income) were adjusted.

Conclusion: A substantial number of children are already overweight and obese and TV viewing and unhealthy food intakes are important contributors of weight gain.

Key words: child obesity, television viewing, diet.

PO1094

DIETARY PATTERN AND FOOD HABITS AMONG ADOLESCENT AND ADULT STUDENT GIRLS IN A CITY OF SOUTH INDIA

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Background and objectives: The prevalence of obesity and underweight has increased in recent years due to changes in eating habits all over the world. On the other hand eating behavior and dietary factors are as a risk factor in several important diseases such as cancer, coronary heart diseases or obesity. Therefore, we assessed the food habits and dietary pattern of adolescent and adult girls in an urban area from south India and exploring relationships between some factors such as SES , age groups and food behavior.

Methods: A cross-sectional study conducted on 1000 healthy young female students aged 11-28 years. A self administered questionnaire was used to collect information on socio-demographic indicators, food habits and patterns. Body weight and height was measured and BMI computed. All the statistical analyses were performed using SPSS 16.0.

Results: 50.1% of adolescents were underweight. Higher percentage of overweight subjects was adults. Skipping meals was significantly higher among adolescents. Subjects belonged to low SES had higher percentage of underweight while higher proportion of overweight girls belonged to high SES. Adolescents formed highest proportion of meal skippers (53.9% vs 49.1%). 68.7% of subjects consumed fast foods daily or frequently. 53.7% of adolescents and 40.2% of adults had snacks regularly. Adolescents from low SES had higher percentage of daily consuming of fast foods and bakery items. Only 13.7% of subjects use to consume at least one animal product, such as meat or an egg every day.

Conclusions: The results of this study could be used as an important baseline for future monitoring of the dietary pattern, nutritional situation of young females especially adolescents.

Key words: food habits, food pattern, dietary pattern.

PO1095

DOSE-DEPENDENT EFFECTS OF N-3 FATTY ACID ON ERYTHROCYTE MEMBRANE IN CYCLISTS

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Background and objectives: Polyunsaturated fatty acids (PUFA), such as n-3 fatty acid (docosahenaenoic acid –DHA- and eicosapentaenoic acid –EPA-), which are present in cell membrane lipid, are important for many biochemical and physiological functions. Fish oil supplementation increases the relative proportion of the long-chain n-3 PUFA in erythrocyte membrane. The purpose of this study was to establish a dose-response relationship between levels of n-3 fatty acid supplementation (Algatrium®) and changes in erythrocyte membrane. Algatrium® is a nutritional supplement consisting of DHA and EPA, and it has the same structure of natural oil–extracted from fish.

Methods: A randomized, double-blind, placebo-controlled, parallel design dose-response supplementation trial of 4 week duration was undertaken. 59 healthy cyclists were randomly into 5 experimental groups receiving different amounts of DHA and EPA (DHA/EPA: 350/50, 1050/150, 1750/250, 2450/350 mg/d, or placebo). Blood was collected in standard tubes using EDTA as anticoagulant. Fatty acid profiles in erythrocyte membranes were assessed at baseline and after 4 weeks by flame-ionization GC.

Results: DHA and EPA supplementation progressively increased the levels of n-3 in erythrocyte membranes after 4 weeks. There was a strong linear relationship between dose and the changes in DHA incorporation. Total n-6 fatty acids decreased in all groups. Consequence of these changes, the ratio n-6/n-3 experienced a dose-dependent significant decrease in individuals who consumed the experimental product under study (350/50 mg $p < 0.023$; 1050/150 mg $p < 0.0012$; 1750/250 mg $p < 0.001$; 2450/350 mg $p < 0.001$)

Conclusions: n-3 PUFA consumption produces an increase in these, particularly DHA, in the erythrocyte membrane, being this raise dose-dependent.

Key words: lipids, n-3 PUFA, docosahexaenoic acid

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PO1096

INFLUENCE OF BIRTHWEIGHT AND BREASTFEEDING PRACTICES ON BODY ADIPOSITY AND INSULIN RESISTANCE OF ADOLESCENTS IN MALAYSIA

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Background and objectives: Few studies have addressed whether there is a relationship between birthweight and infant feeding practices, and body adiposity and insulin resistance during adolescence, especially in adolescents. The aims of the study was to determine the influence of birthweight and breastfeeding practices on adiposity and insulin resistance in 397 adolescents aged 12 to 19 years in Malaysia.

Methods: Information on early growth status and feeding practices was obtained from parental questionnaire. Body adiposity was measured using dual-energy X-ray absorptiometry. Fasting glucose and insulin was measured, and insulin resistance was calculated based on the homeostasis model assessment (HOMA-IR). Analysis of covariance was used to determine the associations between birthweight and feeding practices, and adiposity and insulin resistance, after adjustments for sociodemographic, pubertal status, dietary intakes and lifestyle physical activity and sedentary practices.

Results: Breastfeeding duration was inversely associated with total and regional adiposity. However, subgroup analysis of adolescents with preterm delivery (<37 weeks) showed that birthweight was inversely associated with fasting glucose, insulin and HOMA-IR concentrations, and breastfeeding duration was inversely correlated with adiposity levels. Significant higher fasting glucose, insulin and HOMA-IR concentrations (all $p < 0.05$) were seen among those with low birthweight group compared to those at higher birthweight at preterm birth, after full adjustments for these covariates and body mass index. Additionally, adolescents with longer duration of breastfeeding practices had significantly lower levels of body adiposity (all $p < 0.01$). In contrast, only significant influence of breastfeeding duration on body adiposity levels were found among adolescents borned at full term.

Conclusions: The present findings indicate that intrauterine environment factors determining birthweight may have permanent effects on insulin resistance in preterm delivery, whereas breastfeeding duration practices during infancy, regardless of term delivery status, can exert long-term impacts on body adiposity in adolescence.

Key words: breastfeeding, birthweight, adiposity, insulin resistance, early growth status.

PO1097

A COMPARATIVE STUDY OF IDEAL BODY MASS INDEX AND DIET-RELATED FACTORS OF YOUNG WOMEN IN KOREA AND JAPAN

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Background and objectives: An increase of young lean women (BMI <18.5kg/m2: 29.0%) is one of recent issues in Japan. The idea of that a beautiful woman should be thin has been fixed among young women, and the idea may lead a desire to be thinner for healthy weight. A high rate of young Korean women who strongly desire to be thin was also reported. However, the rate of young lean women in Korea is about half of the Japanese rate (15.0%). This study aims to identify similarities and differences of body images and diet-related factors amongst young Japanese and Korean women.

Methods: A cross-sectional study was conducted at F University in Japan and E university in Korea. The subjects consisted of 168 Japanese and 139 Koreans students. Data was collected through anthropometric measurements and a questionnaire survey. Mann-Whitney's U test and qui-square test were employed for data analysis.

Results: The BMI medians were 19.8(2.3)kg/m2 and 19.7(2.5)kg/m2 in the Japanese and the Korean students, respectively ($p = 0.106$). The ideal BMI means amongst the Korean students (18.5+1.1kg/m2) was significantly lower than that amongst the Japanese students (19.1+1.1kg/m2) ($p < 0.01$). Of the Korean students, the mean number of skipping breakfast was significantly more frequent ($p < 0.01$) and having dinner with family was significantly less frequent ($p < 0.01$) than within the Japanese students. On the other hand, the Korean students were more frequently having a recommended Korean traditional-meal-combination than the Japanese students (recommended Japanese traditional-meal-combination).

Conclusions: Although the ideal BMI mean amongst the Korea students was significantly lower, the perception was not reflected to their actual BMI. Keeping traditional meal combinations might be a factor of maintaining healthy weight. The reasons for being able to have traditional meal combinations despite of frequent breakfast-skipping and eating without family should be studied soon.

Key words: young women, BMI, diet, comparison study.

PO1098

THE RELATION BETWEEN MATERNAL NUTRITIONAL STATUS WITH BABY BIRTH WEIGHT AND BIRTH LENGTH IN SINT CAROLUS HOSPITAL JULY - SEPTEMBER 2011

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Background and objectives: Both birth weight and birth length show prenatal growth of the baby. Maternal nutritional status, which are maternal height and prepregnancy body mass index as before pregnancy, also maternal iron status in third trisemester and weight gain during pregnancy as during pregnancy, have the most important influenced to prenatal growth. This study aimed to determine the relation between maternal nutritional status with baby birth weigth and baby birth length by controlling maternal and baby characteristics.

Methods: This cross-sectional study which conducted at Sint Carolus Jakarta Hospital during April 2012 use secondary data from 220 medical records of mothers and babies.

Results: The result shows that 65.9% of babies borned with 3000 g birth weight or more, and 73.6% of babies borned with 48-52 cm birth length, regardless 8.6% of babies borned with birth weight less than 2500 g and 25.9% of babies borned with birth length less than 48 cm. Prediction model of birth weight includes pre-pregnancy body mass index, maternal height, weight gain during pregnancy and maternal age, with maternal height as the most significant factors. Prediction model of birth length includes only maternal height and newborn sex.

Conclusions: Since maternal nutritional status has significant impact of the baby, this factor needs to be priotized. Unfortunately, there is still a paradigm that this maternal nutritional status only refers to maternal nutritional status during pregnancy. This study supports the sigificant of maternal nutritional status before pregnancy as important as during pregancy.

Key words: birth weight, birth length, maternal.

PO1099

EFFECT OF PRENATAL LIPID-BASED NUTRIENT SUPPLEMENTATION ON GESTATIONAL WEIGHT GAIN

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Background and objectives: Maternal gestational weight gain is an important predictor of pregnancy outcome. Maternal nutritional interventions to improve pregnancy outcomes rarely assessed the effect of the interventions on maternal weight gain. The objective was to determine the effect of antenatal Lipid-based nutrient based supplementation (LNS) on maternal weight gain.

Methods: Anthropometrical data were collected from 938 pregnant women who participated in a randomized control trial of prenatal LNS supplementation on birth outcome in rural Burkina. The intervention group was given 75 g of an energy dense spread containing one recommended daily allowances (RDA) of 15 micronutrients and providing 1.56 MJ of energy and 14.7 g of protein. The control group was given a tablet containing one RDA of the multiple micronutrients (MMN). Maternal anthropometric measurements were collected during the prenatal visits and at delivery. We used non-linear mixed-effects models to assess the intervention effect on weight gain.

Results: LNS increased total weight gain (+0.5 kg; 95%CI: 0.1, 0.9; p = 0.011) and the rate of weight gain (+21.7 g/week; 95%CI: -1.0, 44.6, p = 0.061) during pregnancy. The mean rate of weight gain was 206.5 g/week in the LNS and 187 g/week in the MMN group. In the mixed-effect models analysis, LNS increased the weight gain rate (+0.016 kg/week; 95%CI: -0.0004, 0.03; p = 0.056). Significant effect modification by maternal hemoglobin concentration at baseline was denoted with mothers. Women of the LNS group with higher baseline hemoglobin (mean+1SD) had significantly higher weight gain (+0.04 kg/week; 95/CI: 0.02, 0.05; p < 0.001) compared to those with lower hemoglobin (mean-1SD) concentrations (-0.008 kg/week; 95/CI: -0.03, 0.02; p = 0.553).

Conclusions: Prenatal Lipid-based nutrient based supplementation resulted into a significantly higher gestational weight gain. Baseline maternal hemoglobin appeared to modify this effect resulting in higher weight gain effect in mothers with high hemoglobin concentrations at baseline.

Key words: prenatal, lipid-based nutrient supplement,- maternal weight gain.

PO1100

BIOELECTRICAL IMPEDANCE VECTOR ANALYSIS (BIVA) AND PHASE ANGLE (PA) IN HEALTHY AND FRAGILE ELDERLY

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Background and objectives: BIVA is a valuable tool for assessing nutritional status and hydration in the elderly which classifies individuals by athletic, lean, obese and cachectic, while the phase angle (PA) can be used as a indicator of cell mass. BIVA is analyzed by resistance (R) and reactance (Xc) normalized by height, representing a bivariate vector, not requiring regression equations as in ou bioelectrical impedance (BIA). The aim of the study was to compare and analyze the nutritional status of the elderly, through BIVA and PA, between healthy and fragile groups separated by gender.

Methods: Cross-sectional study involving elderly (over 60 years), divided into two groups: healthy (evaluation clinical-laboratorial) and fragile (reduction in walking speed and manual grip strength, weight loss of 5% per annum, low level of physical activity and self-reported fatigue). The anthropometry and BIA were performed, applying the data in software BIVA 2002 ®. The test Komogorov-Smirnov was used for the normality test and T-test for the evaluation of independent samples.

Results: 12 fragile elderly were evaluated (79.2 ± 6.6 years), 5 males and 7 females, and 20 healthy controls (72.1 ± 3.2 years), 8 male and 12 females. By the classification of BIVA, no healthy volunteer was considered cachectic and no fragile was considered athletic, according to position and length of the vectors in the graph and there was statistically significant difference between the PA means between the female groups, having the fragile group the lowest values, corroborating with the nutritional status changed.

Conclusions: BIVA provides detailed information on the nutritional status of the elderly through the easy monitoring and part of their prognostic power by PA. Therefore, comparative studies of alterations found in the syndrome of frailty in relation to normal aging are of great value.

Key words: bioelectrical impedance, vector analysis, phase angle, elderly.

PO1101

PILOT STUDY IN MATURE SPANISH WOMEN

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Background and objectives: To examine the nutrient intake in urban native Spanish mature women and its relationship with some analytical variables.

Methods: Participants were 23 volunteer females, that gave their informed consent. Body weight and height were measured with standardized methods. From the 3-d FR, dietary intake was calculated using DIAL® program.

Results:: Mean intake of protein and fat exceeded the respective Spanish RDA and mean daily intake of carbohydrates and fiber was less than this RDA. This is in agreement with the high consumption of fatty meat and low consumption of fruit and vegetables. Low intakes of folic acid, Ca and Fe, was observed. Serum cholesterol was significantly correlated with LDL-cholesterol and risk factor of atherogenicity. HDL-cholesterol was inversely and significantly correlated with diet polyunsaturated fatty acids and aterogenity risk factor. Dietary carbohydrates was correlated with serum cholesterol, so probably these are responsible of its increase in serum. We found a lack of correlation of serum vitamin D with dietary vitamin D and was inversely correlated with dietary cholesterol. Dietary cholesterol was correlated with the intake of protein, saturated fatty acids and total fat. Folic acid was correlated with atherogenic risk factors, probably because when folate decreased increased homocisteine responsible of cardiovascular risk.

Conclusions: A dietary inbalance in women was observed. The intake of some nutrientes do not meet the established recommendations for Spain people;we found low vitamin D serum levels. Future research is necessary to better understand the optimal vitamin D concentration for promoting health in mature women. The unfavourable lifestyle of the great majority on mature women may have implications during the elderly. It is neccesary to promote physical activity to prevent future nutrition related health problems.

PO1103

ASSESSMENT OF YOUNG INFANTS' EXCLUSIVE BREASTFEEDING PRACTICE IN GEOGRAPHICALLY DIVERSE AREAS OF BANGLADESH

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Background and objectives: Optimum duration of breastfeeding is essential for maintaining proper nutrition and development of children. Recent Bangladesh Demographic Health Survey reported substantial increase in exclusive breastfeeding (EBF) practice of children aged below 6 months. However, we have limited knowledge about EBF practice in geographically diverse areas, which will be useful for sustaining the improvement. We aim to describe geographical diversity (plain, wet and high land) of EBF practice in <6 months infant in Bangladesh.

Methods: We conducted a multi-stage cluster household survey in 14 sub-districts from 5 districts of Bangladesh in 2009-2010. We assessed 790 children aged 0-5 months about their exclusive feeding practice. We used the Google maps for primary categorization of the areas followed by ground verification by field based staffs. We analyzed rate of EBF and contributing factors across plain, wet and high land areas.

Results: The rate of EBF was lower in plain (62%) than that of wet (68%) and high (77%) land areas. In all areas, the proportion of EBF reduced gradually with age. Lower odds of EBF had observed in women of advanced marital age (OR 0.40, 95% CI 0.20, 0.81, p = 0.01) in plain land and in women of advanced age in wet (OR 0.52, 95% CI 0.30, 0.90, p = 0.02) and high land (OR 0.32, 95% CI 0.12, 0.85, p = 0.02). In wet land women who had antenatal check up (OR 1.99, 95% CI 1.02, 3.89, p = 0.04) and regular exposure to either print or electronic media (OR 4.62, 95% CI 1.63, 13.05, p = 0.004) were more likely to practice EBF.

Conclusions: EBF practice in young infant improved across three geographical areas in Bangladesh where large gap still remains in plain land. Future studies should plan in-depth assessment of both low (plain land) and high (high land) performing areas.

Key words: exclusive breastfeeding, geographical diversity, young infant, Bangladesh.

PO1104

ROLE OF SCHOOL FEEDING PROGRAMME IN MALNUTRITION AMONG UNDER FIVE CHILDREN IN OBOKUN LOCAL GOVERNMENT AREA OF OSUN STATE NIGERIA

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Background and objectives: The poverty situation in Nigeria has contributed to poor nutritional status of children. This has had an adverse effect on their growth and intellectual development. School feeding programmes have been assumed to affect malnutrition. The aim of this study is to assess the level of effectiveness of school lunch programme as a means of malnutrition control.

Methods: This longitudinal study adopted both qualitative and quantitative methods of data collection. Data collection involved two major aspects which included community baseline and school baseline. School baseline involved the collection of anthropometric data of the pupils such as weight, height, Mid Upper Arm Circumference (MUAC) measurement and Age at the beginning and end of each term in all government primary schools in the Local Government Area between year 2010 and 2011. Data entry and analysis of the quantitative questionnaire was done using the Statistical Package for Social Sciences (SPSS) for windows version 16 and WHO Anthro.

Results: Stunting prevalence at first baseline was 25.5% among 1613 pupils assessed; endline prevalence was 17.9% among 2845 pupils assessed. The second baseline prevalence of stunting was 42.7%, this increased to 49.4 at end line. At first baseline prevalence of underweight was 17.7%; at the endline, it was 14.0%. Second baseline prevalence was 41.7% and endline prevalence was 36.7%. At first baseline, 22.1% were wasted while at endline 20% were wasted. At the second baseline, prevalence of wasted was 23% and end line reported a prevalence of 30%.

Conclusions: The above results suggest that the school lunch programme cannot be said to be a way of improving nutritional status among school children.

Key words: Malnutrition, Stunting, wasting and underweight.

PO1105

INTIMATE PARTNER VIOLENCE AND FEEDING PRACTICES OF CHILDREN ATTENDED IN BASIC HEALTH UNITS OF THE RIO DE JANEIRO CITY, BRAZIL

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Background and objectives: In Brazil, only 41% of children under six months remain in exclusive breastfeeding. Complementary feeding has been introduced early, around the 4th month. Studies indicate other risk factors for food introduction, features also observed in women who suffer from intimate partner violence (IPV). The aim of this study was to explore the association between IPV and infant feeding practices.

Methods: Cross-sectional study with 339 children in the 4th month of life which attended to 4 basic health units of the Rio de Janeiro city between June 2005 and December 2009. Feeding practices were assessed through a 24-hour recall and were categorized as: Breastfeeding, Exclusive Breastfeeding (EB), Predominant Breastfeeding (PB), Breastfeeding and semi-solid food, Breastfeeding and solid food, Artificial Feeding (AF), AF and semi-solid food, AF and solid food, supply by: powdered milk; fruit juice; porridge; salt food; fruits; and vegetable soup/porridge. IPV was measured using the Portuguese version of the Conflict Tactics Scales(CTS-1) and was analyzed dichotomous. The period investigated referred to four months prior. Prevalence ratios were calculated with a confidence interval of 95%.

Results: Only 18.4% were exclusively breastfed. The prevalence of children in EB was significantly lower (20.9% vs 88.9%) when IPV was positive. Besides, in presence of IPV it was observed a chance of 1.79 times (95% CI 1.04 to 3.08) that the child was not breastfed, 2.17 (95% CI 1.2 to 3.92) to receive artificial milk and semi-solid foods, and 1.92(95% CI 1.36 to 2.71) to receive porridge.

Conclusions: The prevalence of AF and early introduction of semi-solid foods was higher in children whose parents physically hit each other. It is noted the contribution of these results for the development of health promotion actions, both in terms of encouraging the practice of EB, as with regard to IPV.

Key words: Intimate Partner Violence; Feeding Practices; Lactation.

PO1106

FOLLOW UP OF AMBULATORY AND HOME ENTERAL NUTRITION IN A SPANISH TERTIARY CHILDREN HOSPITAL

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Background and objectives: Nowadays more children need ambulatory and home enteral nutrition support (HEN), sometimes for long periods of time.

Methods: Retrospective data analysis of patients receiving HEN between 2000 and 2012.

Results: 176 patients, 93 male (52.9%) were included. The median age at the initiation of HEN was 3.6 years (IQR 8.2-15.4). The most frequently diseases were congenital heart diseases 38 (26%), neurological and neuromuscular diseases 35 (23.9%), other gastrointestinal tract disorders 35 (23.9%), oncologic diseases 21 (14.3%), oesophageal disorders 12 (8.2%), orofacial anomalies 9 (6.1%), and others 28 (19.1%). EN was delivered via a nasogastric tube in 118 (67.8%), by gastrostomy in 35 (20.1%), orally in 26 (14.9%), and by jejunal access in 1 case. The cyclic feeding was the most frequently route of administration, 90 children (51.1%). Pediatric polymeric formula was administered in 71 (40.3%). The median follow-up time was 108.2 days (IQR 30-138.75).

Conclusions: HEN is an alternative choice to increase the quality of life of these children. The number of these patients is increasing every day. The most used EN way of delivering was by nasogastric tube. The most frequent diseases were congenital heart diseases, however in other publications the most important diseases to start HEN were neurological and gastrointestinal tract disorders. It is important to continue documenting all these patients to reach final conclusions.

PO1107

VITAMIN D, ADIPOSITY AND METABOLIC BIOMARKERS IN CHILEAN CHILDREN

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Background and objectives: Increasing evidence suggests that 25-hydroxyvitamin-D-[VD] concentration is associated with adiposity, and metabolic biomarkers in adults and adolescents. However, there is a lack of information regarding this association in children. We assessed the relationship between VD concentration, adiposity (bioelectrical impedance) and metabolic biomarkers.

Methods: Total-cholesterol, high-density-lipoprotein-cholesterol-[HDL], low-density-lipoprotein-cholesterol-[LDL], triglycerides, glycemia, insulin, HOMA, C-reactive-protein-[CRP], and leptin was determined in a cross-sectional sample of 308 children (7-9 years) who participated in Growth and Obesity Cohort Study in 2011-12 in Chile. The sample was classified in 4 groups according to VD-(ng/ml) and adiposity-(% fat) levels using 'mean' as a cut off: a) High-Adiposity-Low-VD-(HALD), b) High-Adiposity-High-VD-(HAHD), c) Low-Adiposity-Low-VD-(LALD), d) Low-Adiposity-High-VD-(LAHD). An r-Pearson-test was used to evaluate correlation, and two-way-ANOVA to assess interactions between independent variables (adiposity and VD) and comparing the effects between groups.

Results: VD (mean=32.3 ng/ml) was inversely associated with adiposity-(r=-0.12, p = 0.03), BMI-for-age-z-score-(r=-0.09, p = 0.04), subscapular-skinfold-(r=-0.12, p = 0.02), insulin-(r=-0.19, p < 0.001), HOMA-(r=-0.20, p < 0.001) and total-cholesterol-(r=-0.13, p = 0.02). Interactions between adiposity and VD affected glycemia-(p=0.001) and leptin-(p = 0.04). VD had an independent effect on insulin-(p = 0.049), HOMA-(p = 0.01), total-cholesterol-(p = 0.03) and LDL-(p = 0.04); while adiposity had an independent effect on total-cholesterol-(p = 0.03) LDL-(p = 0.02), and PCR-(p = 0.0001). HALD group showed a significant higher concentration of total-cholesterol-(161.1±3.2; 149.3±2.6 mg/dl), LDL-(92.7±2.5; 82.2±2.1 mg/dl), and CRP-(2.8±0.4; 1.2±0.2 mg/l), respectively (p < 0.05) than LAHD.

Conclusions: Our data suggests that VD is associated with insulin resistance independent of adiposity, while low VD in conjunction with higher adiposity is associated with risk of dyslipidemia and inflammation early in life.

Key words: vitamin D, metabolic biomarkers, adiposity, children.

PO1108

RAPID WEIGHT GAIN IS AN EARLY RISK FACTOR FOR PRESCHOOL OVERWEIGHT AND OBESITY: A CASE CONTROL STUDY IN SRI LANKA

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Background and objectives: Rapid weight gain during early childhood is a significant risk factor of adulthood obesity. Our aim was to assess the maternal and child risk factors associated with overweight and obesity among preschool children.

Methods: In this case-control study, from the 1087 preschool children measured, 71 cases and 71 controls of 3-5 years were recruited matching for age, sex and ethnicity. Cases (overweight and obesity) and controls were defined as BMI-for age >+2SD and between-2SD to+2SD, respectively (WHO2006 standards). Birth weight and child's weight upto 2 years were collected from child health records. Infant feeding practices, maternal factors and child's dietary and activity pattern were obtained from the mother. Rapid weight gain was defined as an increase in weight-for-age Z score (WHO standards) above 0.67SD from birth to 2 years. Magnitude and mean difference of the variables associated with overweight and obesity were evaluated using logistic regressions and independent samples-t-test, respectively.

Results: Prevalence of obesity and overweight of the study sample was 1.2% and 6.2% respectively. Cases had significantly shorter duration of breastfeeding (19.4, 24.6, p=0.003), shorter duration of exclusive breastfeeding (3.7, 5.0, p=0.001), long napping hours during preschool age (1.7, 1.1, p=0.03) and early initiation of complementary feeding (5.8, 6.5, p=0.032), compared to controls. Rapid weight gain (OR=4.113, 95%CI=1.194–14.165), watching television while eating (OR=5.224, 95%CI=1.229-22.368) and maternal obesity (OR=3.544, 95%CI=1.053-11.929) were positively associated with obesity. Child's physical activity (OR=0.156, 95%CI=0.042-0.578), mother with tertiary education (OR=0.075, 95%CI=0.007-0.763) and breastfeeding more than 2years (OR=0.123, 95%CI=0.030-0.499) were negatively associated with obesity.

Conclusion: Rapid weight gain is a predisposing factor for preschool obesity. Children watching television while eating and maternal obesity contribute to obesity, while adequate physical activity during preschool age, extended breastfeeding above 2 years and educated mother protects against obesity.

Key words: Rapid weight gain, preschool, overweight, obesity

PO1109

MINERALS IN FOODS FOR INFANTS AND YOUNG CHILDREN

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Background and objectives: Adequate intake of minerals during infancy and childhood is important for growth and development. Both deficiencies and high intakes might be harmful, e.g. an excessive intake of manganese might have adverse effects on the nervous system. The Swedish National Food Agency therefore analyzed mineral content in products for infants (0-12 months) and young children (1-3 years).

Methods: 92 products of porridge, gruel, infant formulae, follow-on-formulae, foods for special medical purposes and 'foods for normal consumption' were analyzed as composite samples from different batches available during the sampling period (n=1-3). Products were analyzed 'on sales' basis, i.e. either dry powders or in liquid form. Copper, iron, manganese and zinc were quantified using Inductively Coupled Plasma-Mass Spectrometry after microwave digestion in nitric and hydrochloric acid and followed by dilution with water. The analysis is accredited according to ISO/IEC 17025 by Swedish Board for Accreditation and Conformity Assessment. In addition, the metals arsenic, cadmium and lead were quantified.

Results: Mineral content varied greatly between the products; median (min-max) concentrations in ready-to-eat products were: copper 0.039 mg/100 g (0.002-0.32); iron 0.77 mg/100 g (<0.10 to 6.0); manganese 0.11 mg/100 g (0.02 to 0.89) and zinc 0.55 mg/100 g (0.02-4.7). For manganese and zinc, concentrations did not differ significantly between products fortified with those minerals and non-fortified products, as compared by the Wilcoxon-Mann-Whitney rank-sum test. Some of the products with the highest content of e.g. manganese were non-fortified. For copper and iron fortified products contained significantly higher amounts than non-fortified products.

Conclusions: Mineral content varied from levels below quantification to above the tolerable daily intake in the products. It is therefore advisable to eat a variety of foods from a variety of brands to avoid insufficient and excessive intakes of minerals.

Key words: infant nutrition, zinc, copper, manganese, iron.

PO1110

MATERNAL MILK CONSUMPTION, BIRTH SIZE AND ADULT HEIGHT OF OFFSPRING: A PROSPECTIVE COHORT STUDY WITH 20 YEARS OF FOLLOW-UP

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Background and objectives: Previous studies have suggested that milk consumption during pregnancy may have growth promoting effects on the offspring in utero. Whether this effect tracks beyond the prenatal period remains unclear. We examined whether milk consumption during pregnancy is associated with infant size at birth and offspring's height and growth related biomarkers at ~20 years of age.

Methods: A prospective cohort of 809 Danish pregnant women was recruited in 1988-1989 with offspring follow-up at ~20 years of age (n=685). Milk consumption was assessed at gestational week 30 using a food-frequency questionnaire. Birth weight and birth length were measured according to standard procedures at delivery and converted to gender specific z-scores.

Results: In adjusted models, maternal milk consumption of >=150 millilitre (ml)/d vs <150 ml/d was associated with 0.32 higher z-scores for birth weight (95% CI 0.06; 0.58) and 0.34 higher z-scores for birth length (95% CI 0.04; 0.64). At follow up, ~20 years later, those offspring whose mothers had consumed >=150 ml milk/d tended to have 0.19 higher z-scores for height (p = 0.16), ~8% higher levels of IGF-I (p = 0.12), and ~14% higher insulin levels (p = 0.11), compared to offspring whose mothers consumed <150 ml milk/d.

Conclusion: Our findings add to recent observations that maternal milk consumption may have growth promoting effect with respect to weight and length at birth. Furthermore, the results provide some suggestion that this effect may even track into early adult age, although further studies with more statistical power are needed for that purpose.

PO1111

MILK CONSUMPTION THROUGHOUT LIFE IS ASSOCIATED WITH BONE MINERAL DENSITY IN ELDERLY MEN AND WOMEN

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Background and objectives: The role of lifelong milk consumption for bone mineral density (BMD) in old age is not clear. Here we assess the association between hip BMD in old age and milk consumption in adolescence, midlife and current old age.

Methods: Participants of the AGES-Reykjavik Study, age 66-96 years (n=4798) reported retrospective milk intake during adolescence and midlife as well as in current old age, using a validated food frequency questionnaire. BMD of femoral neck and trochanteric area was measured by volumetric quantitative computed tomography (QCT). Association was assessed using linear regression models, and difference in BMD in relation to milk intake portrayed as gender specific Z-scores.

Results: Men with current milk consumption of ≥once/day compared with <once/week had Z-scores 0.9 higher on average for femoral neck (95% Confidence Interval -0.01, 0.20). For midlife consumption the difference was 0.21 Z-scores (95% CI 0.04, 0.38), and for consumption during adolescence the difference was 0.15 Z-scores (95% CI -0.16, 0.45). Results were comparable for femoral neck and trochanter, and for men and women, though associations were generally slightly stronger for men.

Conclusions: Our data suggest that milk intake during midlife has the strongest association with hip BMD in old age, and is stronger for men than women.

PO1112

USE OF DIFFERENT FORTIFIED FOODS, AT THE HOUSEHOLD LEVEL, DISTRIBUTED BY A FOOD ASSISTANCE PROGRAM IN BURKINA FASO

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Background and objectives: Food assistance is a strategy generally implemented by international institutions to prevent acute malnutrition among vulnerable groups. The aim of the study is to compare the benefits of 2 different fortified foods distributed, during one year, to 6-23-month-old children mothers as part of WFP food assistance program.

Methods: The study was a cross-sectional survey through questionnaires and observations of the use (preparation, consumption, intrafamily distribution, beneficiaries' satisfaction level, etc) of 2 fortified foods (a lipid-based ready-to-use supplementary food Plumpy'Doz® and a locally processed fortified infant flour). 150 beneficiaries of each product (total of 300 beneficiaries) were selected from the list established the day of survey in 11 health centers. Furthermore, focus groups with each product beneficiaries and interviews of each health center responsible were organized.

Results: The nature and the quality of complementary foods distributed were well appreciated by the beneficiaries of the two groups. However, the frequency of distribution (monthly) and the ration size of Plumpy'Doz® were considered insufficient by the beneficiaries (81%). A preference for fortified infant flours was identified among the beneficiaries who already used the two food products (91%). Plumpy'Doz® was significantly shared at the household level and all family members were generally concerned by this phenomenon. Indeed, 57% of beneficiaries in Plumpy'Doz® group had exhausted their stock in less than 10 days, compared to only 5% of beneficiaries in the fortified infant flour group. The food assistance program encouraged beneficiaries to go regularly to the health centres (98% in the Plumpy'Doz® group and 100% in the fortified infant flour group).

Conclusions: This evaluation suggested the necessity to give priority to the distribution of fortified infant flour produced locally to vulnerable groups, when logistic conditions allow it. Acknowledgments: WFP funded the study.

Key words: food assistance; complementary foods; ready-to-use supplementary food, household level.

PO1113

PHYSICAL ACTIVITY PERFORMED AT EVENING TIME ALTERS CIRCADIAN RHYTHMICITY TOWARDS A LESS HEALTHY PATTERN

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Background and objectives: Physical activity is one of the most important external synchronizer of our circadian system. However, to our knowledge there is no studies demonstrating which time of the day is the most adequate to perform physical activity to improve circadian system health. One of the better markers to evaluate and diagnose circadian disorders is skin temperature. For this purpose we studied the influence of physical activity at different times of the day on circadian rhythmicity in healthy women, by measuring Wrist skin Temperature (WT).

Methods: The study was conducted in 16 normal-weight women (Age: 23±4; BMI: 23.2±2.9 kg/m2). WT was measured every 10 min during three consecutive weeks. The participants performed controlled physical activity (45 minutes of continuous running) during 7 days in the morning (09:00 h) and night (21:00 h) in two different weeks and results were compared with a no exercise week (control week). Rhythmic parameters were obtained using an integrated package for temporal series analysis "Circadianware®".

Results: We found better WT rhythms when physical activity was performed in the morning than in the evening; as observed in the temperature curves (more flattened and irregular in the evening). Indeed, during the evening, the WT pattern was characterized by a higher temperature (morning: 28.08±1.68 vs. evening: 29.04±0.87; P=0.024), a less pronounced postprandial secondary peak (morning: 1.04±0.59 vs. evening: 0.41±0.47; P=0.001) and a phase delay (time of maximum temperature (morning: 04:51±01:11 vs. evening: 06:35±02:14; P=0.009). These results suggest that performing physical activity during the evening induce chronodisruption in our circadian system.

Conclusion: Physical activity trainers and clinician should recommend people to perform physical activity during the morning when possible, instead of the evening.

Key words: physical activity, circadian rhythm, evening, morning, wrist temperature.

PO1115

INFLUENCE OF DIETARY PHYTOSTEROIDS IN THE ANTIOXIDANT CAPACITY IN ELITE AND SUB-ELITE SOCCER PLAYERS.

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Background and objectives: Playing a soccer match can produce hematological changes, oxidative stress and muscle damage in soccer players. Phytosteroids are phytochemical compounds with an ability to reduce blood cholesterol levels and inflammation, but their effect in athletes are still unknown. The aim of this study was to assess the influence of dietary phytosteroids in the total antioxidant status (TAS), as well as, the activity of superoxide dismutase (SOD), glutathione peroxidase (GPx), and glutathione reductase (GR) in female soccer players.

Methods: Team A (from 1st division) and Team B (from 2nd division Spanish league) participated in this study. We studied two soccer matches per each team. Both teams registered their diet intake for 8 days to analyze phytosteroids intake (phytosterols, β-sitosterol, campesterol, stigmasterol). Blood samples were obtained at rest to analyze TAS, SOD, GR and GPx activity. T-student for independent variables and Pearson's correlation were used to analyse the data (by SPSS, v.16). The significance level was set at $P<0.05$.

Results: Team A presented higher TAS (0.8 ± 0.2 vs 0.5 ± 0.2; $p < 0.001$) and GPx activity (84 ± 11 vs 68 ± 12; $p < 0.001$) than Team B. Moreover, Team A showed a higher intake of phytosterols (58 ± 38 vs 38 ± 27; $p < 0.001$) and β-sitosterol (38 ± 22 vs 18 ± 15; $p < 0.001$) than Team B. We found that GPx activity is significantly correlated to phytosterols intake ($r=0.410$; $p < 0.001$) and β-sitosterol intake ($r=0.425$; $p < 0.001$).

Conclusions: There are differences between elite and sub-elite team in the dietary phytosteroids consumption. Moreover, elite team presented better antioxidant capacity than sub-elite team at rest. The correlations found seem to predict that specific phytosteroids may enhance the GPx activity in soccer players which could reduce oxidative stress.

Key words: phytosteroids, soccer, antioxidants.

PO1116

DIET AND ACADEMIC PERFORMANCE AMONG NORWEGIAN ADOLESCENTS

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Background and objectives: While healthy diet is generally assumed to be important for good school performance, there has been little research on this topic among adolescents. This cross-sectional study examined the association between diet and academic performance among adolescents in Norway.

Methods: The study included 2451 out of 2653 eligible students, 15-17 years old, from 17 different high schools in the southern part of Norway (participation rate= 92.4%). The students filled in a questionnaire with food frequency questions of selected healthy (e.g. fruits and berries, vegetables, juice) and unhealthy food items (e.g. sweets, soft drinks and potato chips), questions of meal frequency, and questions regarding school grades. Logistic regression models were adjusted for sex, BMI and parental education.

Results: Regular intake of breakfast (OR: 1.92 (1.50-2.45), p = 0.001) and lunch (OR: 1.39 (1.50-1.76), P=0.006) was significant associated with increased odds of high academic grades. A high intake of healthy foods, such as vegetables (OR: 1.33 (1.01-1.74), p = 0.044), fruits and berries (OR: 1.49 (1.14-1.93), p = 0.003), was also significantly associated with increased odds of high academic grades. At the same time, a high intake of sugar-sweetened soft drinks (OR: 0.50 (0.39-0.65), p = 0.001), diet soft drinks (OR: 0.67 (0.45-0.99), p = 0.044) and salted snacks (OR: 0.59 (0.42-0.85), p = 0.004) was significantly associated with decreased odds of high academic grades.

Conclusions: These findings show that having a regular meal pattern and healthy food intake is associated with increased odds of high academic grades in Norwegian adolescents.

Key Words: diet, meal pattern, academic performance, adolescents.

PO1117

SHIFTING PARADIGMS OF CHILDHOOD HUNGER, MALNOURISHMENT, AND OBESITY: A HISTORICAL POLICY ANALYSIS OF SCHOOL-BASED NUTRITION IN THE UNITED STATES

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Background and objectives: In 1946, the United States enacted the National School Lunch Act (NSLA) in response to the rising number of malnourished American children. NSLA created the National School Lunch Program (NSLP) to provide free or low-cost school meals to qualified students. Research played a major role in the enactment, expansion, and evolution of school nutrition. Although the NSLP is permanently authorized, it undergoes reauthorization every five years to adapt policy to population needs and trends. The paper examines the role of research in advancing and informing school nutrition policy overtime and provide context to complex policies.

Methods: The paper organizes the research and legislative history of NSLP in three major time periods across 1946-2010. The analysis uses a modified policy streams model from John W. Kingdon (1984) as a framework to explain policies development when three "streams" (problem, policy, and politics) converge to create what is called a policy window. An addition, this model includes research as a fourth stream to explore how research influences policy. These windows provide groups and individuals, known as "policy entrepreneurs," with opportunities to change policies.

Results: Historical analysis of each time period highlights policy changes in each of the four streams, providing important details of how research was used by policy entrepreneurs to shape school nutrition policy. Across each period, hunger emerged as a primary policy target, while social and political climates encouraged major policy shifts: malnourishment motivated policy enactment in 1946, poverty drove policy expansion in 1966, and rising rates in childhood obesity influenced programmatic quality improvement in 2010.

Conclusions: Nutrition science is a developing and diverse field that historically and presently influences the school nutrition policy agenda. Alignment is needed between applied nutrition science and school nutrition policy.

Key words: school nutrition, policy streams model, policy development, periodization, United States.

PO1118

EFFECT OF A 12-WEEK RESISTANCE EXERCISE INTERVENTION ON CIRCULATING TOTAL IGF-I IN ELDERLY PEOPLE: RELATIONSHIPS WITH DIETARY INTAKE AND LEAN BODY MASS

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Background and objectives: Insulin-like growth factor-I (IGF-1) is a hormone that is associated with preservation of muscle mass. Levels of IGF-I decline with age, which is thought to make elderly people more susceptible to developing sarcopenia, the age-related decrease in muscle mass. Resistance training is considered an effective strategy to maintain and increase muscle mass in elderly people. However, the effect of resistance training on levels of IGF-I is unclear, with previous studies giving conflicting results. The aim of the current study was to investigate the effect of progressive resistance training on levels of total serum IGF-I in 208 elderly Icelandic volunteers (65-91 years old).

Methods: Participants exercised three times per week and followed an exercise program designed to increase muscle mass and strength of all major muscle groups. Fasting serum total IGF-I was measured at the start and at the end of the study.

Results: Despite significant gains in lean body mass (2%) and strength (11%), levels of total IGF-1 decreased significantly during the study period (-5.4%, $p < 0.001$). However, there was considerable inter-individual variability, as IGF-I decreased in 59% of participants and increased in 39%. The change in IGF-I was inversely correlated with baseline protein intake (g/kg) and change in lean body mass, even after controlling for the effect of baseline IGF-I levels, gender, and/or energy intake.

Conclusion: 12-week resistance training causes an overall decrease in total serum IGF-I concentration in elderly people.

Key words: IGF-I, exercise, resistance training, lean body mass, elderly.

PO1119

CHANGED DIET IN INFANCY AND ASSOCIATION WITH BMI AT 6 YEARS: TWO PROSPECTIVE POPULATION BASED STUDIES 1995-2002 AND 2005-2012

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Background and objectives: Our former study showed a high protein intake in infancy associated with higher body mass index (BMI) at 6-years (6-y) in boys. Icelandic infant dietary recommendations were revised 2003, emphasizing prolonged breastfeeding and limited cow's milk, preferring formula instead of cow's milk. The objective was to assess the effects of the revision on infants' protein intake and possible long-term effects on BMI at 6-y.

Methods: Two prospective randomly selected nationwide infant cohorts, investigated prior to and after the revision of the infant dietary recommendations were recruited and studied until 12 months and again at 6 years. Subjects were 90 and 170 children born in 1995-6 and 2005, respectively. Dietary intake at 9 and 12 months was assessed by weighed food-records. Height and weight from birth to 12 months and at 6 years were measured.

Results: The main milk product consumed at ages 9 and 12 months shifted from cow´s milk in the former cohort to formula with lower protein content in the latter. Protein intake was significantly lower in the latter cohort, 11.9% energy (E%) vs 14.4E% ($p < 0.0001$) at 9 months and 14.6E% vs 15.6E% ($p = 0.02$) at 12 months. Despite similar average BMI, fewer children were overweight (including obese) in the latter cohort, 12% vs 21% ($p = 0.045$). Cow´s milk and protein intake at 12 months were found to be positive predictors of BMI at 6-y.

Conclusion: Emphasis made in the revised infant dietary recommendations from 2003 resulted in lower intake of cow´s milk and subsequent lower protein intake in the latter half of the first year. Changes in infant diet on the population level might have contributed to the downwards trend in BMI at 6-y and lower overweight prevalence in the latter cohort than the former.

Key words: infant, proteins, BMI, overweight, child.

PO1120

PROTEIN SOURCES IN INFANCY AS PREDICTORS FOR BODY MASS INDEX AND IGF-1 CONCENTRATION AT THE AGE OF 6 YEARS

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Background and objectives: High protein intake in infancy has been associated with growth and higher body mass index (BMI) in childhood. It has been suggested that animal protein has a stronger association with growth than vegetable protein has and that the effects are mediated via insulin-like growth factor 1 (IGF-1). The objective of this study was to investigate the association between total protein intake as well as protein from various dietary sources at the age of 12 months and BMI and IGF-1 at 6 years.

Methods: Subjects were 137 children studied from birth to 6 years of age. Dietary intake at 12 months was assessed by three day weighed food records. Information about height and weight during the first year of life and at 18 months and 6 years was gathered. IGF-1 was measured at 6 years of age.

Results: Children in the highest quartile of animal protein intake at 12 months (consuming >11.9E% as animal protein) had higher BMI at 12 months (0.7 (0.0, 1.3) kg/m2), 18 months (0.7 (0.1, 1.3) kg/m2) and 6 years (0.8 (0.2, 1.4) kg/m2) than children in the lowest quartile (<7.7E% from animal protein). Dairy protein intake at 12 months was a positive predictor of IGF-1 at 6 years for girls (5.4 (2.5, 8.2) µg/l), independent of current height or weight.

Conclusions: Our study supports the hypothesis that the association between high intake of total protein and higher BMI in childhood is rather related to high intake of protein from animal sources than vegetable sources. Furthermore, the study suggests that high protein intake from animal sources, especially dairy, at 12 months predicts increased IGF-1 concentration at the age of 6 years in girls.

Key words: animal protein, infant, BMI, insulin-like growth factor 1, child.

PO1121

ENERGY INTAKE AND EXPENDITURE AND BASAL METABOLISM IN PREGNANT ADOLESCENTS FROM NITERÓI, RIO DE JANEIRO, BRAZIL

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Background and objectives: Adolescence is marked by rapid complex biological, psychological and social changes in a growing subject. Pregnancy during adolescence is an additional challenge due to inadequate dietary patterns observed in this period of the lifecycle. Prenatal dietary assessment during pregnancy is important for screening and determination of energy requirements to provide healthy gestational body mass gain. The objectives of this study were to assess energy intake (EI), energy expenditure (EE) and to identify underreporting of EI based on its ratio to measured basal metabolic rate (BMR).

Methods: A total of 43 low-income pregnant adolescents (13-19 year of age) recruited from municipal primary care units of Niterói, Rio de Janeiro, Brazil, participated in this cross-sectional study. The distribution of girls by trimester was: first (7), second (22) and third (14). EI and EE were assessed by 24-hour dietary and physical activity recalls. EE was computed from MET codes described in the Compendium of Physical Activities. BMR was measured by indirect calorimetry (M) and also estimated by the FAO/WHO recommended equations (Schofield - SCH). Goldberg's index (EI/BMR) of 1.35 was used to assess EI underreporting.

Results: Mean (SD) EI and M BMR were 2423.5 (736.6) and 1291.5 (200.4) kcal/day. BMR estimated by SCH was significantly higher 1465.5 (157.7) kcal/day. EI underreporting was 16.3 and 34.9% for M and SCH BMR, respectively. EE was 1874.7 (404.4) kcal/day. The adolescents performed sedentary low intensity activities most of the day.

Conclusions: The data indicate that both the EI and EE varied widely among pregnant adolescents. The use of FAO/WHO predicted BMR can lead to overestimation of energy needs of Niteroian pregnant adolescents.

Key words: Energy intake, Brazil, Basal metabolism, Pregnancy in adolescence

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PO1122

EVOLUTION OF PERIPHERAL LYMPHOCYTE SUBSETS DURING THE PREGNANCY PERIOD. RESULTS OF THE PREOBE STUDY

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Background and objectives: the immune system during pregnancy is the result of a mixture of signals and responses from both the maternal and the fetal–placental immune systems. The aim of this study was to evaluate possible lymphocyte subset changes during the pregnancy period.

Methods: two hundred and forty-five pregnant women (aged 18-45 y) were recruited. The percentage of lymphocyte subsets CD3+ (T cells), CD4+ (helper T cells), CD8+ (cytotoxic T cells), CD3-CD16+CD56+ (NK) and CD19+ (B lymphocytes) was measured at 24th, 34th of gestation, at delivery and 24 weeks after delivery. The CD4+/CD8+ ratio was calculated. Changes over time were analyzed with repeated measures ANOVA, with repeated factor, pregnancy weeks. Post hoc comparisons were performed with Bonferroni (o Paired T test) between time points.

Results: A significant effect of the pregnancy weeks was observed on CD3+, CD8+, CD3-CD16+CD56+ cell percentages and the CD4+/CD8+ ratio ($p < 0.05$, except for CD3+ [$p < 0.001$]). CD3+ and CD8+ cell percentages showed a significant decrease at 24 weeks after delivery compared to 34th week. In addition, CD3+ showed also a decrease at delivery in comparison with 34th week. Moreover, NK cell percentage and CD4+/CD8+ ratio showed significantly higher values at 24 weeks after delivery in comparison with these values at 34th week ($p < 0.05$). CD4+ and CD19+ cell percentages remained unmodified during the whole follow-up.

Conclusions: During this follow-up, the lymphocyte pattern was different especially between 34th weeks of pregnancy and 24 weeks after delivery. However, it is necessary to further study some confusion factors, such as BMI and age to elucidate other possible changes of the immunocompetent cells during pregnancy and 6 months after delivery.

Key words: pregnancy, lymphocyte subsets, follow-up. These results are part of the PREOBE study, funded by Consejería de Innovación, Ciencia y Empresa de la Junta de Andalucía. (PO6-CTS-02341). Spain.

PO1123

FACTORS INFLUENCING DIETARY INTAKE AND NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN RESIDING IN THE SOUTHERN TOWNSHIP OF GAUTENG, SOUTH AFRICA

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Background and objectives: This study was carried out in the previously disadvantaged township of Southern Gauteng, South Africa. The purpose of the study was to evaluate the factors influencing the dietary intake and nutritional status of preschool children dwelling in Southern township of Pretoria.

Methods: This was a cross-sectional study conducted on 100 purposively selected pre-school children aged 1 to 6 years. The measurements included: Socio-demographic questionnaire, 24-hour recall, anthropometric measurements (Height, weight and Mid Upper Arm Circumference -MUAC-). Initially Caregivers/ parents assisted with the completion of socio-demographic and 24-hour recall questionnaires. Statistical Package for Social Sciences (SPSS) was used to analyze socio-demographic data, South African Medical Research Council FoodFinder® program was used to analyze dietary intake, WHO Growth standards (2007) was used to analyze anthropometric measurements (height and weight), and UNCEF colour coded child MUAC tape was used to analyze MUAC.

Results: Socio-demographic results reported that 94 % of the caregivers were young women between the age of 20 and 35 years (69%). Majority (82%) of the caregivers had medium to high level education ranging from standard 8 to 10. Eighty four percent of the caregivers were unemployed with the monthly household income of less than R2500. Dietary intake results indicated that children consumed mainly carbohydrates-rich food and did not meet 100% of the Daily Recommended Intake (DRI) in the majority of the nutrients. Stunting (19.9%), wasting (16.7%) and underweight (3.2%) were prevalence, on the other hand MUAC reported that 4% were moderately malnourished.

Conclusion: Poor social background is still a main factor influencing negatively on the dietary intake and the nutritional status of the pre-school children. Prevalence of malnutrition can be eradicated through various sustainable nutrition programmes.

Key words: Social background, dietary intake, nutritional status, pre-school children.

PO1124

DETERMINATION OF NUTRITIONAL STATUS OF TRAINED WRESTLERS IN AYDIN WRESTLING TRAINING CENTER

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Background and objectives: Wrestling is a sport of strength, endurance, balance, speed and intelligence. Nutrition is very important for wrestling athletes because it is being done according to weight categories. Because they compete in different weight categories, changes in their body weights occur largely. Well-nutrition in wrestlers is crucial because it provides adequate energy and balanced nutrients to increase athletic performance, to manage weight control and replace lost fluids. This study is conducted to evaluate the nutritional status of wrestlers who are exposed to body weight changes.

Methods: 36 wrestlers participated in this study (11-17 years old). General nutrition habits, anthropometric measurements were evaluated with a questionnaire. Individual food records during 3 days was evaluated by the program Nutrition Information System (BEBIS 6.1). For statistical analyses, SPSS 15.0 statistical package program was used.

Results: The mean values of age is 13.6±1.5 years, the average height is 150±10 cm and the average weight is 49.5±16 kg. None of the participants use ergogenic aids. 16.7% use sports and/or energy drink, 16.6% of them use 1-2 times in a week, 83.4% of them use 1 in a month. While 88.9% of participants body weight change before and after the sports season, 11.1% do not change. 68.8% of participants who lose weight have fatigue, 3.1% of them have attention deficit, 12.5% have speed fall and 15.6% of them lose muscle strength.

Conclusions: Concentration and attention is important in every sport game. One of the most important factor is adequate and balanced nutrition. In studies, morbidity and disability rates in well nourished athletes are determined to be less than the malnourished athletes. Protection of body weight is required for the maintaenance of health.

PO1126

CONSUMPTION OF FRUITS AND VEGETABLES AMONG ROMANIAN SCHOOL CHILDREN

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Background and objectives: The healthy nutrition guidelines proposed by international research institutes and World Health Organization recommend a daily intake of fruits and vegetables of a minimum 400 g, representing 5 servings/day (each serving having around 80 g). Moreover, the recommendations underline the importance of consuming both fruits and vegetables daily, preferably at least 2 portions of fruits and 3 portions of vegetables per day. The present study aims to identify the individual and familial factors which influence fruits and vegetables consumption among Romanian children.

Methods: A cross-sectional study by means of anonymous questionnaires was performed among 361 school children aged 11-14 from Cluj-Napoca, Romania (April-May 2011).

Results: The recommendations regarding fruits and vegetable intake were respected by 44.6% 9.1% of the children, respectively. Knowledge regarding the recommended number of daily servings and higher self-efficacy in eating fruits and vegetables every day were positively associated with higher consumption of fruits and vegetables. Fruits preference also influenced positively the consumption of fruits. The familial factor associated with vegetables intake was the perceived behavior of mother, while fruits intake was higher among children who declared higher fruits availability at home.

Conclusions: Nutrition interventions addressing the determinants of fruits and vegetables intake identified by this study should be developed for Romanian children.

Key words: fruits and vegetables; Romania; health promotion.

PO1127

PREVALENCE OVER ONE YEAR OF ABNORMAL VITAMIN B12 AND BLOOD LIPIDS RELATED BIOMARKER VALUES IN SPANISH INSTITUTIONALIZED ELDERLY

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Background and objectives: To follow-up vitamin B12 and lipids status is essential in elderly since they are closely related to non-communicable diseases risk factors. Objective: To analyze the evolution of biomarkers associated to vitamin B12 and blood lipids and to quantify the prevalence of abnormal

values for each biomarker, over one year, in institutionalized elderly.

Methods: Sixty subjects, mean age (±SD) 84±7 years (68% women), were recruited from three old people's homes in the region of Madrid (Spain). Blood samples were obtained four times over a year (at month 1, 5, 9 and 13). To study biomarker mean concentrations evolution along the follow-up period, a mixed model statistics was applied by using SPSS software (v.19.0). Statistical significance was defined as $P<0.05$.

Results: Concerning biomarkers related to vitamin B12 status, prevalence of abnormal values at month 1 and 13 were as follows: serum total homocysteine (63%/68%), serum folate (69%/47%), serum holotranscobalamin (33%/24%), serum cobalamin (10%/12%) and RBC folate (3%/10%). In spite of these prevalence variations, only mean serum cobalamin (299 vs 273 pmol/L) decreased and mean serum folate increased (14.9 vs 16.3 nmol/L) (both $p \leq 0.05$). For biomarkers related to lipids, the prevalences of value out of reference range were for total-cholesterol (30%/38%), HDL (13%/22%), LDL (33%/38%), triglycerides (10%/20%) and lipoprotein A (52%/53%).

PO1128

INFLUENCE OF VITAMIN D SUPPLEMENTATION ON VITAMIN D STATUS AND BONE MASS DURING LACTATION- DOUBLE BLINDED RANDOMIZED CONTROL TRIAL

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Background and objectives: Optimal vitamin D intake for lactating women remains controversial. We hypothesized that 1200IU/d (vs. 400IU/d) of vitamin D during breastfeeding will enhance maternal vitamin D status and bone mass.

Methods: 174 healthy mothers after term, delivery were randomized to receive vitamin D3: 1200IU/d (800 IU/d + 400IU/d from multivitamins) or 400IU/d (placebo + 400 IU/d from multivitamins) during 6 mounths of lactation. Serum 25-hydroxyvitamin D (S-25-OHD), parathormone (PTH) and densitometry (DXA, Lunar Prodigy) were performed after delivery (V0), 3 (V1) and 6 months later (V2).Serum and urinary calcium were assessed at V1 and V2.

Results: 137 women (1200IU/d (n=70), 400IU/d (n=67)) completed the study. Baseline S-25-OHD and anthropometric measurements were similar among groups. Median S-25-OHD increased from 13.65 ng/ml to 25.7ng/ml ($p < 0.0001$) and from 16.1 ng/ml to 24.5 ng/ml ($p < 0.0001$) in the study groups, respectively. S-25-OHD was higher in 1200 than 400IU/d group at V1 (25.7ng/ml vs 24.5ng/ml; $p = 0.049$) and V2 (25.6 ng/ml vs. 23.1 ng/ml; $p = 0.008$), respectively. Vitamin D deficiency (S-25-OHD<20 ngml) rate was similar in both groups at V0 (71.4% vs. 64.2%, $p = 0.005$) but lower in 1200IU/d group at V1 (8.57% vs 23.9%, $p = 0.009$) and at V2 (14.3% vs 28.4%, $p = 0.028$). S-25-OHD>30 ng/ml was not significantly different by group at any time point. PTH decrease from 28.6 pg/ml to 22.1 pg/ml ($p < 0.0001$) and from 30.4 pg/ml to 23.3 pg/ml ($p < 0.0001$) between Vo and V1 in study groups, respectively. There were no differences between groups in PTH, calcemia, calciuria, fish consumption, UVB exposure, bone mass nor decrease of bone mass at any time points.

Conclusions: Vitamin D supplementation at a dose 1200IU/d is sufficient to maintain S-25-OHD>20 ng/ml among majority of lactating women but not effective in achieving S-25-OHD>30 ng/ml and reducing bone mass loss during lactation.

Key words: vitamin D deficiency, lactation, bone mass. Clinical Trials: NCT01506557; Financial support: Nutricia Foundation.

PO1129

THE VALUE OF THE SUBJECTIVE MNA ITEMS IN THE MNA TOTAL SCORE IN ELDERLY NURSING HOME RESIDENTS

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Background and objectives: The prevalence of malnutrition in institutionalised elderly people is generally high and it is essential to know the nutritional status in order to establish action policies. The Mini Nutritional Assessment (MNA) is a useful screening tool to detect malnutrition among elderly people. The MNA classifies individuals as "malnourished", "at risk of malnutrition" and "well nourished" and it consists of eighteen items structured in four parts: anthropometric assessment, global assessment, dietary assessment and self assessment. The impact of each item or set of items on the total score allows us to know the value of them as indicators of the nutritional status. The objective of this survey was to study the value of the two subjective MNA items ("self-wiev of nutritional status" (SNS) and "self-view of health status" (SHS)) as indicators of the nutritional status according to the MNA total score.

Methods: A Cross-sectional study was conducted on a sample of 895 residents, aged 65 or older, living in 34 nursing homes located the province of in Albacete (Spain). Correlations between the subjective MNA items and MNA total score were assessed by Spearman's correlation. Stepwise multiple linear regression analysis was used to assess the MNA items as predictors of the nutritional status by the MNA.

Results: Positive significant correlations between the SNS and SHS with the full MNA were found, r=0.39 ($p < 0.001$) and r=0.49 ($p < 0.001$), respectively. When two questions were considered together the correlation coefficient was r=0.58 ($p < 0.001$). The stepwise linear regression showed that eight questions (among the eighteen MNA items) were able to explain 91% of the MNA variability and the two subjective questions were within them.

Conclusion: The subjective MNA items can be the first indicators of the nutritional status in a rapid screening in elderly institutionalized population.

Key words: Mini Nutritional Assessment (MNA), elderly, nursing home.

PO1130

ENVIRONMENTAL FACTORS ASSOCIATED WITH OVERWEIGHT IN BRAZILIAN PRESCHOOL CHILDREN.

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Background and objectives: In Brazil, there were an increase of overweight among under-five years old children in the last three demographic and health surveys (DHS) conducted in 1989, 1996 and 2006. Such improvement in the overweight prevalence was due to a 2.5-fold increase among preschool children in the same period, since there was a decline in the overweight among infants. Therefore, our aim was to identify and quantify environmental factors associated to the overweight among Brazilian preschool children.

Methods: Data was from the latest Brazilian Demographic and Health Survey-2006/07. We selected children between 23-60 months (n=2908), living in the same house with their mothers. Overweight was defined using the WHO Growth Charts 2006 as weight-for-height z-score <+2 SD. Multivariate models were used to estimate the prevalence ratio and their respective 95% confidence interval (PR[95%CI]) of environmental factors associated with overweight.

Results: Prevalence of overweight among preschool children was 8.0%. We observed higher overweight prevalence among the richest Brazilian regions (10.6%), families with high purchasing power (9.9%), with more than two TVs at home (10.5%). Among those children born with more than 3.5 kg and having up to one brother the prevalence of overweight at survey was 10.4% and 9.7%. From those variables significantly associated with overweight in the bivariate analysis, the independent factors associated in the final fitted model were: living in the richest Brazilian regions (1.53 [1.16-2.02]), families with high purchasing power (1.51 [1.10–2.08]), birth weight higher than 3.5 kg (1.53 [1.17-2.00]) and having up to one brother (1.70 [1.23-2.35]).

Conclusion: We identified that overweight among preschool children in Brazil is associated with factors related to region's or family's wealth. Acknowledgement: Silveira JA receives a scholarship from Fundação de Amparo à Pesquisa do Estado de São Paulo.

Key words: Infants; Overweight; Surveys.

PO1131

EXCLUSIVE BREASTFEEDING FOR 4 VERSUS 6 MONTHS AND GROWTH IN EARLY CHILDHOOD

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Background and objectives: Studies are inconsistent about whether duration of exclusive breastfeeding is protective of overweight and obesity later in life. Existing evidence on this relationship is based on observational studies with a risk of bias from confounding variables. The aim of the study was to investigate the effect of duration of exclusive breastfeeding on weight gain and the risk of being overweight in later infancy and early childhood.

Methods: A total of 119 mother-infant pairs were randomized to either receive complementary foods from the age of 4 months in addition to breast milk (CF), or to be exclusively breastfed to 6 months (EBF). Each infant's weight, length and head circumference were measured at birth, 6 weeks, 3, 4, 5 and 6 months of age. In the follow-up, the children's weight, length and head circumference were measured at 8, 10, 12 and 18 months and infant's weight and height at 29–38 months. All anthropometric measurements were converted to z scores using the WHO Child Growth Standards.

Results: A difference was seen between groups in gain in length from 4-18 months of age, where infants in the CF group (-0.17±0.84) had significantly greater gain in length compared with the EBF group (-0.51±0.84; p = 0.05). However, no difference was seen in the prevalence between groups in risk of being overweight or those who were overweight at 18 months and 29-38 months of age.

Conclusions: The differences in length seen between the two groups in later infancy to 18 months of age remain to be explained and may be a result of differences in dietary intake between groups. Exclusive breastfeeding for 4 or 6 months does not seem to affect risk of being overweight or the prevalence of those who were overweight or obese in early childhood.

Key Words: Breastfeeding, complementary feeding, growth.

PO1133

EUROPEAN ADOLESCENTS CONSUMING BREAKFAST REGULARLY HAVE HIGHER PLASMA 25-HYDROXYVITAMIN D CONCENTRATIONS AND LESS BODY FAT PERCENTAGE THAN BREAKFAST SKIPPERS.

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Background and objectives: Breakfast skipping is an unhealthy behaviour that often occurs during adolescence and could have negative consequences on nutrient status and global health. As low 25-hydroxyvitamin D [25(OH)D] concentrations have been identified in European adolescents of the HELENA study, the aim of the present work was to find out whether there is an association between breakfast consumption and vitamin D status and body composition in adolescents.

Methods: From a subsample of 1006 adolescents (470 males; 46.8%) of the HELENA Cross Sectional Study with an age range of 12.5 to 17.49 years fasting blood samples were taken. Plasma 25(OH)D was analyzed by ELISA. Body mass index (BMI) was calculated from weight and height, and body fat percentage by means of the Slaughter formula. Breakfast consumption was obtained from a validated questionnaire. Descriptive statistics and ANOVA test controlling by age and sex were performed using SPSS 19.0. The level of significance was set at $p < 0.05$.

Results: There were 30.5% of adolescents who slightly, moderately or strongly agreed to skip breakfast. The results showed that the prevalence of eating breakfast almost everyday was lower in girls (43.0%) than in boys (55.5%). Adolescents consuming breakfast almost every day had significantly higher levels of 25(OH)D (61.43+1.26 nmol/l) than those skipping breakfast (55.67+1.25 nmol/l), after controlling by age and sex ($p < 0.01$). Moreover, those skipping breakfast and having low vitamin D status presented significantly higher body fat percentage and BMI (25.45+0.77 and 22.16+0.29, respectively) than breakfast consumers with higher vitamin D status (22.41+0.51 and 20.76+0.19, respectively) ($p < 0.01$) after controlling by age and sex.

Conclusions: Adolescents eating breakfast almost every day had higher vitamin D levels and lower percentage of body fat and BMI than those adolescents not regularly eating breakfast.

Key words: Breakfast, vitamin D, fat mass, adolescence.

PO1134

PRENATAL LIPID-BASED NUTRIENT SUPPLEMENTS INCREASE CORD LEPTIN CONCENTRATION IN PREGNANT WOMEN FROM RURAL BURKINA FASO

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Background and objectives: In developing countries, prenatal lipid-based nutrient supplements were shown to increase birth size, however the mechanism of this effect remains unknown. Cord blood hormone concentrations are strongly associated with birth size. Therefore, we hypothesize that lipid-based nutrient supplements increase birth size through a change in the endocrine regulation of fetal development. The aim of the study was to test the effect of daily prenatal lipid-based nutrient supplements (LNS) on cord blood hormone concentrations.

Methods: Umbilical cord blood samples were collected from 197 pregnant women participating in a randomized controlled trial assessing the effect of LNS on birth size in rural Burkina Faso. Insulin-like growth factors I and II, their binding proteins IGFBP-1 and IGFBP-3, leptin, cortisol and insulin were quantified in cord sera using immunoassays.

Results: LNS was associated with higher cord blood leptin mainly in primigravidae (+57%; $p = 0.02$) and in women from the highest tertile of body mass index at study inclusion (+41%; $p = 0.02$). We did not find any significant LNS effects on other cord hormone concentrations. The observed increase in cord leptin was associated with a significantly higher birth weight. Cord sera from Small-for-Gestational Age newborns had significantly lower median Insulin-Like Growth Factor I (-9 μg/L; $p = 0.003$), Insulin-Like Growth Factor II (-79 μg/L; $p = 0.003$), IGFBP-3 (-0.7 μg/L; $p = 0.007$) and leptin (-1.0 μg/L; $p = 0.016$) concentrations, but higher median cortisol (+18 μg/L; $p = 0.037$) concentrations compared to normally grown newborns.

Conclusions: Prenatal lipid-based nutrient supplementation resulted in increased cord leptin concentrations in primigravidae and mothers with higher body mass index at study inclusion. The elevated leptin levels could point towards a higher neonatal fat mass.

Key words: Intrauterine growth retardation - lipid-based nutrient supplements – endocrine regulation – pregnancy.

PO1135

EFFICACY OF DAILY AND INTERMITTENT SUPPLEMENTATION WITH MICRONUTRIENT POWDERS DURING 6 AND 12 MONTHS ON ANEMIA IN PERUVIAN INFANTS

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Background and objectives: Anemia is highly prevalent in infants in developing countries. The aim of this study is to compare the impact of different dosing and duration schemes for micronutrient powders on anemia, and micronutrient status.

Methods: We supplemented a group of 400 infants, 6-11 months old, living in Cajamarca, in the northern highlands of Peru, with micronutrients powders containing iron, zinc, vitamin A, vitamin C and folic acid. Children were randomly assigned to 4 supplementation groups: a) 6 months daily supplementation; b) 6 months intermittent; c) 12 months daily and; d) 12 months intermittent supplementation. Supplements were provided monthly at the baby well visit. Hemoglobin and micronutrient status were measured at entry and at 6 and 12 months supplementation

Results: We found baseline anemia 72.9%, 70.7%, 73.4% and 75.8%, respectively (p = 0.885). At 12 months anemia was reduced to 21.1%, 30.4%, 6.4% and 8.4%, respectively (p = 0.000). Initial mean hemoglobin values were 116.6, 117.1, 117.0, and 115.6 g/L, respectively. At 12 months mean hemoglobin values were 127.4, 126.0, 131.0 and 129.9 g/L.

Conclusions: The results suggest that supplementation schemes with micronutrient powders for one year were more efficacious in reducing anemia than supplements for 6 months.

Key words: anemia, infants, micronutrient powders. Supported by Micronutrient Initiative, Canada.

PO1136

NUTRITIONAL CARE IN PATIENTS WITH PARKINSON'S DISEASE LEVODOPA DRUG USERS

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Background and objectives: Parkinson is a chronic/degenerative disorder of Central Nervous System that attacks mainly the Motor System, causing tremor, muscle rigidity, slowing of movement and postural abnormalities. This disease is developed when the dopaminergic neurons of the substantia nigra degenerate/decrease their capacity to produce dopamine neurotransmitter. This absence is responsible for the loss control movements. The most effective drug treatment is Levodopa to relieves symptoms/controls evolution of disease and propitiates better way of living. Levodopa is precursor to dopamine. It is absorbed in proximal small intestine. Some factors, such as the reduction of motility, gastric emptying, constipation, and mainly, the ingestion of food rich in protein near the time of taking the drug, reduce its absorption/invalidate its effect, so the amino acids from protein food compete for the same absorption site as Levodopa in intestine. The aim of this work is to guide the carriers Parkinson's disease who use Levodopa, so that they have an appropriate nourishment in order to the drug reach its desirable therapeutic effects.

Methods: Application of semi/opened questionnaire to carriers of Parkinson's disease to evaluate the nutritional state, analyze the interaction drug/nutrient, and perform further individual nutritional orientation at home, with the delivery and explanation of the Guide of Nutritional Orientation to carriers of Parkinson's disease and users of Levodopa drug.

Results: Among 16 participants between 47 and 80 years old, 100% consume protein food (meat, chicken, fish, milk and its derivatives). The carriers who suffer with constipation are 68.8% and 92.9% do not have the care of taking the Levodopa drug according to the recommendation. All participants ,wich energetic density varied from 1600/2400kcal/day, were oriented individuallyin food rich in fiber and suggestions of times of meals and protein amount according to the medicament. Conclusion. Nutritional orientation become primordial once interaction drug/nutrient.

Key words: Parkinson. Interaction drug/nutrient.

PO1137

NUTRITIONAL AND BEHAVIORAL PROFILE OF OBESE ADOLESCENTS IN TREATMENT BY LOW AND VERY LOW CALORIE DIETS

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Background and objectives: Obesity constitutes an important health problem in adulthood, as in childhood and adolescence worldwide, representing a major challenge to health. Obesity treatment in inpatient seeks to promote better quality of life of individuals through the implementation of healthy habits, with accompanying interdisciplinary team. This study aims to identify the behavioral and nutritional profile of adolescents in inpatient and feeding low and very low calorie diets.

Methods: It is a cross-sectional study, secondary base developed in an obesity clinic in the city of Camaçari, Bahia, Brazil. The collection of secondary data in medical records was performed in January 2013, where information was obtained demographic, clinical, anthropometric, and behavioral habits of life. The percentile for body mass index (BMI), age and sex, was used to define the anthropometric status of adolescents. Descriptive analysis was performed using SPSS statistical software.

Results: It was evaluated the records of 15 adolescents between 11 and 19 years. It was observed that 53.3% of participants were female and severe obesity was present in 66.7% of them. Most patients had cases of obesity in the family (93.3%). Of the patients, 73.3% had some comorbidity and 60% said they did not sleep well. Of those who were followed before admission by any nutritionist (86.7%), the majority responded that it not followed the guidelines of the professional (61.5%) and 81.3% reported some type of food aversion. Regarding the behavioral aspects, 40% of adolescents reported waking at night to eat, grazing behavior was present in 40% of them and 73.3% said they eat quickly during meals.

Conclusion: Importants datas were described to the profile of obese adolescent, stressing the need of a deeper study to understanding and rationale for new practices and treatments.

Key words: obesity, adolescents, nutritional profile, behavior.

PO1138

POSTPARTUM WEIGHT RETENTION AND NUTRITIONAL STATUS IN ADULT WOMEN ADMITTED AT HEALTH CARE UNITS IN RIO DE JANEIRO/ BRAZIL.

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Background and objectives: The objective of this study was to investigate postpartum weight retention and nutritional status in adult women admitted at four health care units in Rio de Janeiro, Brazil.

Methods: Post-partum nutritional status was calculated by body mass index (BMI) (OMS, 1995). Weight retention was calculated by subtracting the reported pre-pregnancy weight from the measured weight at each interview at the periods <1.6 and 12 months. Statistical analyses used means and a 95% confidence interval for weight retention and chi-square for categorical variables.

Results: Mean weight retention was 4.1 and 0.85 kg for underweight; 3.6 and 3.2 kg for adequate weight; 1.6 and 1.5 kg for overweight and 1.7 and 2.0 kg for obese woman at 6 and 12 months postpartum, respectively. Prevalence of overweight and obesity was 32.9%, 46.3% and 45.2% before pregnancy, at 6 and 12 months post-partum respectively ($p < 0.005$). At 12 months post-partum, 23.1% of women gained >=2 kg); 28% of adequate pre-pregnancy woman became overweight and 28.2% of overweight pre-pregnancy woman change nutritional status to obesity.

Conclusions: These findings highlight the importance of monitoring nutritional status during pregnancy and post-partum to promote women health.

Key words: post-partum weight, woman health; Maternal Nutrition.

PO1139

THRESHOLD SALT TASTE SENSIBILITY IN TEENS: RELATION TO BLOOD PRESSURE AND NUTRITIONAL STATUS

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Background and objectives: The aim was to evaluate the sensitivity thresholds salt taste (STST) in adolescents and its relation to blood pressure and nutritional status.

Methods: We conducted a cross-sectional study and the blood pressure was measured by a digital device and nutritional status by anthropometry and bioelectrical impedance. To determine the STST, were used 9 solutions of different concentrations of sodium chloride, per dropper tip of the tongue. The solutions (mmol/l) were fed increasing concentrations. Subjects were classified into normal STST (n-STST: <30 mmol/l) and increased (i-STST: >30 mmol/l). We evaluated 421 adolescents (55.6% female) with a mean of 15.8±0.91 years.

Results: The median (P25-P75) of STST was 30 (30-60) mmol/L and 36.1% had i-STST. The prevalence of high blood pressure was 12.6% (95% CI: 9.6 to 16.1), 25.5% (95% CI: 21.38 to 29.93) of excess weight. Groups of i-STST and n-STST were compared between adolescents with high blood pressure and there was no statistically significant difference between groups ($p = 0.676$). When comparing the mean systolic (SBP) and diastolic (DBP) blood pressure between the same groups, after adjustment for sex, age, physical inactivity and body mass index (BMI), only DBP showed a statistically significant effect ($p < 0.0001$) with a difference of 2.1 mmHg (95% CI: 0.1 to 4.1) between the groups. The effect of i-STST on BMI after adjustment for sex, age and physical inactivity was not significant ($p = 0.177$).

Conclusions: No relationship was observed between i-STST and BMI and SBP, DBP only with adolescents evaluated.

Key words: Taste Thresholds. Sodium Chloride. Blood Pressure. Nutritional Status. Adolescents.

PO1140

EARLY INTRODUCTION OF ULTRA-PROCESSED FOODS IN THE FEEDING OF CHILDREN UNDER TWO YEARS

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Background and objectives: Dietary habits established in early life affect the nutritional status in all cycles of development. In recent decades, there was a change in eating patterns of children, with a decline in the consumption of cereals, fruits and vegetables and increased consumption of foods high in sugar, fat and sodium. The aim of this study is to evaluate the age of introduction of foods classified according to the type of processing in children under two years.

Methods: Cross-sectional study with 285 children enrolled in 34 Primary Health Care Centers in Uberlândia, Minas Gerais, Brazill. The food consumption was assessed by food frequency questionnaire (FFQ). Foods were classified according to the type of industrial processing, proposed by Monteiro et al (2010), in group 1: unprocessed or minimally processed foods, group 2: processed culinary and food industry ingredients, group 3: ultra-processed food products. The median age of food introduction was calculated by survival analysis, performed in statistical software R.

Results: A total of 285 children (55% boys) participated of study. The median age was seven months and most of children belonged to low income household. For Group 1 foods: rice, beans, meat, fruits and vegetables and Group 2: pasta, oil and salt the median age of introduction was 6 months. For sugar (group 2) and specific foods to children, formulas and milks ready for consumption (group 3) the median age was seven months. For sugary drinks, snacks, noodles, chocolates and candies the median age of introduction was 12 months.

Conclusions: There is incorrect introduction of foods such as milk and infant formula to replace breast milk and early introduction of sugar and other foods ultra-processed, such sugary drinks, snacks, instant noodles, chocolates. The consumption of these foods increases the risk of obesity and other chronic diseases related to nutrition.

Key words: children, ultra-processed foods, food processing.

PO1141

THE EFFICACY OF MULTIPLE MICRO NUTRIENTS SPRINKLE TO IMPROVE IRON STATUS OF ADOLESCENT GIRLS IN ISLAMIC RELIGIOUS SCHOOL - TANGERANG, INDONESIA

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Background and objectives: Anemia is one of nutrition problems in adolescent school girls and the highest prevalence in Indonesia was found in Tangerang which was 46 – 61%. This research aimed to formulate multiple micro nutrients sprinkle (MMS) and to investigate their efficacy to improve Hb, SF and STfR levels of adolescent girls.

Methods: A randomize, double blind, placebo-control trial were conducted for 150 anemic adolescent girls, grade 9 – 12, aged 14 to 18 years old in five Islamic Religious School in Tangerang. All selected subjects were randomly allocated into 4 groups. Each group received MMS twice a week for 16 weeks containing 30 mg (Fe30 group), 25 mg (Fe25 group) and 20 mg (Fe20 group) elemental iron plus vitamins and other minerals and placebo group, respectively. One-way ANOVA and ANCOVA were applied to analyze difference in variables tested.

Results: There were no difference among the groups in compliance, nutrient intake, the changes of AGP , IL-6 and hepcidin ($p > 0.05$). A significant difference was found in the changes of Hb, SF, STfR and body iron ($p < 0.05$). After controlling with confounding variables, the changes of Hb, SF and STfR was not related to potential determinants ($p>0.05$). The prevalence of anemia decreased into 59.4 % and 35.1% for Fe20 and control groups, respectively.

Conclusions: MMS was effectively improve Hb, SF and STfR levels and decrease the prevalence of anemia in adolescent girls and MMS contained 20 mg of elemental iron was the best to increase the iron store in anemic adolescent girls.

Key words: efficacy, multiple micro nutrients sprinkle, adolescent girls, iron status We thank to Ministry of Health, Ministry of National Education and Indonesian Danone Institute who supported grant for this research and we also thank to Fortitech Malaysia who produce sprinkle for this research.

PO3298

RANDOMIZED DOUBLE-BLIND CROSS-OVER STUDY OF A NUTRITIONAL SUPPLEMENT SPECIFIC FOR PATIENTS WITH NEURODEGENERATIVE DISEASES OVER INFLAMMATORY AND CARDIOVASCULAR RISK BIOMARKERS

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Background and Objectives: An adequate nutrition could be useful in the improvement of patients with neurodegenerative diseases. The aim of this study was to assess the effects of a specific supplement for patients with neurodegenerative diseases (Supressi®) over inflammatory and cardiovascular risk biomarkers, compared with a nonspecific diet (T-Diet Plus High Protein®) when administered as enteral nutrition for three months.

Methods: 98 patients with neurodegenerative diseases were randomly divided into two groups A (n=51) and B (n=47). Subjects in group A were supplemented Supressi® for three months and a nonspecific product (T-Diet Plus High Protein®) during the next three months. Patients in group B received initially the nonspecific diet during the first three months followed by the experimental product other three months. Plasma levels of inflammatory and cardiovascular risk biomarkers were determined at baseline and after three and six months by immunoassay, with MILLIplexTM kits using the Luminex200® system based on the xMap™ technology. We examined the effect of the diets with t test for paired samples ($p < 0.050$).

Results: After receiving Supressi® for three months, there was an increase of the hormone leptin. Administration of T-Diet Plus High Protein® during three months leads to an increase of resistin along with a significant decrease in monocyte chemotactic protein (MCP)-1. Furthermore, a tendency to decrease ($p = 0.065$) was observed for soluble intercellular adhesion molecule (sICAM)-1, after ingestion of control diet.

Conclusions: The new supplement maintains plasma levels of inflammatory and cardiovascular risk biomarkers similarly to the nonspecific diet, while increases the hormone leptin involved in the regulation of food intake and energy balance, what may indicate a better nutritional status in these patients with high risk of malnutrition.

Key words: neurodegenerative diseases; nutrition; supplement.

PO3309

NUTRITIONAL STATUS OF WOMEN CONSULTANTING THE HEALTH CENTRES OF ERRACHIDIA DISTRICT IN THE SOUTH-WEST OF MOROCCO

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Background and objectives: Nutritional status is indicator of global well-being. The aim of this study was to evaluate the nutritional status of women and analysis of household dietary diversity close to socio-economic status

Methods: Information was collected by questionnaire. The number of housewives was 168 with an average age of 27.48 ± 6.2 frequenting the health centres of Errachidia. Pregnant women 78%, nursing 15% and consultants 7%. Age was divided into 4 classes: 17-24, 25-32, 33-40 and 41-49. The food questionnaires were done by 24h dietary recall.

Results: The study population is mostly literate, 79.3% of women are literate to 20.7% illiterate women. The distribution of participants according to age groups show that women in the age group [25-32] represent the highest (43%) followed by [17-24] (36%) which shows the youthfulness of the studied sample. The quantitative estimation of vitamins A, D, E by women indicates excess consumption of vitamin E (≥15 mg/day) and low consumption of vitamins A and D (≤300 µg/day and 10 µg/day, respectively) regardless of level of education. Surveyed have inadequate intakes of some micronutrients such as iodine, calcium, zinc and copper; in this case the level of education has no statistically significant effect on the intake of some nutrients like calcium (≥2.5 g/day) among illiterate women. Food availabilities showed that 67% of women have a contribution in excess Kcal (≥2800 kcal/d) and 40% have a normal setting range between 2200 to 2800 Kcal/day. Iron deficiency anemia seems to be especially important for pregnant women (80%).

Conclusion: Food consumption is one of several factors that have contributed to improving the nutritional status observed in south-west Morocco. Among these factors, it is worth mentioning the improvement of socio-economic status and education.

Key words: Housewives, 24h recall, food availability, demographic, socioeconomic.

PO3310

INTERVAL EXERCISE IMPROVES EXERCISE TOLERANCE IN COPD PATIENTS WITH NO ALTERATIONS IN ABDOMINAL FAT DEPOSITION

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Background and objectives: Abdominal obesity is an important contributor to the respiratory problems and health of chronic obstructive pulmonary disorder patients (COPD). Interval exercise has been shown to improve the exercise capacity of COPD patients. However, no studies have investigated whether interval exercise affects the abdominal fat of the patients. The purpose of this study was to investigate the effect of interval exercise on abdominal obesity in COPD patients and whether its change is related to improvements in exercise capacity.

Methods: Ten overweight COPD patients (FEV1=49.57±14.13, BMI=27.49±5.71 kg/m2) participated in a 12-week program of interval exercise (30 sec: 100% work rate max (WRmax), 30 sec: active recovery) on a cycle ergometer for 40 minutes, 3 times/week. Pre and post intervention patients completed pulmonary function tests, a 6-min walk test, a VO2peak test and dual energy absorptiometry (DEXA).

Results: Patients had a high level of abdominal fat deposition with a mean abdominal -gluteal fat ratio of 1.09±0.12. Interval training improved exercise capacity with improvements in the 6 min walk (pre: 37±77, post: 414±35 meters, P=0.049) and the WRmax test (pre: 72±37, post: 94±33 watts, P=0.004). No significant changes in body weight and composition were found. Abdominal fat (pre: 40.58±9.96, post: 41.0±9.77%, P>0.05), gluteal fat (pre: 37.66±9.72, post: 38.23±9.16%, P>0.05) and the ratio of the two depots did not significantly change (P>0.05). No significant correlations were found between changes in fat deposition and exercise capacity. Conclusions: In COPD patients interval exercise training does not alter the body weight and abdominal fat deposition despite the significant improvements in exercise capacity. As with other clinical populations, it is possible that the addition of a diet program is necessary in order to reduce the body weight and abdominal obesity and possibly lead to greater improvements in these patients.

Key words: Abdominal fat, interval exercise, COPD.

PO3311

ENGAGING FATHERS AND GRANDMOTHERS TO IMPROVE MATERNAL DIETS AND INFANT AND YOUNG CHILD FEEDING PRACTICES IN WESTERN PROVINCE, KENYA

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Background and objectives: Community programs seeking to improve the wellbeing of women and children typically target mothers with young children while grandmothers and fathers are often perceived as obstacles to change. These household members are however important influencers of mothers' infant feeding practices though they are usually perceived as maintaining cultural norms and practices, thereby providing negative social support for adoption of new practices. The purpose of the formative assessment was to generate information for use in the design of culturally relevant interventions for engagement of fathers and grandmothers to support optimal maternal, infant and young child feeding practices in a rural area in Kenya.

Methods: We conducted formative research on maternal nutrition and infant young child feeding practices and the role of mothers, grandmothers and fathers in the household and the community. We conducted 18 focus group discussions with mothers, fathers, and grandmothers and 28 key informant interviews with community leaders, health workers, religious leaders, and community health workers.

Results: Grandmothers and fathers a have a positive influence on the complementary feeding practices of young children if they are engaged in culturally-relevant ways. Suboptimal practices are influenced by cultural beliefs, food availability and knowledge levels. Diets of infants and young children are low in energy and lack variety. Feeding frequency is low and preparation and feeding methods predispose to contamination of foods. Responsive feeding is rare but forced feeding is common.

Conclusion: The family and community roles of fathers and grandmothers put them in key influential positions to positively impact infant feeding practices by supporting mothers, providing a variety of foods and encouraging mothers to practice what they have learned from health workers.

Acknowledgement: Study conducted through support provided by USAID to PATH's IYCN Project.

Key words: Fathers, grandmothers, maternal, child, nutrition.

PO3312

FLUID INTAKE IN CHILDREN AND ADOLESCENTS OF DEVELOPED CITIES IN CHINA

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Background and objectives: Body hydration is essential for adequate physical and mental function, especially in children. This study is to to investigate fluid intake and describe the daily consumption of plain water and beverages of of children and adolescents in the four cities of China.

Methods: A total of 5914 primary, middle school and high school students were selected from Beijing, Shanghai, Chengdu and Guangzhou using multi-stage random sampling method and 5868 subjects completed the survey. The information on the amounts and types of daily drinking water was recorded for seven consecutive days using a quantitative measurement.

Results: The average daily total drinking water of subjects was (1089-1540) ml, with significant difference among the four cities (F=114.28, P<0.05). The average daily drinking water was significantly higher in boys [(1157-1575) m1] than girls [(1026-1498) ml] (*f*Ó2=78.89¡AP<0.05). The difference among different ages was statistically significant (F=91.53, P<0.05) with ascending order in 7-10, 11-13 and 14-17 years old [(953-1483) ml, (1134-1551) ml and (1170-1557) ml]. The average daily consumption of plain water of subjects was (744¡Ó484) ml (68.3% of total drinking water) with statistically significant different among the Guangzhou, Beijing, Shanghai and Chengdu ¡]F=113.74, P<0.05¡^. The average daily consumption of beverages was (345-1287)ml (31.7% of total drinking water). The consumption of beverages of high school students (356¡Ó309) ml and middle school students (360-1301)ml were higher than primary school students (328-1263)ml (F=8.37, P<0.05).

Conclusion: The daily consumption of total drinking water, including plain water and beverages is different in children and adolescents among different cities and is different in gender. The Major drinking water of primary and middle school students in four cities of China wasplain water.

Key words: Children and adolescents, total drinking water intake, beverages, fluid intake.

PO3313

NUTRITIONAL STATUS OF ELDERLY PEOPLE LIVING AT HOME IN SIDI-BEL-ABBES (WEST ALGERIA)

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Background and objectives: The aim of the study was to assess the nutritional status of a cohort of elderly people living independently at home.

Methods: 314 elderly individuals were selected during general medicine examinations. The collection of nutritional data concerned the measurement of some anthropometric parameters (body weight, height, BMI, brachial and calf circumferences), the Mini Nutritional Assessment (MNA) and serum albumin.

Results: The average age was 72.92±6.26 years with a feminine predominance (59.55%). The BMI was 25.63±4.43 kg.m-2 and serum albumin 36.45±5.77g.L-1. 61% of the investigated population were affected by chronic diseases such as: diabetes (39%). Using the MNA as a mean of screening; 46.18% of individuals presented a risk of malnutrition and 4.78% were undernourished. However, when the BMI and serum albumin were used; 14.01% and 42.35% have been considered as undernourished respectively.

Conclusions: The MNA seems to be a more sensitive tool rather than the other screening parameters (BMI and serum albumin) in the assessment of nutritional risk.

Key words: Elderly, nutritional status, anthropometric parameters, Mini Nutritional Assessment, albumin.

PO3314

EFFECT OF FOOD-BASED SUPPLEMENT PRIOR TO AND DURING PREGNANCY ON BIRTH WEIGHT AND PREMATURITY IN RURAL VIETNAM (VINAVAC STUDY)

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Background and objectives: Poor maternal nutrition is linked to both prematurity and fetal growth retardation, which are major causes of death in newborns. VINAVAC research was set up to study the effect of consuming a micronutrient-rich food supplement on pregnant outcomes. Study's main goal is to determine the impact of maternal nutrition at conception on birth weight and prematurity.

Methods: The study is an unmasked, cluster, randomized trial. A total of 450 women from 29 rural communes are being recruited when they register to marry. They are randomly assigned to one of three interventions: I) food supplement 5 days/week from marriage to term (~18 months); II) food supplement 5 days/week from 16 wks gestation to term (~5 months); or III) routine prenatal care. The primary outcome is birth weight and the secondary outcome is the prevalence of prematurity. Other outcomes include maternal micronutrient status (iron, zinc, folic acid, vitamins A and B12), the incidence of infections; infant growth and infections from 0-6 months. of age are also assessed. Maternal data and information are measured at recruitment, 16, and 34 weeks gestation. Infant anthropometric status is measured at birth, 1, 3, and 6 months. Infant gestational age is assessed at birth to determine the prevalence of pre-term deliveries, and the mothe's activity or physical work during pregnancy is also determined.

Results: This study will be the first to compare a food-based supplement consumed prior to conception to term with one given only during pregnancy. Although it is recognized by many that pregnancy may be too narrow a window to improve maternal nutritional health, it is typical for micronutrient supplements to only be given from the time of enrolling for prenatal care to term.

Conclusion: Thus, the results will have world-wide implications as to when maternal supplementation should be initiated during pregnancy.

Key words: Food-based supplement, pregnant outcomes

PO3315

NUTRITION EDUCATION FOR ADOLESCENTS: AN INTERVENTIONAL APPROACH TO CREATE AWARENESS ON" EAT RIGHT AND PLAY WITH MIGHT"

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Background and objectives: Adolescents are most important group of population and the adolescent phase is very critical in the lifecycle. They are also vulnerable to adopt faulty eating habits due to peer pressure, which coupled with lack of physical activity result in overweight and obesity among adolescents. Therefore, a study was conducted to impart education on Nutrition and Physical activity through Participatory Approach.

Methods: Five hundred students from different schools were recruited in the study. Informed consent was obtained from the study subjects and from the principals/teachers of the participating schools. Intervention on adolescent nutrition, growth, development and nutrition, food groups and balanced diet, importance of micronutrients and also the importance of the physical activity was given. Interactive lecture on "Eat right and play with might" was given along with participatory approaches which entailed student activities like computer-aided presentations on these topics. A questionnaire on the dietary behavior and physical activity was administered to all the students before and after the intervention.

Results: About 70% of the students knew the importance of the breakfast and consumed it regularly including different food groups. Most of them were aware of the importance of different food groups. Although they knew ill-effects of carbonated beverages, 50% of them consumed frequently. Since physical education was regular in all the schools, the students participated in the physical activity without realizing the benefits of the same.

Conclusions: An integrated approach on nutrition education combining interactive lecture methods and participatory approaches engaging students was proved to be effective in imparting nutrition knowledge and creating awareness about the importance of physical activity.

Key words: Adolescents, nutrition education, physical activity, participatory approach.

PO3316

THE IMPACT OF PRELACTEAL FEEDING ON BREASTFEEDING DURATION AMONG MOTHERS IN KUWAIT

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Background and objectives: The WHO recommends that infants should be exclusively breastfed for the first six months of life. The use of prelacteal feeds is common among Middle-Eastern countries meaning that few infants are truly exclusively breastfed from birth. Methods: This longitudinal study of infant feeding patterns among women in Kuwait recruited subjects within 48 hours of delivery over the period of October 2007 to September 2008. All participants, whether still breastfeeding or formula feeding, were followed up by telephone interview at 6, 12, 18 and 26 weeks postpartum to determine the duration of breastfeeding and the age of introducing solid foods. The multivariate Cox's proportional hazards model was used to estimate the effects of independent variables on the risk of cessation of breast-feeding.

Results: In total, 85% percent of women left the hospital breastfeeding, with 55% partially breastfeeding and only 30% fully breastfeeding. Less than 1% of women initiated infant-to-breast contact within 60 mins as recommended in the WHO/UNICEF 10 Steps to Successful Breastfeeding, with 76% of women first putting their baby to the breast 6 hours or more after birth, leading to high rates of prelacteal feeding (81.8%) and/or in-hospital formula supplementation. As a consequence only 10.5% of infants left hospital having been exclusively breastfed since birth and no infant was fully or exclusively breastfed to 6 months. Delayed initiation of breastfeeding (>6 hr after birth) was a strong predictor for the early cessation of breastfeeding.

Conclusion: This study has shown that the majority of newborns do not benefit from exclusive breastfeeding as a consequence of the delayed initiation of breastfeeding and the associated high use of prelacteal feeds and supplementary formula whilst in hospital. Interventions are needed to raise awareness of both women and health professionals about the importance of early infant to breast contact to establish effective breastfeeding.

Key words: Breastfeeding, infantas, newborns, prelacteal feeding.

PO3317

NUTRITIONAL INTERVENTION FOR SPANISH ELITE MALE WHEELCHAIR BASKETBALL PLAYERS

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Background and objectives: The Spanish wheelchair national team shows high performance level. Hence, optimal nutrition is required. There are only a few studies available describing nutrition practice in wheelchair basketball (Goosey-Tolfrey 2010). We have offered the team nutritional advice for the upcoming European Championship which is taken place in Frankfurt (Germany).The purpose of this study was to analyse diet composition, with and without nutritional advice, during the precompetitive phase.

Methods: Energy intake (EI) of 14 Spanish elite wheelchair basketballers age 30.2 ± 5.8yrs and weight 75.4 ± 13.7kg was analysed. Diet composition was estimated by food weighing (Mettler-Toledo 1g accuracy) for a 3-day period, both in May and June 2013. Dial Alce® was used to determine nutrient composition. During these dates, athletes completed a 24h activity questionnaire. Between both periods, we provided individual written reports, including nutritional modifications, to optimise their diet composition. Individual feedback have been given before the second evaluation.

Results: EI was 2543 ± 391Kcal/d. Energy distribution was low in carbohydrates (44 ± 7%) and high in lipids (37 ± 5%) and proteins (21±7%) compared to ACSM recommendations for athletes. Cholesterol intake (521mg/d) and fat saturated distributed energy (14%) were also higher than recommended (7%). Conversely, fibre intake was lower (22±8g/d) than adequate (FNB 2006). Therefore, our intervention focused on reducing fat intake and increasing carbohydrates and fibre. Our results demonstrated an improved energy distribution, as well as an increase in fibre intake and a reduction in cholesterol intake, in the second evaluation. Conclusion: In order to reach ACMS guidelines, more nutritional advice is needed to optimize performance for these athletes.

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Goosey-Tolfrey L. (2010). Nutritional practice of competitive British wheelchair games players. APAQ.

PO3318

POTENTIALS AND BARRIERS TO EXCLUSIVE BREASTFEEDING AMONG WOMEN IN AN URBAN LOW-RESOURCE SETTING IN NAIROBI, KENYA: A QUALITATIVE STUDY

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Background and objectives: The practice of exclusive breastfeeding (EBF) remains poor despite demonstrated health benefits to the child. Improving the practice requires an understanding of the social context of infant feeding practices. This study investigated the factors influencing the uptake of EBF.

Methods: A randomized controlled trial in which villages in Kibera slum, Nairobi Kenya were randomly assigned to two breastfeeding counseling groups and a control group that received no counseling. The study participants, 34-36 weeks pregnant, HIV-negative women, attending antenatal clinic, were assigned to study groups and followed up at home until 6 months postpartum. At the end of the 6 months, 2 focus group discussions were conducted separately in each of the study groups; for mothers exclusively breastfeeding to 6 months and those who did not to gain a better understanding of the maternal rationale for the feeding method chosen.

Results: Data was analyzed based on pre-identified themes. The practice of EBF was poor. There were no major differences in the barriers to EBF by study groups. The common barriers were: mothers being away for long periods of time; expressing breast milk was considered tedious and culturally unacceptable for some communities; pressure from relatives to introduce complementary feeding; babies need water to quench their thirst; breast milk is inadequate to nourish the baby and EBF was perceived to make the mother unhealthy. Factors encouraging EBF among those who received breastfeeding counseling were: infants' faster growth; fewer episodes of maternal breast health problems because of the acquired new skills of latching the baby to the breast; spousal support and the continued support offered by research team.

Conclusions: The uptake of EBF is influenced by societal perceptions. The promotion of EBF should address factors involved in decision making of choice of infant feeding.

Key words: Exclusive breastfeeding, potentials, barriers, Kenya

PO3319

DIETETIC EDUCATION TOOL IN PAEDIATRIC PATIENTS IN HEMODIALYSIS

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Background and objectives: Chronic kidney diseases is the main cause of pediatric morbidity and mortality due to malnutrition, cardiovascular alterations and complication in the metabolism of calcium and phosphorus. Critical nutrients are proteins, phosphorus and sodium, and the nutrition approach require adherence to treatment and patient education. The objective was to evaluate the use of an educational tool designed to promote adherence to dietetic plan.

Methods: The aim of this longitudinal descriptive study is the implementation of educational nutrition materials in twenty pediatrics patients under hemodialysis treatment in our center. Interactive education tool allows a practical reminder of basic renal nutrition guidelines. Previous and post knowledge test about phosphorus content, protein and sodium in foods as measured by self-administered questionnaire, in the other hand, patient´s know-how about dietetic plan as measured by dietary recall of 24hs; both, before and after intervention (dietary phosphorus intake was evaluated depending on the degree of serum phosphorus) The cut-off points of reference were the DRIs and protocol used in the institution.

Results: Knowledge about nutrition renal topics showed a significant increase , 90.3 %, versus 72.8 % before intervention. The adequacy of intake of phosphorus improved in 25% of cases, 10% for proteins, and 60% for sodium. Post laboratory values showed decreased serum phosphorus in 55% of the cases

The therapeutic education is essential in patient´s motivation to promote the self care and the adherence to the dietetic treatment.

Conclusions: We found a favorable response to the intervention. The use of the instrument represents a effective educational tool and allows an active learning and skills development in everyday practice.

Key words: Renal Chronic Disease; nutrition education.

PO3320

RELATIONSHIP BETWEEN SERUM FOLATE STATUS AND BLOOD CADMIUM CONCENTRATIONS IN PREGNANT WOMEN: MOTHERS AND CHILDREN'S ENVIRONMENTAL HEALTH (MOCEH)

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Background and objectives: Cadmium has toxic effects on the body, including on the nervous system and reproductive outcomes. It is possible that folate, which is involved in sulfur-containing amino acid metabolism, participates in the lead detoxification process. We evaluated the relationship between maternal serum folate status and blood cadmium in pregnant Korean women.

Methods: The nutritional status of folate and blood cadmium concentration was measured in pregnant Korean women who participated in a multicenter prospective study between 2006 and 2010. We analyzed existing blood mercury data based on serum folate status at two gestational time points (mid and late pregnancy; n=1281 and 890, respectively).

Results: Serum folate concentrations in pregnant women were negatively associated with blood cadmium concentrations at late pregnancy but not at mid pregnancy (P trend 0.0028 and 0.7205, respectively). A general linear model developed after adjusting for age, prepregnancy body mass index, education status, gestational age at blood collection, and urinary cotinine concentrations indicated a significant negative association between the two at late pregnancy.

Conclusions: These results warrant future studies to explore the mechanisms responsible for the beneficial role of folate status against blood cadmium concentrations at late pregnancy in pregnant women.

Key words: Folate, cadmium, pregnant women.

PO3321

INFLUENCE OF DIETARY NITRATE SUPPLEMENTATION ON THE PHYSICAL PERFORMANCE AND THE AUTONOMIC NERVOUS SYSTEM ACTIVITY IN HEALTHY PEOPLE – PRELIMINARY STUDY

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Background and objectives: Neural regulation of the cardiovascular system is ensured by the basic principle of the concept of sympathovagal balance. It is not known whether the ANS activity is changed under the conditions of increased efficiency of oxygen utilization in the working muscles by nitrate supplementation.

Methods: The subjects (5 M; 5 W; 20-30 y.) will be tested in eight occasions. Subjects will perform a ramp incremental exercise test for determination of the peak VO2 and respiratory threshold. Subjects will receive 6 days of dietary supplementation with beetroot juice and placebo in two separate periods. In the 4th day they pass two 6 minutes degrees of exercise in moderate intensity, each 5th and 6th day one degree of medium and one of high intensity to determine pulmonary VO2 dynamics. Degrees will be separated by 25 minutes of passive recovery. The break between the supplementation periods will last for 12-15 days. The supplementation of beetroot juice or placebo will be used two hours before testing. The ANS activity will be monitored in all investigative days every morning in orthoclinostatic conditions by SA HRV. Before the first exercise bout, body pressure will be measured and venous blood samples will be collected for subsequent determination of plasma nitrite.

Results: If the expected results will be achieved (increase on plasma concentration of NO2-, decrease of VO2.kg-1.W-1 in submaximal load, increases in exercise tolerance during high intensity , the ANS activity without the changes), the project will be extended to the patients who are limited by the poor eNOS expression.

Conclusions: Beneficial effect of physical rehabilitation after extensive myocardial damage and dysfunction is closely dependent on the bioavailability of NO.

Key words: Nitrate supplementation, exercise tolerance, ANS activity.

PO3322

FLUID INTAKE AND NUTRITION STATUS IN CHILDREN AND ADOLESCENTS OF DEVELOPED CITIES IN CHINA

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Background and objectives: Suitable water consumption are important for health and leaning ability in children and adolescents. To assess total fluid intake and its association with obesity, a cross-sectional survey were carried out in four developed cities of China in September to October, 2011.

Methods: By multi-stage random sampling method, 5868 secondary and primary school students (aged 8.0-17.9 yrs) were recruited from urban and rural area of Beijing, Shanghai, Guangzhou and Chengdu. The amounts and types of daily fluid intake was recorded by subjects for seven consecutive days using a quantitative cup. Their height and weight were measured by investigators.

Results: The average daily total fluid intake of subjects was 1089ml, including 744ml (68.3%) drinking water and 345ml (31.7%) beverages. Total fluid intakes were higher in boys (1157ml) than in girls (1026ml, P <0.0001), with the most for students in high school (1185ml), in secondary school (1141ml), and finally in primary school (1000ml, P <0.0001). Their total fluid intakes were statistically significantly higher in urban (1185ml) than in rural (991ml), and varied among four cities(all P <0.0001) . Obese children and adolescents had the highest total fluid intake (1270ml), including both plain water (894 ml) and beverages (376ml); followed by overweight students (1202ml, 830ml, and 371ml, respectively) and normal subjects (1067ml, 726ml, and 341ml, respectively); and the least was underweight subjects (1010ml, 681ml and 329ml, respectively, all P <0.0001). After adjusting for age, gender, city, living area and physical activity level, the difference on total fluid intake and plain water was still significant among various nutrition status subjects.

Conclusions: Major of fluid intake of children and adolescents came from drinking water, instead of beverage in developed cities of China. The fluid intake varied with gender, age, living area, city and nutrition status.

Key words: Total fluid intake, plain water, beverage, obesity.

PO3323

ANALYSIS OF DIETARY HABITS IN JUNIOR REPRESENTATION IN SPORT GYMNASTICS

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Background and objectives: In sport gymnastics, good quality performance and trainings require supply of macronutrients and micronutrients. In a junior category, the demand for quality nutrients is even higher. Currently, diet in inseparatable part of training programs of sporting children. Composition of dietary regime became crucial, as it must contain balanced amount of basic nutrients, vitamins, and minerals, along with supplementary plans and individual forms of supplements. All must correspond with training seasons and present requirements. The demands in juniors for quality and quantity of nutrients are, of course, bigger than the ones of adults. Insufficient, even temporary absence of nutritive supplies may result in damage to health, in better scenario the outcome is merely inferior performance or training.

Methods and results: We carried out a research into 33 members of gymnastic teams. There were 13 boys and 20 girls. The average age was 15 years The average age of boys was 15,5 yrs, the average age of girls was 14,5 yrs. The average height/weight ratio of boys was 170 cm/62 kg. The average height/weight ratio of girls was 155cm/48 kg. We applied a method of dietary habits analysis through 24 hour recall, a standard questionnaire for dietary habits in sporting and non-sporting population, in a four days course; i.e. 3 working days and one weekend day. Furthermore, we analyzed the body posture by bio-electric impedance and they passed through Cortex machine.

Conclusion: The average energetic intake was 7000 kJ a day, consisting of 250 g of carbohydrates, 60 g of fat and 60 g of proteins a day. It was irregular, they suffer from vitamine and mineral insufficiency and rather monotonous. The absence of basic nutrients is apparent. Their long-term insufficiency will result in weariness, worse sports performance, injury, decrease in cognitive functions and development.

Key words: Sport gymnastics, adolescents, nutrition.

PO3324

INTERVENTION TO IMPLEMENT HEALTHIER EATING HABIT IN SCHOLAR CHILDREN

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Background and objectives: According with WHO the traditional diets based in vegetable foods now has been change for high-fat diet and high-calories diet, also beef food products. The food eating, no one alone for prevent metabolic diseases exist other factors such as culture, age, sex and familiar eating habits. We implemented an intervention on scholar children of one school in Celaya, Guanajuato, Mexico; based in nutritional education and adherence to the nutritional guide along three months.

Methods and results: We found that some anthropometric measures such as arm circumference (p=0.03), Body Mass Index (BMI) in Z-score (p=0.04) were significantly different after that our intervention. We found that the index scores about daily intake of fruits increase (p<0.03) after our intervention, furthermore index scores about daily intake of white bread (p<0.03), flour tortilla (p<0.03), beef (p<0.03), fish meal (p<0.01) and candies (p=0.01) were low down after our intervention. However we didn't find different results in the index scores about daily intake of corn tortilla, soda beverage, milk, fried food and sugar. For other hand we found that the BMI had inverse association with the born weight (â-0.42, p<0.05), the exercise minutes had both a positive association with basal BMI in Z-score (â 0.46, p<0.04) and negative association with soda beverage (â -0.48, p<0.05); in this topic the final index score about intake of soda beverage was negatively associated with time in front of the television (â-0.55, p<0.3).

Conclusion: Our educational intervention applied in school children along three months promoted changes on their food intake, however we found that some many food rooted in the familiar and ethnic culture such as soda beverage, corn tortilla, milk ad cheese didn't show any change. So it is necessary one intervention into familiar and scholar nuclei for changing them.

Key words: Nutritional Intervention, scholar children and intake

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PO889

ULTRASOUND MEASUREMENT OF BONE AGE IN CHILDREN: AN EPIDEMIOLOGICAL APPROACH

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Background and objectives: Bone age is traditionally measured using hand x-rays, however, there is also the possibility of using a method that does not generate radiation and has a reasonable cost as it is ultrasound (US). However, the accuracy of US measurements may be impaired by adiposity. The objective of this study is to validate the bone age US measurements with a computational method for reading hand x-rays (BoneXpert® -BE-).

Methods: This is a cross sectional study within the Chilean Growth and Obesity Cohort Study (GOCS). The subsample was 194 low socioeconomic status children (54.1% female) with a mean age of 6.9 years (82.3 months) in 2009. We were performed anthropometric measures, left hand x-rays and US measurements of left wrist with BoneAge®. We used Spearman and intraclass correlations (ICC) to compare US and X-rays measurements and we evaluated potential interactions by nutritional status. We calculated adjusted US measurements using an equation developed for obese (BMI >2 SD) and non-obese(BMI < 2 SD) children based on linear regression models adjusted for gender, chronological age, BMI Z score. It was stratified by nutritional status.

Results: Mean bone age according to BE was 87.9 months and 25% of the sample had obesity. Correlation between US and BE was 0.59, but it decreased to 0.52 in obese children. The ICC was 0.41, but it was lower in obese vs non obese children (0.16 vs 0.46). When we adjusted US bone age, correlations with BE improved (r=0.71 and ICC=0.70), and there were no further differences by nutritional status.

Conclusions: Ultrasound is a noninvasive method useful in the assessment of bone age in epidemiological studies, particularly if this equation is used to adjust the US measurements in order to compare with X-rays values.

Key words: bone age, ultrasound, adiposity.

PO1142

BIRTH WEIGHT AND OBESITY IN 7-14-Y-OLD SCHOOLCHILDREN OF FLORIANOPOLIS CITY - SOUTH OF BRAZIL

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Background and objectives: The first stages of human developing, especially the intra-uterine cycle and the first years of life have been associated to obesity. Birth weight, gestational age and catch-up growth have being indicated like factors that influence later weight, height and body composition. We investigated the influence of birth weight in the overweight and obesity status of 7-14-y-old children and adolescents matriculates in public and private schools in Florianopolis (south of Brazil).

Methods: A cross-sectional study was developed with a probabilistic sample. A total of 2, 696 scholars (857 children 7-9-y-old and 1, 839 adolescents 10-14-y-old) was investigated, being analyzed biological (age, gender, birth weight, gestational age, weight, height, subscapular and triceps skinfolds thickness of scholars, age and parental weight and height) and socioeconomics variables (type of school, family income, mother's and father's schooling). Overweight defined as a Body Mass Index (BMI) equal or above the 85th percentile of Must et al. (1991) and obesity defined for this condition plus the triceps and subscapular skinfolds thickness equal or above the 90th percentile of Johnson et al. (1981) were the outcome variables.

Results: Birth weight and birth weight/gestational age were the explanation variables, and the socioeconomics variables and the parental BMI were the control variables. Analyses of multivariable Poisson regression were made, with estimative of prevalence ratios (PR) and confidence intervals (95%). The prevalence of overweight was 31.5% in 7-9-y-old (children) and 21% in 10-14-y-old (adolescents) and the obesity prevalence was 10.9% in children and 6% in adolescents. Male adolescents that have being born with high birth weight (HBW) demonstrated overweight (PR = 1, 14; CI 95% = 1, 02-1, 27; p = 0, 03).

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Conclusions: Birth weight and birth weight for gestational age were not significant associated to obesity. It was just observed association with overweight in the male adolescents that were born with HBW.

Key words: birth weight, obesity, children.

PO1143

PREPARATION AND EVALUATION OF SALAD OIL BLENDS RICH IN OMEGA-3 AND -6 FATTY ACIDS

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Background and objectives: Egyptian people are consuming more saturated fatty acids which raised blood LDL cholesterol causing the risk of heart disease and stroke. This study aimed to increase the intake of omega-3 and-6 fatty acids through preparing vegetable oil blends with health claims to maintain low LDL Cholesterol level.

Methods: Blending of five oils: Flaxseed (F), Corn (C), Sunflower (SF), Soybean (SB) and Wheat Germ (WG) oils were used to formulate three blends of Salad (S) oils rich in n-3 and n-6 fatty acids. Besides, their chemical and fatty acids composition were analyzed. In addition, 36 male albinos' rats feeding experiment over two months period was carried out. Data including body weight, triglyceride level, total cholesterol and LDL cholesterol were collected and analyzed statistically for significance using CoStat version 6.311 and Duncan's multiple range tests.

Results: the highest value of n-3 to n-6 fatty acids (FAS) ratio was found in F oil and blend 3S (15%F+15%SB+19%SF+50%C+1%WGoils W/W). Triglycerides level was relatively higher in the plasma of the rats feeding on diet containing the free n-3 FA oil than those having oil blends (3S, 2S) with different omega 3 and omega – 6 FA ratios. Using diet containing oil blend 3S instead of control caused a marked decrease both total cholesterol and LDL cholesterol. The taste of omega sponge cake was accepted by panelists.

Conclusions: the feeding blend No 3S (rich in omega -3 and -6) was effectively reduced the total cholesterol and LDL cholesterol and would be beneficial in reducing health problem and encourage should be made to broaden the use of Salad Oil blends.

Key Words: Biological Evaluation, Blending Oils, OMEGA-3&6

PO1144

EATING HABITS, LIFESTYLE AND OBESITY: STUDY OF A GROUP OF WOMEN FROM BOUMERDES CITY-ALGERIA

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Background and objectives: the paper consists in presenting the main findings of a survey conducted in 2011 which targeted a group of women through six health centers Boumerdes city (Algeria), in order to determine the prevalence of overweight and obesity among those surveyed, understand the relationship between overweight, obesity, eating behavior and lifestyle, assess the prevalence of chronic diseases they might suffer and finally evaluating the level of consciousness with regard to the relationship between overweight, obesity and chronic diseases

Methods: The survey targeted 786 women, non-pregnant and non-lactating, aged between 18-70 years. The questionnaire contains qualitative variables (lifestyle, eating habits, and education) and quantitative variables (weight, height), 3.

Results: 44.9% of respondents are aged 40 to 49 years with an average age of 41 years. 2/3 of these women are educated, 37.7% with a university degree and 10% are illiterate. They are workers in 64.8% of cases and married in 70% of cases. Poor eating habits are observed and taking Consumption of fast food is found in 41.8% of cases and more than 5 times per month; The household budget determines the nature of the meal. Physical inactivity is observed; only 7.2% of women are overweight or obese exercise sport against 10.3% with normal weight. 51% of respondents spend an average of 2 hours per day watching television. 64.3% of normal weight women and 72% of overweight and obese women take a nap less than 1 hour per day. 33.2% reported having at least one chronic disease. 92.3% are aware of the risks of obesity to health;

Conclusions: Obesity and overweight pose a serious public health problem, in view of the nature of chronic diseases that are generated and the high cost of their care. Nutrition education and physical activity are essential for their reduction.

Key words: obesity, overweight, chronic diseases.

PO1145

COMPARISON OF ENERGY INTAKE AND RESTING METABOLIC RATE AND THEIR RELATION TO ANTHROPOMETRIC AND SOCIODEMOGRAPHIC FACTORS AMONG IRANIAN WOMEN

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Background and objectives: This study assesses the accuracy of energy intake (EI) reporting and its relation to anthropometric characteristics and sociodemographic factors. In addition, we attempt to identify foods for which under- or over-reporting is more prevalent.

Methods: EI was assessed for 187 women using a semi-quantitative 168-item food frequency questionnaire (FFQ). Resting metabolic rate (RMR) was measured with an indirect calorimeter. We calculated the EI/RMR ratio to assess the accuracy of EI reporting. This study defined under-reporters as those with an EI/RMR<1.34 and over-reporters as those with an EI/RMR > 2.4. We measured anthropometric characteristics and collected sociodemographic information. The chi-square test, ANOVA and multiple linear regressions were used for statistical analyses.

Results: Among participants, the under-reporting rate was 35.5% and the over-reporting rate was 7.5%. The EI/RMR ratio was significantly higher for younger women compared to older women ($P < 0.04$). Under-reporters had higher weight, waist circumference (WC), body mass index (BMI) and resting metabolism compared to accurate reporters ($P<0.05$). Resting metabolism was significantly lower among over-reporters than accurate reporters. After adjusting for energy, the consumption of fish, high-fat dairy products, hydrogenated oil, sweets and coffee was lower, whereas consumption of unsaturated oils, tea, salt and yellow vegetables was higher among under-reporters compared to accurate reporters.

Conclusions: Under-reporting of EI is more frequent than over-reporting among Iranian women. Among various factors that may affect the accuracy of EI reporting, age and anthropometric characteristics might have a significant effect.

Key words: Anthropometric, energy intake, energy reporting, sociodemographic factor.

PO1146

CHANGES IN PROTEIN- ENERGY STATUS OF HOSPITALIZED CHILDREN DURING THEIR STAY AT MOFID CHILDREN'S HOSPITAL, TEHRAN, IRAN.

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Background and objectives: Malnutrition is a common finding in hospitalized children and leads to increased mortality, mental and physical growth retardation and increased costs. The aim of the present study was to assess the nutritional status of the pediatric patients on admission and discharge and some relevant factors.

Methods: 224 children (2-6 years old) who were consecutively admitted to mofid children's hospital, underwent objective and subjective assessments on admission and discharge. Objective assessments consisted of weight, height, mid upper arm circumference and triceps skinfold thickness measurements plus determining the energy and macronutrients intake and plasma albumin and prealbumin levels. Subjective assessments was done using Subjective Global Nutritional Assessment tool.

Results: According to objective (weight for height) and subjective methods, the prevalence of malnutrition on admission was 44.3% and 58.9% respectively. During hospital stay, the mean amount of all anthropometric parameters decreased significantly. This reduction was significantly greater in feverish patients, patients with normal baseline nutritional status and surgery patients. The mean energy, carbohydrate and fat intake, in spite of increasing during hospital stay, were below the recommended intakes (DRI). The mean energy, protein and fat intake were significantly related with patient's satisfaction with hospital food service. The mean plasma albumin and prealbumin concentrations were also below the normal ranges on admission and discharge. Malnutrition was diagnosed by physician only in 6.95% of patients affected and only 0.9% of children were referred to a dietitian.

Conclusions: The prevalence of malnutrition is high among hospitalized children and the nutritional status of them deteriorates during their stay. The situation may be improved by using appropriate screening tools with giving special attention to surgery patients, referring the patients at risk of malnutrition for in time interventions and enhancing the hospital food service quality.

Key words: Children, Hospital, Malnutrition.

PO1147

ASSESSMENT OF NUTRITIONAL STATUS AND QUALITY OF LIFE OF WOMEN IN IBADAN NIGERIA

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Background and objectives: The well-being of women is vital to their reproductive roles. Of the several factors that affect women's health, nutrition and Quality of Life (QoL) have been reported to be among the most crucial. The relationship between nutritional status and QoL of women is not adequately researched in Nigeria, particularly in relation to the different domains of QoL. This study was designed to examine the relationship between Body Mass Index (BMI) and QoL in apparently healthy Women of Reproductive Age (WRA) in Ibadan, Nigeria.

Methods: The study was a descriptive cross-sectional survey involving 285 non-pregnant and non-lactating WRA selected by a multi-stage random sampling. Interviewer-administered, semi-structured questionnaires were used to obtain information on demography, anthropometric measurements were taken using a stadiometer to measure height, weighing scale to measure weight and BMI(kg/m2) was classified according to World Health Organization (WHO) cut-off points. WHO-QoL BREF questionnaire was used to assess QoL in four domains (Physical Health (PH), Psychological Health (PSH), Environment (EN) and Social Relationships (SR)) scored using WHO-QoL standard on a scale of 0 to 100. Descriptive statistic and Pearson's correlation test were performed at $p<0.05$.

Results: Mean age of respondents was 29.3±8.3years and 61.8% of the women were from urban areas. Mean BMI of respondents was 24.0±5.2kg/m^2. Mean score of respondents for PH, PSH, EN, and SR domains of QoL were 70.1±30.4, 67.0±13.3, 66.4±18.7, and 57.3±15.9 respectively. Mean overall QoL score was 65.2±11.4. Overall mean QoL score revealed no significant relationship with mean BMI; however, EN domain score of QoL negatively correlated with BMI (r= -0.1, p=0.017).

Conclusions: The environmental components of QoL are more likely to be associated with nutrition. However, further studies are required to clarify this finding.

Key words: Nutrition, Quality of Life, Women, Nigeria.

PO1148

FACTORS ASSOCIATED WITH RECOVERY AMONG ETHIOPIAN MALNOURISHED HIV PATIENTS (PRE ART AND ART) THAT RECEIVED FOOD BY PRESCRIPTION

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Background and Objectives: To examine factors associated with recovery in treatment versus control groups in a program that provided RUTF supplement to malnourished HIV+ adults with MAM or SAM (BMI <= 18.5) also receiving standard ART care on nutritional status.

Methods: RUTF was provided to subjects with MAM or SAM and that were pre ART or ART for up to 6 months at 15 health centers and hospitals (n=1956), with 8 matched comparison health facilities (n=639). Longitudinal nutritional and HIV status data were collected. Recovery was defined as having a BMI >= 18.5 recorded for 2 or more consecutive visits.

Results: Factors associated with recovery, regardless of treatment group, included being treated at a health center instead of a hospital (OR=0.5, p=0.045) and being female (OR=1.4, p=0.013). Among participants in the treatment group who followed protocol (i.e. attended all prescribed sessions until discharge), factors associated with recovery included being on ART < 6 months (OR=2.1, p=0.033), a CD4 count 200 to 350 (OR=1.77, p=0.004) or having some (OR=1.7, p=0.037) or severe food insecurity (OR=2.92, p=0.003).

Conclusions: Food by Prescription does have the potential to improve prognosis of patients. However, successful uptake of Food by Prescription was associated with recovery with health centers faring better than hospitals. Challenges in administering such a program in a large health facility need to be examined. Individual level factors including ART status, CD4 count and level of food insecurity need further examination.

Key words: HIV, malnutrition, Food by prescription, persistence

PO1149

IMPACT OF HOUSEHOLD HEADS ALCOHOL CONSUMPTION ON DIETARY DIVERSITY AND MORBIDITY IN CHILDREN BELOW FIVE YEARS IN NANDI COUNTY, KENYA

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Background and objectives: There are many causes of low dietary diversity and disease. Drugs and substance abuse, a serious global problem with adverse effects on national securities and socio-economic development, is a major contributing factor. Objective: To determine the relationship between household heads alcohol consumption, dietary diversity and morbidity in children under five years of age in households in Nandi County.

Methods: The sample consisted of 170 (6-59 months) children of simple random selected households from Nandi. Selected indicators were examined against a set of variables using univariate and multivariate analyses.

Results: There were 82.9% and 17.1% male and female-headed households respectively. Significantly high percentage (37%) of males consumed alcohol than female (12.4%) ($p<.05$). The present research sought to determine the dietary diversity and morbidity among children under five years of age in households. The relationship between alcohol consumption and food diversity was statistically significant ($p<.05$). A High percentage (55.1%) of children from alcohol consuming households was ill compared to those of non-alcohol consuming households (44.9%). Household-heads that consumed 3 or more litres of alcohol per week had the highest number of sick children. Further statistical analyses confirmed that the morbidity level was significantly higher among children from alcohol consuming households than among those from non-alcohol consuming households [$\beta=0.045$: $p<0.05$].

Conclusions: This study concludes that household heads alcohol consumption contributes to child negligence and low dietary diversity therefore resulting to poor health and high morbidity.

Key words: Household Heads', Dietary diversity, Morbidity, Alcohol Consumption, Children, below five years

PO1150

BALANCED NUTRITION AT WORK: THE EUROPEAN PROGRAMME FOOD (FIGHTING OBESITY THROUGH OFFER AND DEMAND)

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Background and objectives: Designated by the WHO as one of the greatest public health challenge of our century, obesity is responsible for 10–13% of deaths in the European region. Companies are an important setting and information channel for promoting health to their employees. The 2005 study Food at Work from the ILO points out that employees who have access to healthy eating increase their productivity by up to 20%. The European programme FOOD promotes healthy eating habits towards employees. The two main objectives of are to improve: 1. nutritional habits of employees by raising their awareness of health issues 2. nutritional quality of the food on offer in restaurants.

Methods: Edenred proposed to Public Health Authorities as well as Nutritionists and Universities to join the project as partners in Belgium, Czech Republic, France, Italy, Spain and Sweden. To meet its objectives, the project followed a five step methodology: 1. Inventory of existing programmes was followed by a quantitative questionnaire (52, 000 employees and 5, 000 restaurants) and a qualitative study (60 interviews in restaurants) 2. Recommendations were made by the partners, subsequent to the results and analysis of the first step 3. Adapted tools were developed and piloted in the restaurants and the companies 4. Pilots were evaluated 5. Following the evaluation, the tools were adapted and best practices disseminated.

Results: The 102 communication tools reached around 4.2 million employees and 352, 000 restaurants. A network of restaurants applying the FOOD recommendations has been created, thus connecting the offer and the demand sides of balanced nutrition.

Conclusions: After the project period, the partners have decided to take advantage of the actions and results of the project and created a long-term programme. The Slovak Republic and Portugal already joined the programme and more countries are expected.

Key words: Nutrition; prevention; lifestyles; PPP; workplace

PO1151

THE VULNERABILITY OF SELECTED FARMERS IN VALENCIA, NEGROS ORIENTAL, PHILIPPINES TO CLIMATE CHANGE: EL NIÑO PHENOMENON AND MALNUTRITION

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Background and objectives: The purpose of the study was to examine the vulnerability of farmers in Valencia, Negros Oriental to the effects of climate change, specifically the El Niño phenomenon or Southern Oscillation, which was previously experienced by the Philippines in 2009-2010.

Methods: Knowledge, Attitudes and Practices Survey to determine their behavioural response to determine their vulnerability to the effects of the El Niño. Anthropometric and Dietary assessments are used to identify the nutritional status.

Results: 75 % of the respondents claimed that crop significantly decreased during drought season.Anthropometric assessment showed that the prevalence of Chronic Energy Deficiency Grade 1 among females was 17% and 28.57% for Low Normal. While Male Body mass index result for Chronic Energy Deficiency Grade 1 is 10%, Low Normal 18.33% & and Obese Grade 1 is 31.67%. Dietary assessment of macronutrient intake of carbohydrates, protein and fat is 31.6 % among respondents are below recommended amounts (Recommended Dietary Intake). While micronutrient deficiency are prevalent these are the following : calcium, iron, vitamin A, thiamine, riboflavin, niacin, vitamin C.

Conclusions: Placing the current nutritional status (under relative normal climatic conditions) of the farmers in the context of food security in the area, there are reasons to believe that the status will go for the worse if the extreme climatic conditions like the El Niño phenomenon will once again prevail in the region. As the farmers rely primarily on home grown crops for their food supply, a reduction in farm production due to drought conditions during El Niño is expected to adversely affect their dietary intake. Local government should therefore institute programs to increase food resilience and help communities cope with the onset of adverse climatic conditions.

Key words: malnutrition, children, diet, anthopometry.

PO1152

BARRIERS TO MOTIVATION FOR HEALTHY EATING

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Background and objectives: To gain an insight into children views about food and nutrition.

Methods: Data were collected in focus group discussions; two focus group sessions were undertaken with each school group. A total of 11 post primary schools in Northern Region in Ghana. In all, 106 children aged 11–12-y-old (n=52 boys, n=54 girls).

Results: Focus group transcripts were analyzed using qualitative research methodology. Major barriers to healthy eating were taste, appearance of food, filling power, time/effort, cost, choice/availability, risk, rebellion, and body image/weight concerns. The main difference between sexes was in terms of motivating factors for eating well; girls tended to focus primarily on their appearance whereas boys appeared to be more influenced by sport. There was some mention of balance and variety within the focus group discussions, however, in practice, the children had a tendency to categories foods as either 'good' or 'bad', 'healthy' or 'unhealthy'.

Conclusions: This study has revealed a number of barriers to, and motivations for, healthy eating, which should be taken into account when planning nutrition intervention strategies aimed at children moving into adolescence. While it may be possible to immediately attempt to address some of the barriers identified in this study, for example, in nutrition education initiatives, other barriers (such as the lack of available, attractive and affordable healthy foods in the school canteen) will prove more difficult to tackle without changes at the policy level. Overall, it appears that health promotion specialists have a major challenge ahead in order to encourage this age group to view healthy eating as an attractive and achievable behavior.

Key words: Transcript, Barriers, motivation, Tendency, interventions.

PO1153

SAVING FUEL, COST AND PREVENTING ENVIRONMENTAL POLLUTION THROUGH SOLAR COOKING IN MID-DAY MEAL PROGRAMME

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Background and objectives: Noon Meal Programme aims to improve the nutritional status of children, school enrollments, attendance and reduce dropout rates. Increasing fuel cost and emission of carbon monoxide (when wood is used as a fuel) while cooking have remained as unsolved problems in mid-day meal cooking. Objective of the study was to see if solar cooking can save fuel, time and reduce pollution in noon meal preparation.

Methods: An Sk23 paraboloid solar cooker was used for the study. Sixty children received solar cooked lunch (aluminium cooking vessel). Another 60 children received solar cooked lunch (pressure cooker). Third group of 60 children served as control. The smoke emission from conventional cooking was estimated. The impact of using solar cooker for noon meal was assessed for fuel conservation, time taken for cooking and carbon monoxide emission. The experiment was conducted for four months and solar intensity, focal point temperature and ambient temperature recorded.

Results: The results of the study indicated that highest ambient temperature was observed during April and May (36°C and 37°C) and the lowest (33°C) was during July. The trend was similar for solar intensity (1075 w/m2 and 1094 w/m2) and focal point temperature (142°C). In April, the time taken to cook rice was 2 hours. In June, it took 2 hours 20 minutes. On an average carbon monoxide level was estimated as 122.75 ppm.

Conclusions: considering 220 days in a year for solar cooking, about 0.4 to 0.9 tons of wood per school could be conserved per year through the implementation of solar cooking. Sk23 paraboloid solar cooker is pollution free, reduces the drudgery of cooking, saves fuel and time, and the acceptability and growth promoting quality were good. Hence introduction of solar cooking can be taken up for noon meal cooking.

Key words: Solar, Carbon monoxide, Drudgery, Fuel

PO1154

NUTRITIONAL STATUS AND ITS DETERMINANTS FOR WOMEN LIVING IN FEMALE HEADED HOUSEHOLDS IN ETHIOPIA: A MULTILEVEL ANALYSIS

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Background and objectives: Nutritional status is one of the essential components for the welfare of an individual. However, the prevalence of malnutrition is high throughout the world, particularly in sub-Saharan Africa where 30% of its population is undernourished in 2010. It has become one of an important public health problem in countries like Ethiopia.Thus, this study aims to assess the nutritional status and its determinants for women living in female headed households in Ethiopia.

Methods: This study is carried out using data obtained from the 2005 Demographic and Health Survey of Ethiopia. A multilevel analysis was used to determine factors affecting the nutritional status of women living in female headed households.

Results: Among women living in female headed households, 26.6% were undernourished. In the multivariate analysis, age, family size, being engaged in agriculture, living in households with no toilet facility were found to be factors affecting the nutritional status of women living in female headed households. The risk of under nutrition was high among women aged 15-19 (OR=2.17, P-value<0.01) and 40-49 (OR=1.75, P-value<0.1) years. The risk of malnutrition was also high among women having small household size, whose occupation was agriculture, and those living in households with no toilet facility (OR=1.49, P-value<0.05). Rural women having small parity (OR=2.24, P-value<0.1) and Urban poor (OR=1.74, P-value<0.05) and very poor (OR=1.81, P-value<0.1) women were also likely to be undernourished.

Conclusions: Hence based on the findings raise of awareness about the importance of women nutrition, avoidance of childbirth at early and late ages, improvement of environmental sanitation and economic status of women and providing labor saving technology to the women are suggested recommendation.

Key words: nutritional status, malnutrition, female headed households.

PO1155

HAS THE IODINE STATUS, KNOWLEDGE AND PRACTICES OF PREGNANT AUSTRALIAN WOMEN IMPROVED SINCE MANDATORY BREAD FORTIFICATION?

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Background and objectives: In order to address the population-level mild iodine deficiency in Australia, a mandatory iodine fortification program of salt used in bread-making was introduced in the country in late 2009. To date, there has been no assessment of the effectiveness of the program.

Methods: A before-after quasi-experimental study was conducted to assess changes in median urinary iodine concentration (MUIC) measurements, according to supplement use, in pregnant women attending a public antenatal clinic in a regional area of New South Wales, Australia in 2008 (n = 139), 2011 (n = 147) and 2012 (n = 114). Knowledge and practices related to iodine nutrition were investigated in the 2012 sample using a self-administered questionnaire and dietary iodine intake evaluated using a validated iodine-specific food frequency questionnaire.

Results: The mild to moderate iodine deficiency that was confirmed pre-fortification (MUIC (IQR) = 87.5 (62, 123.5) has steadily improved to 145.5ug/L (91, 252) in 2011 and 166 (97, 237) in 2012 (sufficiency ≥150μg/L). However, only those women taking supplements containing iodine had MUIC indicative of sufficiency in both years surveyed post fortification (178ug/L vs. 109 ug/L; P<0.001 (2011) and 202 μg/L vs. 124 μg/L; P < 0.05 (2012). Despite bread being the vehicle for iodine fortification, dairy foods remained the major contributor to total iodine intake (58 %). Overall knowledge regarding health implications of iodine deficiency and identification of iodine rich food sources was poor.

Conclusions: Iodine status of women has improved since the introduction of mandatory iodine fortification; however supplementation is indicated during pregnancy.

Key words: iodine, fortification, pregnancy, supplementation

PO1156

FROM RESEARCH TO POLICY IN CHRONIC DISEASE PREVENTION: MANDATORY SALT REDUCTION IN SOUTH AFRICA

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Background and objectives: Ischaemic heart disease and stroke are the leading causes of death after HIV in South Africa. Excessive salt intake, a major cause or hypertension, is considered to be a major risk factor for cardiovascular disease in the South African population.

Methods: A systematic series of studies was undertaken to (1) assess main contributors to total salt intake; (2) to develop and consumer test reduced Na variants of these foods; (3) to conduct an 8-week randomised controlled trial to assess the blood pressure-lowering impact of substitution of these foods in African hypertensives.

Results: Bread is the major source of dietary salt intake, providing 25 to 41 % of non-discretionary salt intake in various groups. Other major contributors include margarine and spreads, savoury snacks, processed meats, soup powders and stock cubes. The salt content of bread could be reduced by 32 % without adverse impacts on commercial baking properties or taste. The magnitude of BP reduction found in the RCT (systolic BP = -6, 2 mm Hg (SEM 2.63) (95 % CI: -11.4 to -0.94 mmHg; P<0.05) provided motivation for salt reduction legislation in foods.

Conclusions: As a result of these studies, South Africa is leading the way globally in policy regarding mandatory salt reduction in various food groups. Monitoring and evaluation of the legislation will be required to assess its effectiveness on health outcomes.

Key words: salt reduction, blood pressure, policy, bread

PO1157

PREVALENCE AND DETERMINANTS OF ANEMIA AMONG OLDER SCHOOL CHILDREN IN THE VOLTA REGION OF GHANA.

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Background and objectives: Anemia, a critical public health issue resulting from micronutrient deficiencies, infections and infestation confronts a wide range of population groups. Research in Ghana on anemia among school aged children is often neglected. This study aimed to assess the iron status of older school children, assess their dietary intake and screen them for parasitic infections and infestations.

Methods: The study was cross-sectional involving School Children aged 6 to 12 years. 162 of the participants were randomly selected for the study using a simple random sampling. Blood and stool samples were collected and assessed for malaria parasitemia, helminthes, ferritin, and hemoglobin concentrations. Hemoglobin was determined in the field using a Hemocue Hemoglobinometer ((Hemocue AB, Angelhom, Sweden). Serum ferritin and serum transferrin receptor were measured using radioimmunoassay (Alpha Diagnostics Inc) and enzyme-linked immunosorbent assay respectfully. Malaria parasites and helminthes were investigated using Giemsa staining and Standard Kato-Katz techniques respectfully. SPSS (version 16.0) was used for all statistical analyses.

Results: There was high prevalence of anemia (30.8%) and low iron store (71.3%) among the study participants. Girls had higher prevalence of anemia (41.5%) than boys (21.8%). Malaria prevalence was high (67.8%) among the children and evenly distributed across gender; girls (66.2%) and boys (69.2%). Hookworm infestation was only prevalent in boys (18%). The mean energy, iron and vitamin C intake of the children were 982.67±255.91kcal, 18.98±8.84mg and 23.69±6.76mg respectively.

Conclusions: Anemia was high among the children in the region. Further research is needed to determine other factors responsible for the high prevalence of anemia.

Key words: Anemia, malaria, hemoglobin, ferritin, iron.

PO1158

ADJUSTING PLASMA CONCENTRATIONS OF FERRITIN, RETINOL, AND ZINC AFFECT THE PREVALENCE OF MICRONUTRIENT DEFICIENCIES IN CHILDREN BUT NOT IN WOMEN

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Background and objectives: The nutritional biomarkers plasma ferritin, zinc and retinol concentrations are influenced by subclinical inflammation/infection leading to over or under-estimate the real prevalence of iron deficiency (ID), zinc deficiency (ZD), and vitamin A deficiency (VAD) in populations. The aim of this study was to assess changes in ID, ZD, and VAD prevalence among women 15-49 years, and children 12-59 months old after adjusting for subclinical infection/inflammation.

Methods: Infection/inflammation was assessed by the measurement of plasma C-reactive protein (CRP) and alpha 1-acid-glycoprotein (AGP) by immuno-turbidimetry in 1496 children, and 1082 women recruited during a national representative cross sectional nutritional survey in Senegal. Plasma ferritin, plasma zinc, and plasma retinol concentrations were measured by ELFA, AAS, and HPLC, respectively. Published correction factors were used to remove the influence of infection/inflammation from each biomarker and the prevalence of ID, ZD, and VAD were compared before and after adjustment.

Results: In the children, inflammation decreased the prevalence of ID by 27% (56% vs. 82%; n= 1431; P<0.0001), increased the prevalence of ZD by 7% (50% vs. 43%; n=1148; P<0.0001), and the prevalence of VAD by 7% (24% vs. 17%; n=1418; P<0.0001). In contrast, although acute and chronic infections were detected in 11%, and 10% among the women, respectively, the adjusted prevalence was for ID 39%, for ZD 58%, and for VAD 1.9%, and was not significantly different from the measured one.

Conclusions: Measures of acute phase proteins (CRP and AGP) are needed to estimate the real prevalence of iron, zinc, and vitamin A deficiency in children but not in adolescent and adult women in Senegal.

Key words: micronutrients deficiency, inflammation, children, women, Senegal.

PO1159

CONCURRENT DEFICIENCIES OF IRON, ZINC AND VITAMIN A IN SENEGALESE WOMEN AGED 15-49 YEARS: A NATIONAL STUDY

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Background and objectives: The Senegalese government has launched a national fortification program to prevent iron and vitamin A deficiencies in Senegalese women. However, the extent of concurrent deficiencies in the population remains unknown. This study assessed the baseline concurrent deficiencies of iron, zinc and vitamin A (VA) among Senegalese women aged 15 to 49 years.

Methods: Concurrent deficiencies were analysed in 1082 women under the framework of a national representative cross sectional baseline survey using a stratified two-stage cluster sampling method. Plasma ferritin (PF), plasma zinc (PZ), and plasma retinol (PR) concentrations were measured by ELFA, AAS, and HPLC, respectively. The data were weighted, and adjusted to subclinical inflammation/infection defined by the plasma concentration of C-reactive protein, and alpha-1 acid glycoprotein measured by immuno-turbidimetry.

Results: For the individual measures, 39% and 58% of the women were iron and zinc deficient, respectively. Very few women (1.9%) was VA deficient (PR <; 0.7 µmol/L) but low PR values (< 1.05 µmol/L) were found in 14.2% of them. Seventy seven percent (77%) of the women were suffering from at least one micronutrient deficiency. Among them, 46% were deficient in one micronutrient: zinc (30%), iron (13.4%), or had low VA status (2.5%); P<0.0001. Concurrent two micronutrients deficiencies affected 26% of the women (iron and zinc: 17.5%, zinc and low VA status: 5.5%, iron and low VA status: 3.1%; P<0.01). Concurrent three micronutrients deficiencies were found in 5% of the women.

Conclusions: Zinc is the most single micronutrient deficiency among the Senegalese women, but concurrent two micronutrient deficiencies, particularly zinc and iron, were also prevalent. The Senegalese Government should considered zinc during food fortification and/or supplementation program.

Key words: Concurrent micronutrient deficiencies, women, Senegal.

PO1160

CONCURRENT DEFICIENCIES OF IRON, ZINC AND VITAMIN A IN SENEGALESE INFANTS AGED 12-59 MONTHS: A NATIONAL STUDY

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Background and objectives: Home fortification with micronutrient powders has been suggested by WHO as an alternative to increase iron, zinc and vitamin A intake in children aged 6-23 months. However, the existence of concurrent deficiencies on these micronutrients in children remains largely unknown. The aim of this study was to assess the concurrent deficiencies of iron, zinc and vitamin A (VA) among Senegalese children.

Methods: A national representative cross sectional survey using stratified two-stage cluster sampling method was conducted in Senegal, and 1496 children aged 12-59 months were investigated for iron, zinc, and VA status. Plasma ferritin (PF; n=1431), plasma zinc (PZ; n=1151), and plasma retinol (PR; n=1418) concentrations were measured by ELFA, AAS and HPLC, respectively. The data were weighted, and adjusted to subclinical inflammation/infection defined by plasma the concentration of C-reactive protein, and alpha-1 acid glycoprotein measured by immuno-turbidimetry. The analysis of concurrent deficiencies involved 1135 children.

Results: Using individual measures, 82.4%, 42.8% and 17.1% of the children were iron (FP<12 µg/L), zinc (PZ<65 in the morning and PZ<57 µg/dL in the afternoon), and marginal VA (POR≤0.70µmol/L) deficient, respectively. More than ninety percent (90.7%) of the children were suffering from at least one micronutrient deficiency. Among them, 46.6% were deficient in one micronutrient including iron (39.4%), zinc (5.8%), and marginal VA (1.3%); P<0.001. The prevalence of two micronutrient deficiencies was 27.7% for iron and zinc, 7.7% for iron and VA, and 1.4% for zinc and VA. Concurrent three micronutrient deficiencies affected 7.2% of the children.

Conclusions: Although iron is the main single micronutrient deficiency among the Senegalese children aged 12-59 months, concurrent two micronutrient deficiencies (zinc and iron) were also prevalent and therefore needs particular attention during home fortification.

Key words: Concurrent micronutrient deficiencies, children, Senegal.

PO1161

ANEMIA AND NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN NORTH GAZA, PALESTINE

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Background and objectives: The most common cause of anemia is deficiency of iron; but it may also be caused by deficiencies of folates, vitamin B12 and protein. Some anemias are not caused by nutritional factors, but by congenital factors and parasitic diseases such as malaria. This study attempted to estimate the prevalence of anemia and investigate nutritional status among pre-school children in three rural communities of North Gaza government area.

Methods: A total of 150 children between the ages of 24 - 62 months were randomly selected over a period of six months and prevalence of anaemia was estimated. The World Health Organization (WHO) age-adjusted cut-off for hemoglobin were used to classify anemia. Under- nutrition (stunting, wasting and underweight) was classified according to the National Centre for Health Statistics standards. Heights, weights and Mid Upper Arm Circumference were measured.Haemoglobin levels of children were estimated by cyanmethaemoglobin method.

Results: The prevalence of anemia was 65.3 % having haemoglobin levels lower than 11g/dl. The percentage of anemic children among male and female children was 35 and 30 respectively and statistical analysis showed that male children were more susceptible to anemia. Malnutrition was patent; 34.0% of the children were stunted, 20.3% wasted and 45.0% underweight. Anaemia was also significantly higher in Jabalia camp than in bait hanon and Bait lahia town pre- school children ($P<0.001$).

Conclusions: It is concluded that poor anthropometric indices, undernutrition and iron deficiency anemia may be due to lower intake of food than recommended.

Key words: food intake; Haemoglobin; Anthropometrics; Anemia; pre- school children.

PO1162

FOODBORNE DISEASES IN BAMAKO

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Background and objectives: Foodborne diseases are a serious public health problem, both in developed and developing countries. They are the result of ingestion of food contaminated with microorganisms or chemicals. The present study aims to estimate the magnitude of the problems posed by foodborne diseases and their characteristics in Bamako, Mali's capital.

Methods: A descriptive retrospective analysis of food poisoning cases, notified between 2000 and 2010 by two University Hospitals (CHU) and six Health Reference Centers (HRC) in Bamako, was performed.

Results: During 2000-2010, a total of 573 cases of foodborne diseases were identified, constituting 52% of accidental poisoning cases notified during this period. Of that number, 201 cases (35, 7%) occurred in children under the age of 6 years (among the 563 cases for whom the age is known). The average age of victims was 15 years. According to data recorded, the poisoning symptoms are varied, depending on the type of contaminated food, the type and degree of contamination, the ingested quantity and the delay before treatment. Among the cases for whom the evolution is known, 2 of them died after eating contaminated food. For other cases, the outcome was favorable with or without sequelae.

Conclusions: Foodborne disease will continue to be a matter of major concern around the world in the foreseeable future, despite some important successes at reducing the levels of certain pathogens in foods.

Key words: Food, Poisoning, Epidemiology, Bamako, Mali.

PO1163

COLLECTIVE FOOD POISONING IN DOUGABOUGOU, MALI

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Background and objectives: This study examines the relationship between educational level and the prevalence of obesity among adults in Abeokuta, Ogun State, Nigeria.

Methods: A total of 240 respondents were selected from two different localities i.e rural and urban, with their ages ranging from 20 years and 64 years. The educational level details were obtained based on the personal information given and the prevalence of obesity was determined using the Body Mass Index cut-off (≥ 30 kg/m2) to estimate those obese. The data were analyzed using descriptive and correlative parameters to demonstrate the influence of educational level and its resultant effect on income level on obesity across the sampled population.

Results: The results showed the highest level of among the rural males of lower educational status. Adjustments were made to establish relationship between educational attainments and BMI graphically.

Conclusions: Conclusively, there was strong and direct association between the educational level and the BMI; which further affirmed that educational level determines the income level and obesity mostly among the urban population. Findings of this nature can provide functional insights into some socioeconomic developments that can help to overcome obesity epidemic.

Key words: Educational Level, BMI, Adults, Trends.

PO1164

EDUCATIONAL LEVEL AND OBESITY ACROSS ADULTS IN ABEOKUTA, OGUN STATE, NIGERIA.

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Background and objectives: This study examines the relationship between educational level and the prevalence of obesity among adults in Abeokuta, Ogun State, Nigeria.

Methods: A total of 240 respondents were selected from two different localities i.e rural and urban, with their ages ranging from 20 years and 64 years. The educational level details were obtained based on the personal information given and the prevalence of obesity was determined using the Body Mass Index cut-off (>30 kg/m2) to estimate those obese. The data were analyzed using descriptive and correlative parameters to demonstrate the influence of educational level and its resultant effect on income level on obesity across the sampled population.

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Key words: Educational Level, BMI, Adults, Trends.

PO1165

EFFECTS OF AGE AND ENERGY EXPENDITURE ON OBESITY AMONG ADULTS IN ABEOKUTA, OGUN STATE, NIGERIA

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Background and objectives: The purpose of the study was to assess the independent effects of age and energy expenditure on the risks of obesity among adults (20-64 years) in Abeokuta.

Methods: A cross-sectional study with changes in age, changes in work and leisure-time, and physical activities information played roles. In all, 240 adult subjects of which 120 were females and 120 were males with age ranging between 20-64yrs in rural and urban localities in Abeokuta. The cut-off for energy expenditure and BMI were estimated in accordance with the FAO/WHO classifications. The data were analyzed using descriptive and correlative parameters to demonstrate the influence of age on energy expenditure.

Results: Physical activity information determined the energy expenditure, while the BMI determined the risk of obesity among the subjects. The risks of obesity in the rural and urban areas strongly increased with increased age across the gender, while energy expenditure contributed to the risks in the urban population. Statistically, age has a strong and direct association with obesity in both rural and urban settings, while energy expenditure was inverse in its association.

Conclusions: Findings from this study showed that in developing societies, age tends to be a risk factor for obesity, whereas energy expenditure is to be protective. Level of education and economic development are relevant modifiers of the influences exerted by these variables.

Key words: Age, Energy Expenditure, BMI, Rural/Urban.

PO1166

INFANT YOUNG CHILD FEEDING PRACTICE AND THEIR NUTRITIONAL STATUS IN A NATIONAL NUTRITION PROGRAM AREA

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Background and objectives: Appropriate feeding practice during the first two years of life is important for the growth and development of a child. The aim of this study was to assess infant young child feeding practice and their nutritional status in a national nutrition program area.

Methods: This cross-sectional study was conducted in Kapasia under Gazipur district, Bangladesh. In total, 150 children of 0-2 years were selected purposively.

Results: The rates of initiation of breast-feeding within one hour was 67.3%, exclusive breast-feeding and continued breastfeeding were 82.7% and 98% respectively. Starting complementary feeding at appropriate time was 83.1%. Among the respondents 34% was reported of using bottle for child feeding. In responsive feeding practice 45% mother were talking during feeding but 17% were forcing child to eat. Majority (76%) of the caregivers washed their hands properly before offering complementary feeding to their children but mothers did not use variety of foods. In the program area the underweight, stunting and wasting rates (<-2SD) were 22%, 31.7% and 11.6% respectively. Significant association was found between education of mother and exclusive breast feeding (p<.005) and between sex of children and stunting (p<.002).

Conclusions: In the study area infant young child feeding practices were good and their nutritional status was acceptable and the prevalence of malnutrition was low. Comprehensive policy response is required to address infant young child nutrition in Bangladesh.

Key words: NNP, infant young child feeding practice, nutritional status.

PO1167

BODY CONCERNS VARY BETWEEN ACADEMIC BACKGROUNDS: A COMPARISON OF FEMALE FASHION DESIGN AND DANCE STUDENTS

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Background and objectives: While an excessive desire for thinness has been suggested as a potential health risk for young females, an influence of course of study on body image has not been examined extensively. The present study explored lifestyle, body perception and reasons for body concerns among female university students enrolled in fashion design and dance performance, disciplines with a professional focus on aesthetics of the body.

Methods: A self-administered questionnaire was distributed and 81 completed questionnaires were returned. Data of 27 fashion design and 33 dance students with completed gender, age, and current height and weight information were included in the analysis.

Results: Dance students had a shorter and a lighter physique than their design counterparts (p<0.01) but both had a comparable body mass index (BMI). There were no differences in eating behavior and effort for weight management but dance students exercise more frequently (p<0.01). Similarly, while perceptions toward their current weight and physiques did not differ between the groups, a greater proportion of dance students reported training/education as an influencing variable for body perception compared to design students (72.7% vs 11.1%; p<0.01). Compared to dance students, a greater proportion of design students raised having reassurance (81.5% vs 30.3%; p<0.01) and attractiveness (81.5% vs 57.6%; p<0.05) as reasons for body concern whereas dance students raised sports performance (p<0.01), comments from family members and a comparison of a physique with their surroundings (both p<0.05) as their reasons for body concerns.

Conclusions: The current findings indicate reasons for body concern differ between females studying different professions, although their eating behavior and body perception were comparable. It may be important to evaluate differences in reasons for body concerns further for future implementation of population-specific approaches to improve body concern of young females.

Key words: Body concern; females; university students; enrolled course.

PO1168

KNOWLEDGE AND USE OF FOOD LABEL INFORMATION AMONG URBAN CONSUMERS IN INDIA

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Background and objectives: Overweight, obesity and associated diseases are on the rise in India. To discourage consumption of unhealthy foods, Indian food regulations made nutrition labeling mandatory since 2009. A study was conducted with an objective to assess knowledge, perceptions and use of food labels among consumers.

Methods: A cross-sectional study was conducted in two metro-cities of India using both quantitative and qualitative methods. Intercept interviews (n=1832) were conducted at super-market sites by administering structured questionnaires on a stratified random sample of adolescent (10-19 years), adult (20-59 years) and elderly (60 years) consumers. This quantitative information was triangulated with qualitative data from 21 Focus Group Discussions (FGDs).

Results: About 45% of consumers across the age groups buy packed foods once in a week and 12% buy every day. Taste, quality, convenience and ease-of-use were reported to be reasons for buying packed foods. Although 90% of the consumers across the age groups check food labels, majority (81%) of them look only for manufacturing date, expiration/best-before date. Only 1/3rd of the consumers check nutrition information and list of ingredients. Nutrient information on labels was not often checked because most of them felt they either lacked nutrition knowledge or found information too technical to understand. About 60% of the respondents check quality symbols. It was observed that the significantly ($p<0.001$) higher number of respondents with higher education were checking quality symbols and nutrition information in all categories of the prepackaged foods. Women and girls concerned about 'fat' and 'sugar' intake were checking nutrition facts.

Conclusions: The intent of promoting choice of healthy foods through use of food labels is not being completely met. Majority find nutrition information complicated to comprehend; there is perhaps a need to take up educational activities and/or experiment newer forms of nutrition labeling.

Key words: Food-label, consumer-survey, nutrition.

PO1169

NUTRITION GOVERNANCE FOR MATERNAL AND YOUNG CHILD NUTRITION SECURITY IN THE PHILIPPINES

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Background and objectives: An important dimension of the UNICEF and the European Union's project to improve child survival, growth, and development through nutrition security and life cycle interventions was to assess the functionality and state of multi-sectoral coordination in addressing maternal and young child nutrition security (MYCNS). Specifically, this paper aimed to: 1) assess the functionality of the local nutrition committee (LNC) and the Local Nutrition Action Plan (LNAP); 2) identify gaps across intervention areas and highlight opportunities for possible stakeholders or partnerships to fill these gaps; and 3) to provide the basis for prioritizing the interventions towards MYCNS.

Methods: The study covered 316 municipalities and cities where both primary and secondary data related to the nutrition interventions were collected. Secondary data were generated to characterize the municipal level nutrition attributes while primary data to characterize the stakeholders and the extent of collaboration and functionality of the LNP and LNC were generated though key informant interviews.

Results: The assessment revealed: 1) an indicative relationship between functionality of the LNC and the LNAP; and 2) the positive relationship between LNC functionality LNP sustainability and functionality and sustainability and effectiveness as measured by the extent of malnutrition. Another indicator used in the study is the knowledge and practices (K&P) rating to measure the degree of functionality of the institutions and the level of appreciation by the key service providers on appropriate knowledge and good practices in health and nutrition interventions.

Conclusions: Overall, K&P rating indicates that knowledge does not necessarily translate into good practices. This rating can serve as the basis for prioritizing the services either

by government administrative unit, by service provider, and by component.

Key words: Nutrition Security, Local Nutrition Planning, Knowledge and Practice Rating.

PO1170

PROMOTING HEALTHY EATING HABITS IN GHANA THROUGH THE PRINT AND ELECTRONIC MEDIA

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Background and objectives: There is lack of knowledge on healthy eating and preventive health practices such as exercise in Ghana. Taking a history on the above theme from patients that reported to me for dietetic care in the hospital revealed the truth behind this assertion. There is therefore the need to put out information that would elicit public interest in the area of gaining knowledge on healthy eating practices. The objectives were to write articles on healthy eating habits in a simple non-technical language for people to read. It was also aimed at getting social groups like churches, corporate organizations, health clubs, and clinics/hospitals to engage the services of dieticians and nutritionists for some basic education to their members.

Methods: I chose a national newspaper where I write articles once a week. The newspaper is called "The Mirror". Contact information is provided for readers to get in touch with me.

Results: On weekly basis readers send me emails seeking further clarifications on their diet. There have also been calls from groups and corporate organizations that needed our services in educating their members on healthy eating habits. Through these articles in the Mirror, other media houses including TV stations and radio stations have interviewed me on various aspects of diet and health. This has been going on for the past three years. The various articles published in the year 2012 will be presented at the ICN conference. The title of the first article published in 2012 was "Just 30 minutes of walking daily will do these" and the last one published in 2012 was "The appointments you should keep in 2013".

Conclusions: The whole nation gets educated on their diet and health. Groups and organizations also engage our services for further education through seminars.

Key words: Mirror, Articles, Healthy, Diet, Knowledge.

PO1171

THE IMPACT OF VARIOUS DOSES OF LIPID-BASED NUTRIENT SUPPLEMENTS (LNS) ON ENERGY INTAKE OF 9 MONTH OLD MALAWIAN INFANTS

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Background and objectives: The causal pathway of undernutrition during infancy is complex. One of the key players is quality/quantity of complementary foods (CF). LNS has been successfully used to treat moderate undernutrition and is now being evaluated for its potential to prevent undernutrition. The impact of LNS on total intake is not well understood. Objective: To assess the impact of various doses of LNS on energy intake from CF of 9 month old infants participating in a larger trial (International Lipid-Based Nutrient Supplement [iLiNS-DOSE trial]) in Mangochi, Malawi.

Methods: Infants were randomly allocated to one of four LNS doses at enrolment (6 months of age) – control, 10g LNS/d, 20g or 40g. In the dietary assessment substudy, two interactive 24-hour dietary recalls per infant were completed 7 days apart at 9 months of age. Energy and nutrient intake estimations were made using a food composition table compiled for Malawian foods. Between group differences were assessed using an unadjusted linear regression model and pair-wise comparisons between groups using post-hoc linear combination tests.

Results: Recalls were collected from 568 infants. Median (25, 75th percentile) energy intake (kcal/d) from CF in each group (control, 10, 20 and 40 LNS g/d) was 345 (247, 464); 396 (309, 532); 409 (300, 548); and 388 (304, 548), respectively; $p=0.003$. Upon post-hoc analysis, all LNS dose groups were significantly different from the control ($p<0.05$), but differences between LNS groups were not significant ($p>0.05$).

Conclusions: LNS (10, 20 or 40 g/d) increased energy intake from CF; the magnitude of increase was not related to the dose of LNS provided. This could have important implications for the cost of potential interventions. Acknowledgement: This work was funded by grant from the Bill & Melinda Gates Foundation to the University of California, Davis.

Key words: undernutrition, infant, LNS, dietary assessment.

PO1172

FOOD LABELING IN INDIA – A STUDY ON CURRENT SCENARIO OF REGULATION, COMPLIANCE BY INDUSTRY AND CONSUMER PERCEPTIONS

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Background and objectives: India witnessed ~300% rise in consumption of packed foods in the last two decades. Considering that food labeling is an important population-based approach to promote healthy and informed food choices, Indian food regulations mandate compulsory food labeling. This study aimed to assess the current scenario of labeling in terms of regulations, market compliance, consumer perceptions and use of label information.

Methods: The study was conducted in three phases. Phase-I: A review of food labelling regulations in India vis-à-vis other countries was done through systematic library and internet search. Phase-II: To assess the manufacturer compliance with mandatory labelling requirements, 815 pre-packaged foods encompassing 15 categories were collected from supermarkets. Their labels were assessed using pre-tested proforma. Phase-III: Questionnaires, stakeholder interviews, and focus groups were used to assess use of label information and consumer perceptions.

Results: India's food labeling regulations are on par with those in developed countries, however, there is ambiguity about nutrition and health claims. Market survey revealed food products were ~100% compliant with mandatory labeling; 77% of labels displayed 'instructions-to-use' and 'storage-conditions'. Nutrient declaration was based on nutritive values of raw ingredients, whereas regulation mandates values based on final product analyses. Although 90% consumers claimed to read labels, >80% perceived shelf-life as a concern and checked only 'best-before' or 'expiration' dates. Only 1/5th of them read nutrition/ingredient information. Many found nutrition information too complex. Education and nutrition knowledge were major determinants of label use.

Conclusions: It is time to evolve permitted nutrition and health claims that can be used on labels. The intent of promoting healthy foods through use of food labels is not being completely met. Nutrition education is the key to promote consumer use of label information for food choices. Keywords Labeling, Regulation, India, Consumer perceptions.

PO1173

ALARMING RATE OF ANAEMIA AMONG UNDER TWO YEAR CHILDREN FROM AYEYARWADY DIVISION, MYANMAR

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Background and objectives: Iron deficiency (ID) is most common micronutrient deficiency among young children. ID impairs cognitive performance, behavior and physical growth of these children which often have long term consequences. Although anemia is multifactorial, prevalence of anemia is a practical indicator used to assess ID in low-income setting. Our previous study showed complementary feeding diet for these children cannot meet their requirement for iron, zinc, folate and vitamin B12. Recently, we conducted a survey to estimate the magnitude of anemia and undernutrition problems among under-2-years children from Myanmar.

Methods: A cross-sectional survey was conducted among 489 children of 12-18 months, in Pan-Ta-Naw and Kyaung-Gon townships, Ayeyarwady Division, Myanmar in February, 2013. This was screening phase of a randomized trial comparing food-based and supplement-based nutrition interventions (ClinicalTrials.gov Identifier: NCT01758159). The children were screened for their Hemoglobin (Hb) concentration by Hemocue and anthropometry assessment was done. Screening for malaria infection was also done by rapid immunochromatographic test (ICT) malaria p.f/p.v.

Results: Mean Hb concentration was 9g/dL and 91% of children were anemic (Hb<11g/dL) with 84% mild anemia, 8.8% moderate anemia (Hb<7g/dL) and 0.2% severe anemia (Hb<5g/dL). Prevalence of wasting (WHZ<-2SD) was 12.1%, stunting (HAZ<-2SD) 28.2% and underweight (WAZ<-2SD) 22%; severe wasting (WHZ<-3SD) 1.2%, severe stunting (HAZ<-3SD) 10% and severe underweight (WAZ<-3SD) 7.3% respectively. The prevalence of anemia and undernutrition are similar in two townships. Only one child was detected for malaria infection.

Conclusions: Anemia is a major nutrition problem among under two year old Myanmar children. Malaria infection was not common among the children. Poor complementary feeding practices based on monotonous and cereal-based diet with low bioavailability of iron may contribute to the problem. The study highlights the urgent need for nutrition intervention for the children of vulnerable age group in Myanmar.

Key words: Anemia, Under 2 year children, Myanmar.

PO1174

BEHAVIORAL AND NEUROCOGNITIVE STATUS OF IRON DEFICIENT SCHOOLCHILDREN IN KENITRA NORTH WEST OF MOROCCO

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Background and objectives: This work aims study the problem of iron deficiency and its implication on neurocognitive regulations and their impact on neurocognitive development and choolchildren performances in Kenitra north west of Morocco. Iron deficiency remains an important public health trouble on a global scale, regional and local levels. The relations between iron deficiency and cognitive performance exist but the biochemical and physiological mechanisms linking it to an altered neurocognitive function are not yet clear.

Methods: We reviewed the studies relating IDA to Neurocognition especially on hippocamus functions alteration and consequently on learning abilities and memory. Then a set of cross sectional observational studies carried out in the city of Kenitra and its region will be presented. A total of 600 pupils were observed in different settings in rural periurban and uban. After validation and adaptation of cognitive tools, extracted batteries were used to assess cognitive status (Raven Progressive matrix, Bell tests, WISC extracts etc..). Iron status was assessed by Hemoglobin and serum ferritin.

Results: The results confirm that anemia is very important in schoolchildren and its prevalence varies from 20 to 30 %. A strong association was found between iron deficiency alone and iron deficiency anemia with a global induced intelligence and visual attention performances.

Conclusions: Scientists rely on the use of new exploration techniques and behavioral neurocognitive (f MRI, EEG evoked potentials) to enlighten in the near future.

Key words: Iron Deficiency, NeuroCognition, Development.

PO1176

THE EFFICACY OF EDUCATION ON NUTRITIONAL AND DENTAL CARIES KNOWLEDGE OF OBESE CHILDREN'S PARENTS

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Background and objectives: Obesity, Dental caries and periodontal diseases are among major public health concerns and growing chronic diseases especially in children. The aim of this study was to determine nutritional and dental caries knowledge of obese children¡¯s parents. (All parents of 7 year-old obese pupils, BMI≥95).

Methods: This semi-experimental study was conducted to investigate the impact of nutritional and dental caries educational program (32 hours) on knowledge of 75 parents who were randomly selected from several Health clinics in Tehran, Iran (2010). A questionnaire was filled for each subject, based on their Demographic data, Nutritional and Dental caries knowledge, considered into three categories: Good, Moderate and Weak. Data were analyzed using SPSS.

Results: 52% of obese children were girls.85% family size, belonging to 4 households. The highest level of education was academic, 55% and 50% in fathers and mothers respectively. 39% of Fathers were individual employees. 72% of mothers (mean age 35.62 yr), were housewives. Scores of nutritional and dental caries knowledge in three categories (Good, Moderate, Weak) were: (3.6%, 50.9%, 45.5%) before, and (58.2%, 61.8%, 0%) after education, respectively ($p< 0.0001$).

Conclusions: Considering to the results, Education on nutritional and Dental caries knowledge is an effective approach to promote knowledge by using attractive modern technology is highly recommended.

Key words: Nutrition, Dental caries, Knowledge.

PO1177

PROMOTING EDUCATION AND PROFESSIONAL INSERTION OF WOMEN IS KEY FOR REDUCING THE OBESITY GENDER GAP IN NORTH-AFRICA: EVIDENCE FROM TUNISIA

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Background and objectives: South Mediterranean countries have experienced a marked increase in prevalence of obesity whose prevention is now a public health challenge in these countries; beyond general obesity reduction policies, the marked environmental, socio-economic and socio-cultural patterning of obesity underlines the need for targeted strategies. In this gender sensitive socio-cultural context, we studied women vs. men differences in corpulence and their environmental and socio-economic modifiers among Tunisian adults.

Methods: Cross-sectional survey (2005): 35-70y. Tunisians. National, 3 level random cluster sample (F: n=2964, M: n=2379). BMI=weight(kg)/height(m)2 from measured height and weight, obesity was BMI >= 30, abdominal obesity waist(cm)/height(cm) ratio >= 0.6. The gender contrast measure was women vs. men obesity odds-ratio (OR); multivariate models featuring gender x covariate interaction assessed modifying effect of environment (urban vs. rural) or socio-economics (age, marital status, profession, education, economic level).

Results: Obesity was much more prevalent among women vs. men (37.0% vs. 13.3%, OR=3.8[3.1-4.7]) as was abdominal obesity (42.6% vs. 15.6%, OR=4.0[3.3-4.8]). The obesity gender contrast was higher in urban (OR=3.3[1.3-8.7]) than rural areas (OR=2.0[0.7-5.5]). This obesity gender contrast decreased with level of education (none: OR=6.9[2.0-23.3], primary: OR=4.2[1.5-12.3], secondary and more: OR=3.3[1.3-8.6]) and also steeply with professional activity (not working: 3.3[1.3-8.6], employee/worker: 2.3[1.0-5.4], upper/intermediate: 1.4[0.5-4.3]). Analogous results were observed for abdominal obesity.

Conclusions: The large observed overall gender obesity gap was higher in urban areas but much lower among the more educated and even more so among those having more qualified professional activities. Beyond general policies aimed at prevention of obesity, or nutrition interventions targeted at women as a group especially at risk, these results underline the importance of reducing social role gender differentials for reduction of gender obesity inequities in the long term. This is a challenge for prevention in the changing socio-political context.

Key words: obesity, gender, inequities, socio-economics, Tunisia.

PO1178

FRUIT CONSUMPTION IS ASSOCIATED WITH LOWER RISK OF DEPRESSION IN MID-AGE WOMEN

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Background and objectives: There is continued interest in the associations between diet and depression and several cross-sectional studies have focused on individual diets or diet patterns to investigate the relationship. A Mediterranean diet pattern, of which fruit and vegetables form a large part, has been implicated as a possible protective factor. We investigated the association between fruit and vegetables and symptoms of depression in the mid-age cohort of the Australian Longitudinal Study on Women's Health.

Methods: A total of 6869 women with a mean age of 52.5 (SD 1.5) years at baseline were followed up at three surveys over 10 years. A score of greater than or equal to 10 on the Center for Epidemiological Studies Depression-10 scale indicated depressive symptoms. Women were classified as chronically depressed if they had a score of greater than or equal to 10 at all surveys. Fruit and vegetable intake was assessed using short questions. Logistic regression, using general estimating equations, was used with adjustment for several factors including smoking, alcohol consumption, BMI, physical activity, marital status, education, total energy and fish intake. Analysis was performed using STATA 11.0.

Results: A total of 430 women (6.3%) were chronically depressed over 10 years. Among these women only 31% consumed two or more pieces of fruit/day at all three surveys compared with 47% in the group showing no depressive symptoms. There was a reduced odds of depression [OR 0.89 (95% CI 0.86-0.93, p<0.001)] among women who ate two or more pieces of fruit/day even after adjustment. There were no consistent associations between the intake of vegetables and depression.

Conclusions: These associations of fruit intake on depression, if replicated in future longitudinal studies, may be useful for dietary based primary preventive strategies for reducing the burden of depression.

Key words: diet, depression, fruit and vegetable intake.

PO1179

ASSOCIATION BETWEEN LACK OF EXCLUSIVE BREASTFEEDING AND DIARRHOEAL MORBIDITY: AN ANALYSIS OF NATIONAL DATA SETS FROM SOUTH ASIA

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Background and objectives: Exclusive breastfeeding (EBF) for the first six months and continued breastfeeding for the first two years of life are among the most effective interventions for reducing childhood mortality and morbidity. Although the prevalence of breastfeeding in South Asia is high, the low prevalence of EBF remains a significant factor that threatens the health and survival of infants. This analysis aims to investigate the association between EBF and diarrhoea in infants aged 0-6 months in the South Asian region.

Methods: Public domain data sets from 2005-2007 including Demographic and Health Survey data from Bangladesh, Nepal, Pakistan and National Family Health Survey data from India were used for this analysis. EBF was defined using the WHO definition. The primary outcome variable was the two week prevalence of diarrhoea. Logistic regression was used and factors such as gender, education and age of mother, birth order, urban/rural location, sanitation variables and poverty quintile were included in the final multivariable model. Analysis was performed using STATA 11.0.

Results: A total of 5660 subjects across the four countries were used for this analysis. The overall prevalence of EBF was 45.4%, ranging from 37.1% in Pakistan to 53.1% in Nepal. The overall prevalence of diarrhoea was 12.3%, ranging from 4.6% in Bangladesh to 26.5% in Pakistan. The odds ratio OR (95% CI) for the protective effect of EBF on diarrhoea was 0.66 (0.54-0.82) p<0.0001. Low maternal education and male gender were also associated with diarrhoea. Factors associated with lack of EBF varied across countries.

Conclusions: Improving rates of EBF is likely to reduce diarrhoeal morbidity substantially in South Asia. Because the prevalence and other factors associated with lack of EBF vary across countries in the South Asian region, promotion efforts should be tailored according to the context.

Key words: exclusive breastfeeding, diarrhoea.

PO1181

FREQUENCY OF NUT CONSUMPTION AND PREVALENCE OF METABOLIC SYNDROME, OBESITY AND DIABETES IN THE PREDIMED RANDOMIZED TRIAL.

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Background and objectives: Prospective studies have consistently suggested that nut consumption is inversely related

to fatal and non-fatal coronary heart disease. Limited data are available on the epidemiological associations between nut intake and cardiometabolic risk factors. The aim of our study was to evaluate associations between frequency of nut consumption and prevalence of cardiometabolic risk factors [obesity, metabolic syndrome (MetS), type-2 diabetes, hypertension, and dyslipidemia] in a Mediterranean population at high cardiovascular risk.

Methods: Cross-sectional study of 7, 210 men and women (mean age, 67 y) recruited into the PREDIMED study. MetS was defined by the harmonized ATPIII and IDF criteria. Diabetes and hypertension were assessed by clinical diagnosis and dyslipidemia (high triglycerides, low HDL-cholesterol, and hypercholesterolemia) by lipid analyses. Nut consumption was assessed using a validated food frequency questionnaire and categorized as <1, 1-3, and >3 servings/wk. Control of confounding was done with multivariate logistic regression.

Results: Compared to participants consuming <1 serving/wk of nuts, those consuming >3 servings/wk had lower adjusted odds ratios (OR) for obesity (0.61, 95% confidence interval 0.54 to 0.68; P-trend <0.001), MetS (0.74, 0.65 to 0.85; P-trend<0.001), and diabetes (0.87, 0.78 to 0.99; P-trend=0.043). Higher nut consumption was also associated with lower risk of the abdominal obesity MetS criterion (OR 0.68, 0.60 to 0.79; P-trend<0.001). No significant associations were observed for the MetS components high blood pressure, dyslipidemia, or elevated fasting glucose.

Conclusions: Nut consumption was inversely associated with the prevalence of general obesity, central obesity, MetS, and diabetes in subjects at high cardiovascular risk.

Key words: Nut consumption, cardiometabolic risk, obesity, metabolic syndrome. Acknowledgments:We thank all the participants of the PREDIMED study.

PO1182

THE EXTENT AND NATURE OF TELEVISION FOOD ADVERTISING TO CHILDREN IN XI'AN CITY, CHINA

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Background and objectives: Childhood obesity is a growing global epidemic while wide sales of energy dense low nutrient food are a gradually prominent factor for it. Television advertising as a public media plays an important role in food propaganda and sales, and children who are without independent judgment will be affected in food cognition and choice. This study aims to explore the extent and nature of food advertising that children are exposed to on television in Xi¡¯an, China.

Methods: Television data for 2 weekdays and 2 weekend days between 6:00 and 22:00 during May and June in 2012 from three television channels which children like most were recorded. Food advertisements were classified as healthy food (nutrient dense, low in energy), unhealthy food (high in undesirable nutrients or energy), or miscellaneous. The persuasive marketing skills were divided into promotional characters and premium offers. The time children watching TV were categorized as peak viewing times and non-peak viewing times.

Results: Of the 5527 advertisements transcribed, 25.49% were for food, among which 58.27% were considered to be unhealthy. More than 50% unhealthy food advertising used persuasive marketing skills. The frequency of advertising was 22 per hour per channel, including six food advertisements and three unhealthy food advertisements. The rate of unhealthy food advertising was higher during children¡¯s peak viewing times. Significantly more unhealthy food advertisements were screened on weekends compared with weekdays, children¡¯s television channel compared with other television channels, CCTV compared with local television stations.

Conclusions: Children were exposed high levels of television advertising for unhealthy food, with children oriented persuasive marketing skills. The study provided a baseline to this field in Xan and more research need to be done in order to improve children health in future.

Key words: television food advertising; children; obesity.

PO1183

THE IMPACT OF SMOKING ON DIET IN ISRAEL

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Background and objectives: Israel, a multi-cultural society, offered the opportunity to study the co-occurrence of unhealthy diet and smoking - both modifiable risk factors for chronic disease.

Methods: The study, a cross-sectional secondary analysis of Israel's national health and nutrition MABAT (1999-2001) adults (25-64 years) survey, compared dietary patterns, diet quality index (DQI) and BMI in relation to smoking status - never smoked, current and past smoking. Chi-squared test tested differences between proportions, ANOVA, differences

between means and binary logistics, associations between categorical variables.

Results: Current smokers read food labels least often and skipped and combined meals most often. They had the highest mean total caloric intake, but the lowest mean fiber and micronutrients intake except for sodium, iron, zinc, vitamins A, E and niacin. They had the lowest mean DQI score in contrast to former smokers who had the highest (54.15±0.55 and 57.17±0.66 respectively, p=0.002). Former smokers had significantly better dietary intakes compared to the other two groups. However, past smoker status was associated with a significant 38% increased likelihood of being obese (AOR: 1.38 95% CI 1.06-1.80). Current smoking was not protective of being overweight/heavier or obese (AOR 0.88 95% CI 0.72-1.08 and AOR 0.80 95% CI 0.63-1.01 respectively). Among past smokers, each cigarette smoked daily was associated with a 3% increased likelihood of being overweight/heavier (AOR 1.03 95% CI 1.01-1.04) and a 2% increased likelihood of being obese (AOR: 1.02 95% CI 1.01-1.03). The likelihood of being overweight or obese differed with country of origin suggesting a possible genetic modification of nicotine's action on weight which needs further investigation.

Conclusions: This study adds to growing evidence that smoking is associated with poor dietary choices, and quitting improves eating habits, findings that warrant the integration of dietary counseling in smoking control programs.

Key words: Smoking, diet, obesity.

PO1184

ACCESS TO AND CHOICE OF FOOD IN A STUDENT RESIDENTIAL AREA: THE CASE OF BONAMOUSSADI, CAMEROON

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Background and objectives: The Universal Declaration on Human Rights recognizes the right to food as a core element of basic living standards. In Cameroon, there is little data on the determinants of access to and choice of food amongst students, the country's future. This study sought to address the above data gap.

Methods: A pilot cross-sectional survey of 150 participants of a student residential area in Yaoundé, Cameroon's most populous city.

Results: Food-related expenditure represented 54.7 % of total monthly household expenditure, 47.6 % of which was on non-nutritious (junk) food. Non-nutritional factors were as strong a reason for food choice as were nutritional needs (51.3% versus 48.7%). Half (55 %) of participants depended on friends or relatives for food. Non-financial determinants of food choice included taste (55.8%), culinary skills (27.3%), cohabitation (9.1%) and cultural restrictions (7.8%). Two-fifths (42.7%) of participants ate out often at restaurants. Two-thirds (66.0%) of participants acknowledged that this might pose a health risk, 42.4% of who were those who ate out often and 57.6% those who rarely (p=0.933). The high price of food was the most commonly (68.0%) cited cause of restricted access to sufficient, safe and nutritious food, followed by insufficient time to cook (23.3%), and lack of storage facilities (4.7%) and land to farm(4.0%). Men and women, and university and non-university graduates differed significantly (p<0.001 and 0.040 respectively) on how important the above issues were impediments. One-third (34.7%) of participants relied on untreated water sources for drinking. Though 92.7% reported that environmental hygiene influenced what they ate, only 6.0 % acknowledged engaging often in environmental sanitation practices.

Conclusions: Non-nutritional factors as well as nutritional needs determine access to and choice of food, and need to be taken into consideration in food security initiatives in Cameroon.

Key words: Access to food, students, food choice.

PO1185

MULTILEVEL CORRELATES OF ANTHROPOMETRIC TYPOLOGIES IN COLOMBIA IN 2005

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Background and objectives: Overweight and underweight increase the risk of metabolic impairments and chronic disease. The dual burden of malnutrition is also a growing problem in developing nations. The goal of this study was to establish the association of maternal, family and contextual correlates of anthropometric typologies at the household level in Colombia.

Methods: Using 2005-DHS/ENDS data we included household level information from mothers 18-49 yrs. and their children <5yrs. Stunting and overweight was assessed for each child. Mothers were classified according to BMI. We constructed four anthropometric typologies, normal, underweight,

overweight, and dual burden. Selected municipal and state level indicators were included. Hierarchical multinomial models with three levels (states n=33, municipalities n= 226, and families n=9, 138) were carried out. Four separate models were developed using normal anthropometric typology as the reference, an empty model, one including maternal and family characteristics, then adding municipal characteristics, and finally state characteristics.

Results: Most of the variance was explained by maternal and family characteristics versus municipal and state characteristics. Higher levels of municipal living conditions index and royalties were negatively associated with the underweight typology, while higher municipal density was positively associated. Higher municipal living conditions index was positively associated with the prevalence of overweight, while density was negatively associated. Higher municipal royalties was the only contextual variable associated with the dual burden of malnutrition in a negative direction.

Conclusions: Proximal risk factors such as maternal and family characteristics are explaining most of the variance in household anthropometric typologies. Variance components show that municipal and state levels indicators also contribute to explain differences but to a lesser degree than maternal and family characteristics. Findings highlight the fact that Colombia is still in the midst of a nutrition transition where overweight is still more prevalent among higher socioeconomic conditions.

Key words: nutrition-transition, overweight, dual burden, Colombia.

PO1186

MATERNAL AND FAMILIAL CORRELATES OF ANTHROPOMETRIC TYPOLOGIES IN COLOMBIA IN 2010

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Background and objectives: Overweight and obesity are a growing problem in developing nations, while prevalence of underweight is decreasing. There is also documentation of a dual burden of malnutrition where both problems coexist at the household level. Both overweight and underweight increase the risk of metabolic impairments and chronic disease. The goal of this paper is to determine the maternal and familial correlates of various anthropometric typologies at the household level in Colombia.

Methods: Using 2010 DHS/ENDS data we included household level information from mothers 18-49 yrs. and their children <5yrs. Each child was classified according to z-score of height for age (HAZ <2 SD) to assess stunting, and mothers according to their BMI distribution. Four final anthropometric typologies at the household level were determined including normal, underweight, overweight, and dual burden households. Multinomial logistic regression models were carried out to examine several maternal and familial correlates of the different anthropometric typologies in 2010.

Results: Maternal and familial indicators were associated with the prevalence of specific anthropometric typologies at the household level, including parity, maternal age, wealth index, female head of household, and area of residence (urban versus rural). Participation in nutrition programs for children younger than 5 was associated with a lower likelihood of overweight and underweight typology. Being an indigenous household was positively correlated with the likelihood of being classified as an overweight, underweight and dual burden household. Food purchase decisions made by the mother were positively correlated with likelihood of underweight and less likelihood of overweight and dual burden. Moderate food insecurity was associated with a higher likelihood of dual burden.

Conclusions: It is necessary to identify the micro and macro determinants of the various anthropometric typologies at the household level to better frame policies and programs targeting potentially modifiable risk factors.

Key words: underweight, overweight, dual-burden, indigenous, Colombia.

PO1187

VITAMIN A SUPPLEMENTATION PROGRAMME IN NIGERIA-CHALLENGES AND PROSPECTS

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Background and objectives: Vitamin A supplementation has been carried out in Nigeria for over the past twelve years. It is therefore necessary to assess the progress made in vitamin A supplementation and the challenges experienced.

Methods: Reports from various monitors and supervisors were analysed from all over the country. The NDHS (1999, 2003, 2008) were used as secondary sources.

Results: Under-five mortality rate in Nigeria was 200/1000 live birth in 1999 (NDHS 1999) and this informed the need to include vitamin A supplementation as a plus in the national immunization days (NIDs). The NID programme was later change to national immunization plus days (NIPDs). NIPDs were essentially implemented as a WHO led programme and

this led to resistance by the WHO- supported health workers to accommodate input from UNICEF that brought in the VACs as a component of the NIPDs. There were also disparity in the remuneration between health workers supported by WHO and those supported by UNICEF. Some health workers could not administer VACs correctly due to poor training. In some cases political considerations informed the recruitment of adhoc staff who could not administer both the vaccines and VACS. Data management was poorly carried out. Poor micro-plans and supply of enough quantities of VACs, scissors, wipes and tally sheets were also observed.

Conclusions: Despite these challenges, vitamin A coverage for under-five children had risen from initial 27% in 1999 to 75% in 2011. This has also positively affected the under-five mortality by reducing it to 157/1000 live birth (NDHS, 2008)

Key words: Vitamin A supplementation, under-five mortality, data management.

PO1188

YAKUMO-CHO INHABITANTS MEDICAL EXAMINATION -RESULT OF TASTE AND OLFACTOMETRY –

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Background and objectives: In Japan, an already aged society, healthy taste and olfaction are a necessary part in the process of creating a safe and fertile living environment for everyone, and of improving the quality of life. Given these circumstances, the objective of this study was to understand the age-related decline in taste and olfactory function in people aged 40-99 years, and identify the odours which are particularly difficult for people of these age groups to distinguish in order to draw attention to the issues that face people and to facilitate the improvement in the quality of life.

Methods: The study included 40 people aged 40-49 years, 74 people aged 50-59 years, 191 people aged 60-69 years, 89 people aged 70-79 years, 15 people aged 80-89 and 1 people aged 90-99 years in Yakumo Town, Hokkaido, Japan. Taste was tested using a "Test paper" (ADVANTEC Toyo Roshi Kaisha, Ltd., Japan). Odours were tested using a "standard odours by odour stick identification" (Daiichi Yakuhin Sangyo, Japan).

Results: There was possibility of the taste disorder in 20%. In addition, the person with impaired taste had high BMI level. There was possibility of the sense of smell disorder in 7%. The ability to identify domestic gas - an odour that may be considered closely linked to QOL - was lost from the 60-69 years to the 80-89 years age group.

Conclusions: Although "gas" is not an odour that people actively look for in everyday life, considering the dangers posed by gas leaks and explosion, efforts must be made so that people won't forget such an odour. It is necessary to understand more detail of relationship between taste disorder and the BMI. The taste abnormality, connection with the metabolic syndrome is doubted.

Key words: Health examination, Taste, Odour, BMI, Metabolic syndrome.

PO1189

A RANDOMIZED CONTROLLED FEEDING STUDY WITH PROVITAMIN A RICH CASSAVA IMPROVES TOTAL CAROTENOID INTAKE IN PRIMARY SCHOOL CHILDREN IN KENYA

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Background and objectives: Biofortified pro-vitamin A rich cassava could potentially contribute to reduce vitamin A deficiency (VAD) in Africa. Efficacy in improving vitamin A (VA) status in humans has not been proven. We aimed to measure the effect of daily consumption of biofortified cassava on VA intake in children aged 5-13 years in Kenya.

Methods: Children (n=342) with VAD (serum retinol-binding protein concentration (RBP) 4.5 ng/ml, sd 0.75) were randomly allocated to 1) biofortified cassava and placebo capsule; 2) white cassava and placebo capsule; or 3) white cassava and a capsule (1, 400 µg âcarotene). Cassava was cooked and mashed with salt and 4 g /oil per portion; portion size was 325 and 375

g per child depending on age given daily for 6 days/week for 18.5 weeks. Nine different varieties of biofortified cassava were locally grown and harvested daily during intervention. Participants and staff were blinded to capsule contents but not to cassava type. Cassava intake was measured daily and cooked cassava was sampled daily for carotenoid analyses with HPLC.

Results: Complete data were collected for 337 children. Mean duration of intervention was 112 days. At baseline, groups were similar regarding age, sex and RBP. Compliance to cassava feeding was 100% with no differences between groups. Mean cassava intake per day was 365.6 g (sd 24.5) for white cassava and 360.6 g (sd 25.8) for biofortified cassava. Mean carotenoid concentration of biofortified cassava was 394.20 µg (sd 75.3) per 100 g (fresh weight). Daily mean carotenoid intake from biofortified cassava was 200 µg RAE. Conclusions Daily consumption of biofortified cassava improved the vitamin A intake to 50% of the EAR. Acknowledegments The project was realized in the framework of INSTAPA Project, funded by EU: FP7/2007-2013 nr 211484.

Key words: Biofortification, cassava, Vitamin A, Randomized controlled feeding trial, Kenya

PO1190

BIOFORTIFIED CASSAVA WITH PRO-VITAMIN A IS SENSORY AND CULTURALLY ACCEPTABLE FOR CONSUMPTION BY PRIMARY SCHOOL CHILDREN IN KENYA

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Background and objectives: Biofortification of cassava with pro-vitamin A can potentially reduce vitamin A deficiency in low-income countries. However, little is known about consumer acceptance of this deep yellow variety of cassava compared to the commonly available white varieties. We aimed to determine the sensory and cultural acceptability of the consumption of pro-vitamin A rich cassava in order to identify key factors predicting the intention to consume pro-vitamin A rich cassava by families with school-aged children in Eastern Kenya.

Methods: Sensory acceptability was measured by replicated discrimination tests and paired preference tests among 30 children (7-12 yr) and 30 caretakers (18-45 yr) in three primary schools. Cultural acceptability was assessed with a questionnaire based on the combined model of The Theory of Planned Behavior and The Health Belief Model in one primary school among 140 caretakers of children aged 6 to 12 years. Multivariate analyses and correlations were used to determine associations between summed scores for model constructs.

Results: Both caretakers and children perceived a significant difference in taste between white and pro-vitamin A rich cassava and preferred pro-vitamin A rich cassava over white cassava because of its soft texture, sweet taste and attractive color. 'Perceived barriers 1' (â=-0.21, P=.02), 'Control beliefs' (â=0.18, P=.02) and 'Cues to action' (â=0.51, P=<.01) were the best predictors of intention to consume pro-vitamin A rich cassava. 'Knowledge' was a strong predictor of 'Health behavior identity' (â=0.29, P=<.01).

Conclusions: Pro-vitamin A rich cassava is well accepted by school children in our study population. Acknowledegments The project was realized in the framework of INSTAPA Project, funded by the European Union's Seventh Framework Programme [FP7/2007-2013] under grant agreement nr 211484.

Key words: Bio-fortification, Cassava, Pro-vitamin A rich cassava, Acceptability, â-carotene.

PO1191

APPETITE TESTING IN HIV-INFECTED AFRICAN ADULTS RECOVERING FROM MALNUTRITION AND GIVEN ANTIRETROVIRAL THERAPY (ART)

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Background and objectives: The NUSTART trial is investigating the appropriateness of a two-stage re-feeding regimen, analogous to that used for severely malnourished children, for malnourished HIV-infected African adults starting ART. We investigated whether, as for children, regain of appetite could indicate when to increase calorie provision for adults in such regimens.

Methods: Malnourished (BMI< 18.5 kg/m2) HIV-infected Zambian (n= 593) and Tanzanian (n=378) adults participating in the NUSTART trial were provided with a low calorie lipid nutrient supplement (LNS) from referral for ART until 2 weeks

after starting ART and a high calorie LNS from weeks 2-6 ART. At weekly visits appetite was measured by short questionnaire and by weight of maize porridge consumed in a standardized test. Appetite questions were combined for analysis using polychoric correlations to generate a standardized score. Linear regression was used to relate appetite and body weight change at three key points, referral, starting ART and trial completion (12 weeks post ART). Cox regression was used to assess the effect of appetite on mortality.

Results: Both measures of appetite showed data clumping in Zambia, suggesting results did not represent appetite accurately. In Tanzanian participants, appetite questionnaire score and weight increased over time but there was little change in the appetite test. In Tanzanian participants, there was weak evidence that lower referral appetite score was associated with lower values of weight change up to starting ART and higher mortality to 12 weeks ART.

Conclusions: There appeared cultural differences between the sites such that the appetite questionnaire and test were of little use in Zambia. In Tanzania the appetite score was a better indicator of changes over time than the appetite test and correlated with weight change. The appetite questionnaire appeared an adequate and cheap way of measuring appetite in Tanzania.

Key words: appetite, malnutrition, HIV, Africa, adults.

PO1192

ARE THE INCREASES IN BREASTFEEDING DURATION EQUAL WITHIN COUNTRIES? THE FUNDAMENTAL CAUSE CONCEPT BEING TESTED ON 50 COUNTRIES.

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Background and objectives: Breastfeeding duration has been increasing in most Countries, but not all the segments of the society experiment those increases in the same rate. We aim to observe what segments of the society has been experiencing the highest increases on breastfeeding duration.

Methods: The outcomes were the increase in the median durations (in months) of Total Breastfeeding (TBF) and Exclusive Breastfeeding (EBF), obtained from secondary data of Countries that did at least two national representative surveys (from 1986 to 2011) according to Demographic and Health Survey (DHS) methodology. The study population was children under three years of age, categorized according to the following background characteristics: place of residence (rural, urban); household wealth index (lowest, second, middle, fourth, highest); and educational level (no education, primary, secondary or higher). The differences of increase in median duration of TBF and EBF between categories were evaluated with Wilcoxon non-parametric test.

Results: From 86 Countries with DHS surveys, 50 Countries had at least two comparable surveys with data on TBF and EBF duration. The median duration of TBF increase within Countries was higher in the population living in urban areas (62.5%, p=0.05, n=48), wealthier (52.5%, p=0.46, n=40) and with highest educational level (68.1%, p<0.01, n=47). The increase of EBF duration was higher among: urban (58.3%, p=0.32, n=48), wealthier (48.8%, p=0.85, n=40) and highest educational level (55.3%, p=0.04, n=47) population.

Conclusions: The population experienced increases of the duration of TBF and EBF in different rates, giving support to the theory of fundamental social causes, where people who have more resources (eg. knowledge, money, power, prestige) are better able adopt protective health behaviors, such as breastfeeding. The public policies on breastfeeding must focus on closing the gaps between different segments of society.

Key words: Breastfeeding, Social epidemiology, Inequalities, Child nutrition.

PO1193

MILK CONSUMPTION OF COLLEGE STUDENTS

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Background and objectives: Milk contains most of the essential nutrients for growth and it consists one of the main food groups which has to be consumed everyday. Milk is the best source of calcium which plays an important part in body functions during lifespan. Aim: The study is planned and conducted to determine the milk consumption of college students who attend Ankara University and live in dorms.

Methods: 190 Turkish and 20 foreigner students participated in the study (n=210). Data collection was made by a questionnaire. SPSS was used to evaluate data.

Results: Median age for female (56.7%) and male (43.8%) students is 21 and 22 years, respectively. 42.9% of them regularly drink milk (n=89) and 43.8% of the participants stated they made a habit of drinking milk in pre school period and 63.3% of them are encouraged to drink milk by their parents. 37.1% of the participants stated they consume milk for its nu-

tritional value, 33, 3% of them consume it before sleep and 71.9% of them apply no heat on it. Among the students who consume milk, 27.1% of them consume it 3-4 times a week 24, 0% of the subjects twice a month, 21.4% of them 1-2 times a week, 20.3% of them everyday and 7.3% of them 5-6 times a week. 33.3% of the subjects who state they drink milk everyday, consume ≥ 500 mL /day. Mean consumption amount is 280 mL (male: 290 mL, female: 250 mL) which is statistically significant according to gender.

Conclusions: The development of dietary habits that include the frequent intake of milk during childhood and adolescence is likely to lead to higher calcium intake in later years. Recommendations to the public should continue to emphasize increased calcium intake, perhaps most effectively achieved by increasing milk consumption.

Key words: Turkey, Milk Consumption, Students

PO1194

COMPARING PHYSICAL ACTIVITY AND ENERGY EXPENDITURE BETWEEN OBESE AND NON-OBESE PRESCHOOL BOYS OF THE KINDERGARTEN A HANOI IN 2011

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Background and objectives: The physical activity patterns of Vietnamese obese and non-obese preschool boys have been not described. This study aims to compare physical activity (PA), energy expenditure between obese and non-obese preschool boys.

Methods: Body weight and height of 51 children (20 obese, 31 non-obese), mean age of 62.5 years old from the kindergarten A Hanoi were collected. Subjects were asked to wear an accelerometer (Omron Active style Pro HJA-350IT) while awake for 5 consecutive weekdays. The Omron Bi-Link Activity monitor Professional Edition Ver1.0 software was used to generate the measurements of physical activity. Obesity was defined according to WHO 2007 child growth standards.

Results: the number of steps of obese children was 7, 623 steps/day and that of non-obese children was 6, 389 steps/day (P = 0.049), physical activity level values were 1.93 and 1.86 respectively (P = 0.099). When normalized for body weight, energy expenditure for walking and non-walking (kcal/kg/day) was not different among the two groups: 11.6 vs. 11.7 (P = 0.959); 22.3 vs. 24.3 (P = 0.218). The quantity of PA among obese children was 74.2 METs•hour/wk and that of non-obese children was 67.9 METs•hour/wk (P = 0.347).

Conclusions: some PA parameters are similar among obese and non-obese preschool boys, excessive food intake should be considered as the main cause of obesity in this target group.

Key words: Physical activity, energy expenditure, preschool children.

PO1195

PERCEPTION OF CARDIOVASCULAR HEALTH IN AN ADULT POPULATION

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Background and objectives: Cardiovascular epidemiology began in the thirties as a result of the observed changes in the causes of mortality, in the fifties were launched several epidemiological studies to clarify the causes of cardiovascular disease and four years after the start of the Framingham Heart Study the researchers identified that cholesterol and high blood pressure were important cardiovascular risk factors. The aim of this study was to determine the cardiovascular risk using the Framingham Score in people 35-79 years in the town of Nuevo Necaxa, Puebla.

Methods: It was performed a study of health perception in a random sample of people who voluntarily participated in the study through a signed consent. Study subjects were chosen randomly in the busiest areas of town (down town, market, hospital, etc.) They were given a questionnaire that included parameters like: sex, age, total cholesterol, systolic blood pressure and smoking habits. Were collected 221 surveys and the answers were assessed using the Framingham Score.

Results: 78 % of the surveyed population perceived low risk of cardiovascular disease, 20.5% moderate and 1.5% high risk; women considered to have a low risk of cardiovascular disease compared with men, this could be a problem because if perception of people is of healthy or low-risk, little can do in preventive health, which could lead to start the condition of chronic degenerative diseases.

Conclusions: The population doesn't have a good perception of their cardiovascular health, these results do not match the percentage of obesity in adults than in this year increased in Mexico to almost 70%, so people have to be aware of their health and have at least one checkup a year to rule out cardiovascular disease.

Key words: Cardiovascular health, chronic degenerative disease, Framingham

PO1196

BEVERAGES CONSUMPTION: A QUANTITATIVE ANALYSIS ON CHILDREN AND ADOLESCENTS DIET IN BRAZIL

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Background and objectives: Epidemiological studies are generally designed to evaluate solid food intake; whereas, beverages should also be considered in the nutritional approach, as fluids have a relevant participation on population`s diet. The aim of this study was to evaluate the volume of beverages consumed by children and adolescents in Brazil.

Methods: This descriptive study was conducted in 90 census tracts randomly selected, in order to represent socioeconomic diversity, in 5 Brazilian cities. It included 831 participants (3-17 years old), selected according to population proportions per each age group. Liquid intake volume was assessed using a dietary record.

Results: Total volume of liquid intake increased with age, as did the volume of water and carbonated beverages consumed ($p<0.05$), whereas the intake of milk and dairy products decreased as the age of the participants increased. For study participants aged 3 to 6 years, 7 to 10 years and 11 to 17 years, water intake represented 31%, 33% and 34% of the total volume of liquid intake, respectively; carbonated beverages composed 13%, 17% and 23% of that figure, respectively; and milk and dairy products represented 32%, 24% and 16% of that figure, respectively.

Conclusions: Our findings show a worrisome beverages intake profile in Brazilian children and adolescents, which should encourage healthcare professionals to be more diligent in recording liquid intake and to prescribe water to their patients to ensure healthy hydration, in order to prevent complications in adulthood.

Key words: beverages intake, children, adolescents, water

PO1197

BRAZILIAN CHILDREN AND ADOLESCENTS: WHAT ARE THEY DRINKING?

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Background and objectives: Obesity is considered an important public health problem and a global epidemic. One of the factors that could impact on this high prevalence is energy from liquids. The purpose of this study was to investigate the quality of beverages consumed by children and adolescents and to determine the proportion of their daily energy intake composed of liquids.

Methods: This descriptive study included 831 individuals and was conducted in 5 cities, considering a random selection of census tracts according to Brazilian Institute of Geography and Statistic. Liquid intake was assessed using a dietary record. Energy intake from liquids was compared with the daily energy requirements recommended for children and adolescents by the Brazilian food regulation authority, the National Health Surveillance Agency (ANVISA).

Results: Energy intake increased significantly with age. Sugar sweetened beverages provided 37%, 46% and 59% of the energy intake of individuals ages 3 to 6 years, 7 to 10 years and 11 to 17 years ($p<0.05$), respectively; whereas milk and dairy products contributed 52%, 40% and 27% ($p<0.05$) of the total energy intake for these age groups, respectively. Among 11- to 17-year-olds, sugar sweetened beverages alone contributed an average of 290 kcal/day, which constituted 15% of the recommended daily energy for this age group, exceeding the maximum recommendation of World Health Organization (10%).

Conclusions: This study indicates that a high daily energy intake comes from beverages and when such patterns are associated with a high-energy solid food diet, they may lead to excessive weight gain. Health care professionals and nutrition education programs should encourage water intake, which has no additives or calories, to ensure proper hydration.

Key words: beverages, water, children, adolescents, obesity.

PO1198

ANTHROPOMETRIC, BIOCHEMICAL AND LIFESTYLE COMPARISON OF A POPULATION DIAGNOSED WITH DIABETES MELLITUS TYPE II AND A HEALTHY POPULATION

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Background and objectives: The prevalence of diabetes in Mexico has increased significantly, to stand as the second leading cause of overall death according to the National Institute of Statistics, Geography and Informatics, though some statistics place it as the leading cause of mortality in the country. The development of type 2 diabetes is linked to lifestyle factors, so it suggests it may be a preventable disease, hence the objective of this study was to compare the lifestyle and anthropometric and biochemical parameters of a healthy adult population versus a population diagnosed with diabetes mellitus type II, in order to evaluate the differences among them.

Methods: Laboratory tests were performed (glucose, cholesterol, triglycerides, urea and creatinine) to 300 patients attending the Public Health Clinic in Atlixco, Puebla. We measured blood pressure and anthropometric measurements were taken. Later they were given a survey of personal and dietetic habits in order to determine any correlation with the disease or health condition. The results were processed with the statistical program R-sigma Babel.

Results: The population consisted of 160 diabetic and 140 non-diabetics. The average age was 52 years. The average BMI was 29.7. No anthropometric differences between populations. Overweight in diabetics was 35.63%, while in non-diabetics was 40%. Obesity was 46.25% in diabetics and 42.14% in non-diabetics. Regarding clinical parameters, there were differences in glucose, triglycerides and urea being higher in diabetics ($p < 0.05$). Blood pressure was high in both groups, with no differences between them. The percentages of people who smoke, drink alcohol, soft drinks and junk foods, as well as those who do not practice physical activity were similar in both groups.

Conclusions: Diabetics are not adequately controlled and non-diabetics have many risk factors for diabetes, if it is not that already are diabetic and are undiagnosed.

Key words: Diabetes, Obesity, Lifestyle.

PO1199

ASSESSMENT OF THE IMPACT OF ORGANIC SCHOOL MEALS TO IMPROVE THE SCHOOL FOOD ENVIRONMENT AND CHILDREN'S AWARENESS OF HEALTHY EATING HABITS

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Background and objectives: The aims of this study were to identify the extent to which public organic food procurement policies might act as a driver for healthy eating among children, to explore potential actions to support the introduction of organic food in public school food serving outlets for school children, and to understand and to increase our understanding of sustainable nutrition among school children.

Methods: Study I & II: These were two cross-sectional studies involving school food coordinators as the research subject and using web based questionnaires distributed in selected public primary and lower secondary schools in Denmark (n = 179), Germany (n = 2050), Finland (n = 998) and Italy (n = 940). Study III: An observational study was carried out among 6th grade Danish pupils in two organic schools (n = 85) and two non-organic schools (n = 80) in two different municipalities located in the Copenhagen Capital region.

Results: Schools with an organic food policy are more likely to adopt a FNP ($P < 0.001$), to build a health promoting school ($P < 0.001$), to promote physical activity and to supply a school canteen ($P < 0.001$). Children in schools with an organic food policy had better expectations of school meals ($P < 0.001$). School children's attitudes had an impact on their intention to consume organic food, independently of whether the school had or not an organic food policy ($P < 0.001$). The organic concept could act as a landmark/characteristic for those engaged in healthier lifestyles.

Conclusions: The results of the thesis suggest that that it is possible to influence pupils' awareness of health and eating habits, through combining modifications of the school lunch with modifications of the whole school food environment.

Key words: School children, organic food procurement policy, school meals, healthy children.

PO1200

SHIFTING OF UNDERNUTRITION TO OVERNUTRITION AND ITS DETERMINANTS IN THE LOW TO MEDIUM INCOME COUNTRIES

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Background and objectives: The shifting of underweight to overweight among women of child-bearing age in the low- to middle-income countries (LMIC) are relatively less understood. Objectives are to examine the shift away from undernutrition towards overnutrition for LMIC and investigate the potential determinants of this shift using the nationally representative survey data.

Methods: We analysed cross-sectional, representative samples of 540, 290 women aged 20-49 years drawn from the Demographic and Health Surveys (DHS) at two time points in 36 LMIC. Potential determinants of underweight (BMI<18.5) and overweight (BMI≥25) are examined.

Results: In the latest DHS compared to the earliest DHS (mean duration 10 years), the prevalence of underweight significantly declined for one in two countries and the prevalence of overweight significantly increased for 80% of the listed countries. The annual increase of overweight was two folds higher than annual decline of underweight (6.4% vs. 3.3%). Although higher socio-demographic factors are associated with shifting of underweight towards overweight, over time, the risk of the highly educated, wealthy, and urban women being overweight is weakening.

Conclusions: Findings of this study suggest that among women of child-bearing age there was a large shift away from undernutrition to overnutrition for most of the LMIC. Overtime, the contribution of higher education, wealth and urbanization to the being overweight was decreasing in the LMIC.

Key words: undernutrition, overnutrition, women, low to medium income countries.

PO1201

EVALUATION OF NUTRITION REPORTS BASED ON RESEARCH STUDIES IN POPULAR INDIAN NEWSPAPERS

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Background and objectives: Newspapers are an important form of Mass media that can play significant role in health promotion, which is crucial for social development. Studies revealed that newspaper reports lacked consistency in presenting nutrition research results to the readers. A study was conducted with a hypothesis "Newspapers often highlight nutrition research findings disproportionately in order to draw reader's attention". Objective: To assess presentation of nutrition research findings/ outcomes by newspapers as compared to the original research papers on which they are based.

Methods: Based on the circulation figures, the top six popular newspapers (three from English and three from Telugu) were selected for the study from 1st September 2010 to 28th February 2011. A scale was evolved based on 10 parameters for gauging accuracy of the reports.

Results: A total of 214 reports were identified as based or claimed on nutrition research in all the above six newspapers. Overall, vernacular newspapers published more number of reports (125) on nutrition research compared to English dailies (89). One-fourth of the newspaper reports did not conveyed nutrition research results properly. Few reports were found as contrary to the original findings on which they were based on. Almost one-fifth of the reports have no mention of the source, which denies access to the reader for the original report. Usually, any research or scientific study has its own limitations. But, this vital aspect is missing in the newspapers reports on nutrition research.

Conclusions: With emphasis on short, 'newsworthy' pieces, the media often only report the results of single studies, and many stories are chosen simply because the results run contrary to current health recommendations. Nutrition scientists need to help translate their research for consumers.

Key words: Newspapers, Health promotion, Nutrition, Research translation.

PO1202

CAN HYDRATION STATUS IN POPULATIONS BE BETTER ESTIMATED FROM URINE OUTPUT THAN FROM WATER INTAKE?

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Background and objectives: Guidelines for adequate water intake are based on observational data rather than empirical estimates of water requirements. However, water losses may provide a better basis for estimating hydration status in populations. We present first results from a study aiming to quantify components of water balance and assess adequacy of water intake. Water balance = (Water intake from diet + metabolic water) – (urine volume (UV) + non-renal water losses (NRWL)).

Methods: Total water intake (TWI) was calculated from 7-day weighed diet records from the UK National Diet and Nutrition Survey of Adults for 2000/2001 (https://www.esds.ac.uk/). Metabolic water was calculated from macronutrient intake, assuming complete oxidation. Urinary losses were calculated from 24 h urine collections (n 1328).

Results: Mean TWI was 2.57 L/d (SE 0.03) and 2.11 L/d (SE 0.03) among men and women, respectively; metabolic water contributed 0.33L/d for men and 0.23 L/d for women. Thus total available water (TAW) averaged 2.90 L/d and 2.34 L/d, respectively. Urine volumes (UV) were correlated with water intake in men and women (r 0.50, r 0.52; P<0.0001); mean UV was 1.98 L/d (SE 0.04) among men and 1.80 L/d (SE 0.03) among women. The difference between TAW and UV equals NRWL at zero water balance; mean NRWL was 0.92 L (SE0.04) for men and 0.54 L (SE 0.03) for women, decreasing with age. Average NRWL is usually estimated to be about 1.0-1.3 L/d, so our result may indicate underestimation of intake and/or overestimation of output in the NDNS, or possibly negative water balance.

Conclusions:TWI and UV were higher than those reported in Germany (Manz et al. (2012) Br J Nutr 107: 1673-1681) while estimated NRWL were lower. Further investigation of the obligatory urine volume (OUV) may provide an estimate of hypo-hydration risk.

Key words: Water, intake, urine, balance, hydration.

PO1203

EFFECT OF SELECTED DIETARY SUPPLEMENTS ON MICRONUTRIENT STATUS DURING RECOVERY FROM MODERATE ACUTE MALNUTRITION IN YOUNG MALIAN CHILDREN

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Background and objectives: Moderate acute malnutrition (MAM) and associated micronutrient (MN) deficiencies are major public health concerns in low-income countries. Iron (Fe) and vitamin A (VA) status indicators were measured before and after 12 weeks of treatment with 1 of 4 dietary supplements in young Malian children aged 6-35 mo with MAM.

Methods: 12 health centers were randomly assigned to provide children with MAM 1 of the following supplements containing ~500 kcal/d and micronutrient (MN) profiles designed to meet or exceed WHO recommendations: 1) lipid-based, ready-to-use supplementary food (Supplementary Plumpy, SP); 2) special corn-soy blend (CSB++); 3) locally processed, fortified food (Misola, MI); or 4) locally milled flours and MN powder (HFM). The type of Fe used in the 4 groups were Fe sulphate, Fe fumarate, electrolytic Fe and NaFeEDTA, respectively. Hemoglobin (Hb) was measured in 1154 children, and plasma ferritin (pF), transferrin receptor (pTfR) and retinol binding protein (pRBP) were measured using a sandwich ELISA technique in a subset of 452 children.

Results: Attendance at weekly/bi-weekly follow-up visits was >85% in all groups. Mean ± SD change in Hb were 0.96±2.1, 0.27±1.7, -0.13±1.7, 0.60±2.0 for groups respectively (SP > MI p<0.05, ANOVA). After adjusting for inflammation, mean change in pF were 4.3±38.6, -7.25±35.1, -9.7±26.4, -8.1±38.5, for the groups respectively (SP > CSB++, MI, p<0.01, ANCOVA) Mean change in pTfR were -4.4±8.8, - 0.2 ± 8.3, -1.1±6.4, -2.6±8.6, for the groups respectively (SP< CSB, MI, HFM; HFM < CSB ++, p<0.05, ANCOVA). By contrast, for VA, mean change in pRBP were 0.05±0.39, 0.18±0.49, 0.12±0.39, 0.08±0.39, (NS).

Conclusions: SP was more effective than the other dietary regimens in increasing Hb and pF and decreasing pTfR. CSB++ was more effective in increasing RBP.

Key words: Moderate Acute Malnutrition, Iron, Vitamin A
Supported by: UNICEF.

PO1204

THE COMPLIANCE OF PACKAGED FOOD PRODUCTS IN INDIA WITH NATIONAL AND INTERNATIONAL NUTRITIONAL LABELLING STANDARDS

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Background and objectives: India is experiencing a nutrition transition with the consumption of processed foods rapidly increasing. Nutrition labels are essential if consumers are to understand the healthiness of these products. The Food Safety and Standards Authority of India has recently introduced regulation defining national nutrition labelling requirements and Codex Alimentarius recommends a global standard. Our objective was to quantify the compliance of the nutrition labels on Indian packaged foods with national and global requirements.

Methods: The presence or absence of data for seven required nutrients was recorded for all food products available for sale in branches of three major retail chains and three smaller stores in Hyderabad, India between October and November, 2010.

Results: Data were collected for 4166 packaged products that fell into 14 different food groups. 52% of products displayed nutrient information on energy, protein carbohydrate, sugar and total fat, meeting the minimum requirements of the Food Safety and Standards Authority of India. Only 27% met the minimum criteria defined by Codex which also requires the reporting of saturated fat and sodium. There was significant variation in compliance for major brands, country of manufacture and food group ($p<0.001$ for all).

Conclusions: The compliance of Indian packaged foods with food labelling requirements is sub-optimal. With the Indian population likely to consume much more packaged food over coming years full and effective food labelling will be essential. The failure of Indian legislation to require labelling of sodium and saturated fat may warrant review.

Key words: Food labelling, processed foods, public health nutrition.

PO1205

ADULTS' CONSUMPTION OF MILK AND DAIRY PRODUCTS IN TURKEY

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Background and objectives: It is known that in Turkey, milk is mostly consumed as yogurt, white cheese and ayran; and drinking milk consumption is lower compared to other dairy products. In this study, it is aimed to identify the milk and some dairy product consumption of adults who live in Ankara, Turkey.

Methods: The study sample consists of 2433 subjects (M:647, F:1786) who agrees to participate among the ones who apply to Family Health Centers in different regions of Ankara. Data collection was made using a questionnaire and data evaluated using SPSS program.

Results: 26.7% of the participants are high school graduates, 73.0% of them are married and 69.3% of them are employed. Milk was consumed regularly by 61.7% (F:60.2%, M:66.0%), yogurt was consumed regularly by 93.7% (F:93.6%, M: 93.8%), cheese was consumed regularly by 95.3% (F:95.5%, M:94.7%), and kefir was consumed regularly by 10.2% (F:10.6%, M:8.8%) of the participants. The most stated reason of not consuming milk (34.4%), yogurt (40.3%) and cheese (69.4%) was the subjects' dislike of taste or smell of the product. The reason of consuming kefir has given as kefir's positive health benefits by 62.0% of the subjects who regularly consume it. The most preferred kind of milk was whole milk (50.1%), yogurt (51.5%) and white cheese (100%) was whole fat. The mean consumption amount of participants who regularly consume milk, yogurt, kefir and cheese were 228.8+114.5 mL, 206.7+80.7g, 194.80+91.7 mL and 34.4+11.9 g; respectively. The mean consumption amount of milk differed significantly according to gender ($p=0.009$).

Conclusions: It is recommended for adults to consume 3 servings of milk and dairy products daily by Dietary Guidelines for Turkey. Regarding the health benefits of milk and dairy products, it's essential to raise the awareness of community about consuming these products.

Key words: Milk, Yogurt, Cheese, Kefir, Turkey.

PO1206

FAMILY-BASED INTERVENTION FOR CHILDHOOD OBESITY: AN EXPERIENCE AMONG TEHRANIAN CHILDREN

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Background and objectives: Treatment of childhood obesity is difficult and successful management may differ in various areas with different cultural backgrounds. The present study was conducted to assess the effect of lifestyle modification family-based intervention in young Iranian children.

Methods: This field trial study was conducted in 2011 among 156 obese children (BMI≥95th) in Tehran, Iran. They were randomly assigned to intervention and control groups. At the baseline, anthropometric measurements and biochemical analysis were assessed. The second and third phases consisted of training sessions for parents of intervention group.At the fourth phase there was no training program. In all four phases, questionnaires on demographic characteristics, lifestyle and food frequency were completed by interviewing with mothers and biochemical analysis was repeated at the end of the study.

Results: The mean body mass index was 23.08 (2.9) kg/m2. Evaluation of anthropometric indices showed that weight and height increased significantly in both groups, though weight increased more slowly and waist and hip circumferences was decreased during 2nd and 3nd phase in the intervention group. Also, serum triglycerides and cholesterol decreased significantly in intervention group ($p<0.05$). Analysis of food group consumption showed that in the intervention group, not only consumption of milk, dairy and nuts group increased significantly but also the corresponding figure decreased for bread and cereals, sugar and confectionery ingredients; moreover, the family`s oil and fat consumption decreased significantly ($p<0.05$). Watching TV and playing computer decreased significantly in intervention group; However walking time increased significantly in both groups ($p<0.05$).

Conclusions: The family-based lifestyle program had limited effects on anthropometric and metabolic outcomes of the obese children. We suggest that if interventions were done in longer periods with teamwork, weight control and lifestyle modification would have been more efficient.

Key words: Obesity, Children, Family-based intervention.

PO1207

CALORIE LABELING OF MENUS: A FEASIBILITY STUDY IN A UNIVERSITY CAFETERIA

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Background and objectives: Nutrition is becoming increasingly important in the food service and catering industry due to the high frequency of eating out, a trend which might contribute to chronic illness and obesity. Nutritional labeling has been proposed to encourage healthier menu choices, but there is still no consensus on how it should be implemented. Calorie labeling is now mandatory in the USA for chain restaurants with 20 or more locations, and has stimulated interest in Europe, particularly among international caterers.

Methods: A recent Swiss study at a campus gastronomy restaurant showed that calorie-labeling led to selection of menus with significantly lower energy contents. Indeed further research is needed. The present preliminary study aimed to test calorie-labeling in a university cafeteria. Lunch menus (3) were labelled for three days using a traffic light system, with green, yellow or red corresponding to increasing energy contents. After menu selection, customers completed questionnaires and their reactions were also recorded. The experiment will be repeated and compared with a more complex labeling system recently developed at ZHAW.

Results: In the first testing, a total of 248 students, lecturers and researchers from the university participated. Answers showed 70% of customers took notice of, and 56% found the traffic-light system to be helpful. However, only 17% of customers considered the nutritional data in their menu selection, suggesting a low influence on customers. Further study is required to determine the reasons. Simple adjustments to the labeling system, such as additional nutritional information, might lead to higher influence on customers towards the targeted outcome, i.e. selection of lower calorie menus. Nonetheless, the traffic light system appears to be a good starting point.

Conclusions: Further studies should include stricter control of experimental errors associated with food catering, e.g. data collection, menu preparation, portion size and others.

Key words: food service, food catering, labelling, calories, menu.

PO1208

INFLUENCE OF EARLY EXPOSURE TO VITAMIN D FOR LATER DEVELOPMENT OF TYPE 1 DIABETES - THE D-TECT STUDY

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Background and objectives: To date, the relationship between vitamin D status during fetal life and long-term health has not been widely examined. Fetal vitamin D levels are similar to maternal levels, as vitamin D travels freely over placenta. The present study examined the influence of maternal intake of extra vitamin D from fortified margarine during pregnancy, for the development of type 1 diabetes (T1D) during child- and adulthood in the offspring.

Methods: In 1961-1985 fortifying margarine with vitamin D was mandatory in Denmark. Fortification supplied 15% of vitamin D intake on average. This well-defined time period provide a natural experiment for comparing the effects of early exposure to vitamin D on the development of diseases later in life amongst exposed and non-exposed adjacent birth cohorts. To find out the incidence of T1D, the data from the Danish National Patient Registry were used. To compare time to debut of T1D in the adjacent birth cohort, Cox regression analyses were conducted. To compare incident rates of T1D in these cohorts, Poisson regression models were run.

Results: Hazards ratios (HR) as well as incident rate ratios (IRR) for T1D among those exposed to extra vitamin D were lower than among non-exposed: HR=0.763 [95 % CI 0.685-0.849], p<0.001; IRR=0.874 [95 % CI 0.787-0.969], p=0.01. Time trends in meteorological conditions and influenza extent in the country were considered.

Conclusions: The present results suggest that ingestion of extra vitamin D from fortified margarine during pregnancy lover the risk of T1D in the offspring. Such results add to our understanding of potential benefits of vitamin D, qualify the ongoing discussion on food fortification, and contribute to future recommendations related to vitamin D.

Key words: Vitamin D, long term effect, T1D.

PO1209

FOOD-RELATED LIFESTYLES AND THEIR ASSOCIATION TO PHYSICAL ACTIVITY IN POLAND

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Background and objectives: Economic changes altered people's lifestyle. The modern living conditions facilitate unhealthy behaviours concerning food and physical activity. The food-related and physical activity can contribute together to the weight gain. Objective is to investigate the associations between physical activity and Food-Related Lifestyles (FRL) in Poland.

Methods: A survey was carried out in September 2012, with quota samples on gender, education, and locality of residence. A total of 1000 respondents participated. Obtained data included socio-demographic characteristics, measure of the food-related lifestyle scale and self-reported frequency of physical activity. Individuals were classified as physically active if the frequency of physical activity was one-twice a week or more frequently. The Cronbach's alpha test was carried out to assess the internal reliability of the FRL scale dimensions. FRL scores are presented as means and standard deviation. Comparisons of means within both groups have been performed with one-way ANOVA tests.

Results: Non-active respondents scored lower on all dimensions of quality, particularly on freshness (4.89 vs 5.21), price/quality relation (4.80 vs 5.03) and health (4.09 vs 4.26). They attached lower levels of importance of shopping list (4.47 vs 4.60), women's task (4.46 vs. 4.64); security (4.53 vs. 4.71), social relationships (4.37 vs. 4.69), and social event (3.73 vs. 3.99). Physically active respondents scored lower only on one dimension of consumption situations, ie. snacks vs. meals (3.59 vs. 3.74). Thus, physically non-active respondents are generally less involved with food than physically active, especially regarding the FRL quality and purchasing motives dimensions. They preferred snacks vs. meals.

Conclusions: Exploring FRL as determinants of food intake and its association with consumers' physical activity might be of great interest for public health, particularly for implementation of more efficient interventions focused on nutrition and physical activity.

Key words: Food-Related Lifestyle; physical activity; eating behaviour; eating attitudes.

PO1211

META-ANALYSIS OF DIETARY PATTERNS AND ESOPHAGEAL CANCER RISK

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Background and objectives: Dietary patterns, which represent a complex integration between food and nutrients, have been reported to be related to the risk of esophageal cancer. However, there is no synthetically quantitative analysis from available. To clarify the associations between dietary patterns and esophageal squamous cell carcinoma (ESCC) and esophageal adenocarcinoma (EAC), respectively, by pooling the results of available studies.

Methods: Pertinent articles published up to January 2013 were searched through Pubmed, EMBase, CNKI and VIP and related citations (web of science). The most common dietary patterns were selected. Studies defining dietary patterns through principle component/factor analysis were included. Random effects model was used to estimate adjusted odds ratios (ORs) by comparing the highest with lowest categories of a selected dietary pattern. Heterogeneity was tested using chi-square test and I2 statistic. Publication bias was assessed by funnel plot and Egger¡¯s and Begg¡¯s tests.

Results: 6 case-control studies were included into this study and 3 common patterns were selected: western/meat/fat pattern, vegetable-fruits/healthy/antioxidant pattern, alcohol drinking pattern. Smoking and other covariates or confounding factors were considered in all of papers. In comparison between the highest and the lowest scores of specific dietary patterns, western/meat/fat pattern significantly increased the risk for EAC (OR=2.56, 95%CI: 1.13-5.80), but not for ESCC (OR=0.64; 95%CI: 0.81-3.32). Alcohol drinking pattern was associated with an increased risk for ESCC (OR=2.50, 95%CI: 1.46-4.30). Vegetable-fruits/healthy/antioxidant pattern was related to a decreased risk for ESCC (OR=0.44, 95%CI: 0.35-0.57) and EAC (OR=0.89, 95%CI: 0.44-1.77), though no statistical significance in the latter.

Conclusions: The results from the limited number of studies suggested that dietary patterns may be a determining factor for EAC, though variation existed in ESCC and EAC. More research focusing on the dietary patterns in esophageal cancer patients is needed to provide more convincing evidence.

Key words: esophageal cancer, dietary patterns, meta-analysis.

PO1212

ORDERING FOOD ONLINE: THE HABITS OF KUWAIT'S RESIDENTS

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Background and objectives: Fast-food consumption has been linked to a plethora of chronic conditions and to poor dietary indicators. Residents in countries undergoing economic development are exposed to obesogenic environments that include ample access to high-fat/high-sugar foods. Kuwait, one of the richest countries in the world, is rapidly becoming one of the fattest; home-delivered food ordered from on-line systems is widely popular in this country. Frequently consumed home-delivered foods and their nutrient contribution to the diet of Kuwaiti residents is presented for the first time in this study.

Methods: Data from a popular on-line food delivery system was accessed and the ten most frequently ordered foods in Kuwait were identified. Nutrient composition for these foods was calculated using data from the USDA and is presented per portion. Portion sizes were obtained by direct weighing of the portions delivered by the on-line delivery system. The most frequently ordered foods from the same on-line system in neighboring countries were also identified and compared.

Results: Out of the 100 most popular food items ordered for home-delivery in Kuwait only three were not high-fat/high-sugar foods. On average, the top ten most frequently ordered foods contributed 783 calories, 14.4g of saturated fat, 1271 mg of sodium and 10.2g of sugar per portion to the diet. The most popular food items ordered included burgers, cookies and fries. Compared to neighboring countries, Kuwait has a higher number of high-fat/high-sugar foods among its most frequently home-delivered orders.

Conclusions: Rapid lifestyle changes leave little room for adjustment in levels of physical activity, energy intake and diet quality. Availability and accessibility to an almost unlimited amount of food, energy, trans fats and sugars are likely to be significant contributors to obesity and diet-related diseases by creating obesogenic environments in Kuwait.

Key words: Kuwait, obesity, fast food, obesogenic environment, food composition.

PO1213

SCHOOL-BASED INTERVENTION PRACTICES TO REDUCE BODY MASS INDEX: META-ANALYSIS OF 57 RANDOMIZED TRIALS

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Objective: To evaluate the effectiveness of interventions that promoted physical activity and/or nutrition education in the school environment for the reduction of overweight and obesity in children and adolescents by body mass index.

Study Design: Systematic Review and Meta-analysis

Methods: We searched 14 databases and analyzed papers published up to September 2012. The standardized mean difference was calculated using Hedges' g, and random-effects model was used to obtain the summarized effect. We stratified the primary analysis by studies with specific samples of overweight /obese children.

Results: Of 5,906 papers initially retrieved, in the primary synthesis 57 community randomized trials provided data on 41,634 children and adolescents, resulting in an effect of -0.03 (95% CI: -0.09 to 0.03, p=0.3,I2=87%).The results of the overweight/obese children subgroup showed the following effect:-0.21 (95% CI: -0.54 to 0.13, p=0.2, I2=74%, n=644, 7 trials). After excluding those seven studies of primary analysis, the summarized effect was not changed in the statistical perspective: -0.02 (95% CI: -0.08 to 0.04; p=0.6; I2=88%).

Conclusions: Although the findings of this meta-analysis were inconclusive, we reinforce the beneficial role of physical activity and nutrition education interventions in the school environment. The high percentages of heterogeneity obtained derive from the different characteristics of the randomized trials and jeopardize the external validity of the results. This suggests caution in generalizing these findings to other populations.

Key Words: (PubMed MeSH): schools, nutritional sciences, physical education and training, overweight, review

PO1214

BOLIVIA AND MALNUTRITION ZERO: EXAMINING ORGANIZATIONAL CAPACITY FOR MULTISECTORAL NUTRITION AGENDAS

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Background and objectives: Undernutrition, remains a significant burden in developing countries, as an important contributor to child death and disability. Multi-sectoral nutrition programming and implementation is claimed to effectively address this pressing issue for millions. This requires not only designing evidence-based interventions but also ensuring successful delivery, often through complex partnership structures. Little attention has been paid to the organisational capacity requirements for these endeavors.

Methods: We applied an organisational capacity framework to analyse the partners involved in Bolivia's Malnutriiton Zero initiative; in addition we sought to assess particular organisational capacity constraints related to strategic leadership, structure, human resources, financial management, infrastructure, programme management, process management, and inter-organisational linkages, all of which may hinder effective implementation. Data collection included key informant interviews, document review, and structured observations.

Results: In Bolivia, findings reveal the particular importance of: 1) strategic leadership including empowerment of all partners, 2) clear governing structures and division of roles and responsibilities, 3) substantial investments in operationalizing communications strategies, 4) joint meetings involving representatives from different levels of the governing structure, and 5) flexibility in approach.

Conclusions: These organisational capacity weaknesses of the Bolivian program are context-specific, but provide examples of the type of capacity constraints which, if ignored, may prevent substantial investment of time, energy, and funds in programming from having their intended pay off in reducing undernutrition. There is new ground for discussion regarding how to best to strengthen organisational capacities of institutions involved in complex programming to address undernutrition or other development challenges.

Key Words: Undernutrition, organisational capacity, multisectoral, implementation.

PO1215

SUCCESS FACTORS IN INTERVENTIONS AND ACTIVITIES IN THE NEIGHBORHOOD VINKHUIZEN IN GRONINGEN (THE NETHERLANDS) TO PREVENT OVERWEIGHT.

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Background and objectives: The aim of this study is identifying success factors in group interventions to prevent overweight in the neighborhood Vinkhuizen in Groningen (the Netherlands). The study is part of the project (2010- 2014) "what is an effective approach to prevent overweight among low SES-groups in the neighborhood, by a community based, integrated approach in collaboration with stakeholders?".

Methods: We screened already collected information on group interventions (2011-2012)in Vinkhuizen regarding effectiveness. To assess whether an intervention has sufficient potential to be successful, the quickscan developed by Cooperative Effective Youth Care Nederland (SJEN) was used.

Results: In total 102 group interventions to prevent overweight were organized in Vinkhuizen. 16 interventions were carried out by professionals. Two of them were reviewed as "well described", two as 'well founded" and two as "program with potential". No detailed information was available about the effectiveness of these interventions. 86 interventions were carried out by volunteers. These interventions were summarily described and had no methodical approach. Health perspectives and effectiveness were indirect targets, pleasure was more important. We suggest to define the group interventions by volunteers as "activities". Due the lack of information none of the "activities" could be labeled as "programs with potential" and data of effectiveness were missing. We developed a modified version of the quickscan specific for "activities", consisting the SJEN items and added with successful Dutch BBOFT elements. BBOFT is a Dutch acronym for encouraging Breastfeeding, Exercise and Outdoor Playing, Breakfast and limiting Soft Drinks and TV/PC watching.

Conclusions: Most of the group interventions in the neighborhood were carried out by volunteers. Additional information is needed about content, methodology, results and experiences to screen success factors and monitor effectiveness.

Key words: overweight, neighborhood, interventions, activities.

PO1216

ASSESSING IMPLEMENTATION OF INTEGRATED MANAGEMENT OF ACUTE MALNUTRITION PROTOCOL FOR MANAGEMENT OF ACUTE MALNUTRITION IN PILOTING SITES OF WAKISO DISTRICT

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Background and objectives: In Uganda, the malnutrition levels are unacceptably high and recently the Ministry of Health developed guidelines on management of acute malnutrition. Integrated Management of Acute Malnutrition (IMAM) protocol should be part of the routine activities within health facilities. IMAM to be successfully implemented, a favorable environment of adequate technical human resource like the nutritionists, doctors, and nurses is paramount. The protocol has been piloted with support from UNICEF in Kampala and Wakiso districts. The study assessed capacity of piloting facilities, level of integration and exploring other basic requirements for implementation in Wakiso to integrated IMAM into routine services.

Methods: It was a descriptive cross sectional study design. The study population was all health workers in pilot sites in Wakiso district and total 7 pilot health facilities were purposely selected.

Results: Only 25% of the health workers within the facilities have been trained to implement IMAM as a new approach in the district. Despite low training coverage, majority of the health workers (68.6%) know that weight is a nutrition assessment criterion and is also conduct regularly in most health facilities. However, more than 10% of health workers do not know how to interpret the nutrition assessment results using indices like BMI, and Z-scores. As such, the capacity of health workers is still lacking within most facilities to implement IMAM. Only 27.5% of the health workers are directly involved in management of acute malnutrition out of which majority are only nurses involved.

Conclusions: The integration of IMAM protocol within the health facilities has not been realized. The low involvement of health workers and lack of key supplies and equipment at key points indicates they are implementing but not as a routine activity.

Key words: Malnutrition, Health workers, Health facilities.

PO1217

CORRELATING DIET AND LIFESTYLE TO OBESITY IN BULGARIAN SAMPLE

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Background and objectives: Obesity as a multifactoral origin disease results from the interplay of social, behavioral, psychological, genetic, cellular, molecular and metabolic factors. Nowadays obesity is related to increased prevalence of metabolic diseases, cardiovascular diseases, colon cancer and even mortality. The present study aims to investigate the contribution of nutritional habits, physical activity and certain socio-demographic factors to the manifestation of obesity in Bulgarian sample.

Methods: The study involved 182 adults of Bulgarian origin. Anthropometric characterisation included height, weight, waist and hip circumferences, body mass index (BMI) and waist/hip ratio. Obesity-associated clinical indices were determined: levels of plasma glucose, triglycerides, total cholesterol, high-density lipoprotein cholesterol (HDL-C), and blood pressure (systolic/diastolic). Respondents filled in questionnaires including their diet habits, physical activity, educational and social status.

Results: Statistically significant difference in all clinical parameters between the two groups - normal weight and obese subjects was established. Regular consumption of fresh fruits and vegetables was related to lower BMI, while juices rich in sugar had a negative impact. Interestingly, the consumption of salty foods was not prevalent in overweight people but rather in those with normal weight. The level of physical activity had significantly positive impact on BMI. A positive correlation between BMI and age, hypertension, and marital status, and a negative correlation between BMI and employment was found.

Conclusions: Some features specific to the Balkan area were established for the Bulgarian sample. Data obtained in this study may serve in creating adequate recommendations for a healthy lifestyle to optimize national strategies for obesity prevention.

Key words: obesity, Bulgarian population, diet, lifestyle.

PO1218

25-HYDROXYVITAMIN D AND COGNITIVE PERFORMANCE IN MID-LIFE

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Background and objectives: Hypovitaminosis D has been linked with poor cognitive function, particularly in elderly populations, but the effect of reverse causality remains unknown. We aimed to assess the relationship between 25(OH)D and subsequent performance in cognitive tests in mid-adulthood and the influence of earlier life factors including childhood cognitive ability, on this association.

Methods: Information came from members of the 1958 British birth cohort (n=6, 496). Serum 25(OH)D, indicating vitamin D status, was measured at 45y. Verbal memory (immediate and delayed word recall), verbal fluency (animal naming) and speed of processing were tested at 50y. Information on childhood cognitive ability, educational attainment, vitamin D-related behaviours and other covariates was collected prospectively from participants throughout their life.

Results: Childhood cognitive ability and educational attainment by 42y were strongly correlated with cognitive performance at 50y, and with several vitamin D-related behaviours in mid-adulthood, but not with 25(OH)D concentrations at 45y. Participants with both low (<25nmol/l) and high >75nmol/l) 25(OH)D concentrations at 45y performed significantly worse on immediate word recall. Associations attenuated after adjustment for childhood cognitive ability, education, and socioeconomic position, however, for immediate word recall test, there was a non-linear association with 25(OH)D even after further adjustment for obesity, menopausal status, smoking, alcohol, physical activity and depressive symptoms at 45 years (pcurvature=0.01).

Conclusions: 25(OH)D concentrations were found to be non-linearly associated with immediate word recall in mid-life. Clarification of the level of 25(OH)D that is most beneficial for predicting better cognitive performance in mid-life is required.

Key words: Vitamin D; Cognitive function; 1958 British Birth Cohort.

PO1219

VITAMIN D AND COMMON MENTAL DISORDERS IN MID-LIFE: CROSS-SECTIONAL AND PROSPECTIVE FINDINGS

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Background and objectives: While there is a biologically plausible link between vitamin D and common mental disorders (CMDs), epidemiological evidence to date remains unclear. We aimed to determine if behaviours affecting vitamin D concentrations differ between individuals with or without CMDs and evaluate, cross-sectionally and prospectively, the extent to which the association between 25(OH)D and CMDs are explained by these behaviours.

Methods: Data are from the 1958 British birth cohort (n=7, 401). Behaviours were ascertained by questionnaire at age 45 years. CMDs (depression, anxiety, panic, phobia) were assessed using the Clinical Interview Schedule-Revised at 45 years and depression using Mental Health Inventory-5 at 50 years.

Results: Participants with CMDs at 45 years differed from others on some but not all vitamin D related behaviours. There were inverse, cross-sectional associations at 45 years of 25(OH) D with depression and panic, which persisted after adjustment for vitamin D related behaviours (OR=0.57, 95%CI: 0.40, 0.81 and OR=0.33, 95%CI: 0.40, 0.81, respectively). Association between 25(OH)D and subsequent (50 years) risk of depression was non-linear (p=0.01), with lower risk for participants with 25(OH)D between 50 and 85 nmol/l compared with those with lower or higher concentrations.

Conclusions: This study provides support for an association of low 25(OH)D concentrations with current and subsequent risk of depression in mid-adulthood.

Key words: Vitamin D; Common mental Disorders; 1958 British Birth Cohort.

PO1220

SERUM FOLATE AND VITAMIN B12 IN ELDERLY CHILEANS. RESULTS FROM THE NATIONAL HEALTH SURVEY 2009-10

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Background and objectives: Supraphysiological levels (SFL) of serum folate (SF) derived from the flour fortification with folic acid (FA) could determine major health risks especially in older adults with low levels of vitamin B12 (B12. The objective of this study is to describe and analyze SF and B12 levels in elderly Chileans and to identify risk groups.

Methods: Participants were 1043 seniors from the National Health Chilean Health Survey 2009-2010 (NChHS 2009-10), a multistage stratified random sample, representative of the national population. SF (μg/L) and B12 (pg/ml) were determined in fasting samples (Competitive Chemiluminescence Immunoassay). Average, deciles and percentiles (5th and 95th) were calculated. We define four SF categories: <4, 4 (deficit); 4, 41-20 (normal) and SFL: 20, 01-25, 6; 25, 601-29 and> 29 μg/L (80th percentile of the distribution) and three vitamin B12 categories: < 200 (deficit); 200, 01-299, 5 (marginal deficit) and >299, 5 (normal). Prevalences by sex and age were calculated. Multiple and logistic regression models were used and adjusted considering educational level and urban/rural area.

Results: FS and B12 average and 95th percentil: 21, 2(± 0.56)/38, 6 μg/L and 348, 4(±7, 6)/637(pg/ml). 0, 3% and 8, 1% present folate and B12 deficiency. Men versus women have significantly lower SF level >29μg/L (OR adjusted 0, 47 95%CI: 0, 26-0, 84). B12 shows no significant variation by age and sex. No statistically significant association was observed between levels of folate and B12.

Conclusions: For the first time, NChHS 2009-10 enabled the evaluation of effects of folic acid fortification in older adults. SF deficit is low, but a significant percentage of elderly sample have SFL. Only 4, 1% of the total sample has SFL associated with B12 deficiency.

Key words: folic acid, vitamin B12, seniors, fortification

PO1221

BREASTFEEDING PRACTICE, PARENTAL EDUCATIONAL LEVEL AND STUNTING IN CHILDHOOD

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Background and objectives: Malnutrition among childhood is a major public health problem in developing countries, including Indonesia. The objective was to study association between exclusive breastfeeding, duration of breastfeeding, mother's education, father's education and stunting in childhood.

Methods: A cross-sectional survey was conducted on 81 mother-child pairs of 3 – 8 years old children in West Sumatra between October and November 2012. A bivariate analysis was performed using a chi square test. This study examined exclusively breastfeeding, duration of breastfeeding, mother educational level, and father educational level in relation to childhood stunting.

Results: The analysis revealed that 37.0% of children 3 – 8 years old were suffering from stunting. The result of this study showed that analysis significantly association between non exclusive breastfeeding (OR=3.00, 95% CI=1.18-7.64) but not duration of breastfeeding and childhood stunting. There was also significantly relationship between mother with low level of education (OR=3.07, 95% CI= 1.18-8.01), father with low level of education (OR=3.09, 95% CI=1.16-8.22) and stunting in childhood.

Conclusions: Development and implementation on exclusively breastfeeding program aimed at addressing childhood malnutrition should also consider improving parental educational level.

Key words: childhood stunting, breastfeeding, parental education.

PO1222

DECLINING INEQUALITY IN OBESITY AMONG URBANISED ADULT MEXICAN WOMEN, BUT IT IS NOT GOOD NEWS

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Background and objectives: The objective of this study was to assess the trend in socioeconomic inequalities in obesity from 1988-2012 for adult Mexican women. We hypothesised that education would be inversely associated with obesity in richer urban areas of Mexico but not in rural areas, and that the gradient in urban areas would become steeper as the nutrition transition progressed.

Methods: Data came from four nationally representative surveys carried out in 1988, 1999, 2006 and 2012. Response rate ranged from 80% to 97% and sample size of non-pregnant women age 20 to 49 from 10, 318 to 14, 531. Weight and height were measured by a nurse and education level (higher education, high school, secondary, primary or less) was self-reported. Analyses were adjusted for survey design. The relative index of inequality (RII) was computed and its trend from 1988-2012 tested.

Results: Nationally, age-standardised obesity prevalence increased from 9.3% to 33.7% over the 25 year period. An inverse association between education and obesity was observed in urban areas. In rural areas, obesity prevalence increased markedly but there was no association with education level. Obesity increased 5.92 fold (95% CI 4.03, 8.70) among urban women with higher education in the period 1988-2012 compared to 3.23 fold (95%CI 2.88, 3.63) for urban women with primary or no education. The RII in urban areas declined over the period (2.87 (95% CI: 1.94, 4.25) in 1988, 1.55 (95% CI: 1.33, 1.80) in 2012, trend $p<0.05$).

Conclusions: As expected, an inverse association between education and obesity was observed in urban areas of Mexico. However, the stepwise decline in obesity inequalities was because obesity prevalence increased faster among higher educated groups. In rural areas there was no association between education level and obesity across the four surveys.

Key words: obesity, socioeconomic status, middle income countries, health trends, Mexico.

PO1223

BODY SHAPE CONCERNS IN FEMALE COLLEGE STUDENTS: VALIDATION STUDY

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Background and objectives: The body shape concerns may have an important role in the daily life of an individual. Usually, clinical and epidemiological studies use scales to assess the information. Therefore, knowing the validity and reliability of these instruments is important so that the decision making regarding their use is well informed. The Body Shape Questionnaire (BSQ) evaluates the level of body shape concerns. Thus, the present study was developed to assess the BSQ's psychometric properties, in a sample of female college students.

Methods: Overall 753 students participated in the study. The Portuguese full version of the instrument (entailing 34 items) was used. It was considered the original factorial model, with a single factor. A characterization of the sample was done through sociodemographic and anthropometric data collection. Construct validity was estimated through factorial and convergent validity. A Confirmatory Factor Analysis (CFA) was done. The Composite Reliability (CR) and the Average Variance Extracted (AVE) were estimated. The internal consistency was given by the Cronbach's Alpha.

Results: The student's mean age was 20.9 (SD=4.0) years old. Most students (70.1%) presented an adequate weight, were studying in the Humanities field (70.6%), do not word (69.6%) and have a monthly income of USD 1307.09 – 2339.57 (52.3%). The factorial model presented an inadequate quality of fit (x2/gl=7.280; CFI=.826; GFI=.699 and RMSEA=.091). To achieve an adequate fit between the model and the sample used, items 26 and 32 were removed (x2/gl=6.321; CFI=.868; GFI=.751 e RMSEA=.084). Adequate values of convergent validity (AVEsingle-factor=.51; CRsingle-factor=.97) and internal consistency (single-factor=.97) were shown.

Conclusions: To assess the body shape concerns in female college students, the BSQ should be used without two items, in order to collect data with quality.

Key words: body shape; validity; college students. Grant number FAPESP: 2012/13475-4.

PO1224

EFFECT OF FEEDING PRACTICES ON ANTHROPOMETRIC STATUS OF CHILDREN 0-5YEARS IN ORPHANAGES OF ABUJA, NIGERIA.

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Background and objectives: The Prevalence of malnutrition increases rapidly in under-five children because of their rapid growth and development. The objectives was to assess the feeding practices, Anaemia and anthropometry status of orphans and provide evidence based data for appropriate nutrition interventions for orphans in Nigeria.

Methods: Cross sectional descriptive study was used among 20 orphans, 96 males and 104 females between 0-5 years living in ten orphanages. Hemocue was used for anaemia assessment. The children were screened for malaria parasites and worm infection. Height, weight and MUAC were used for anthropometric assessment. Feeding practices and socioeconomic were assessed using questionnaires. Dietary intake was determined using food frequency questionnaire and weighed food intake. The values obtained from nutrient intakes were compared with FAO/WHO recommended nutrients intake. Abuja Health Research Ethics Committee approved the study. Informed verbal consent was obtained from the management of the orphanages.

Results: The study recorded high prevalence of malnutrition among the children. 45.5% of the orphans were underweight, 63.5% were stunted while 47.5% were wasted. Anaemia prevalence was 42.5%. The children met the mean daily energy, protein, calcium, iron, thiamin and riboflavin intake. Zinc, vitamin A, niacin and ascorbate were below the recommended allowance. There was low prevalence of malaria parasite(12.5%) and worm infestations(10.0%). Anaemia was significantly ($P<0.05$) associated with helminthes infestation as well as malaria parasite. The children were feed infrequently as against recommended standard. These deficiencies were associated with poor feeding practices, low caregiver to child ratio (1:5) and low socio-economic status. There was significant ($P<0.05$) difference between income level and the prevalence of malnutrition and also significant ($P<0.05$) relationship between the children that were moderately stunted and zinc deficiency.

Conclusions: The study shows that protein energy malnutrition is still of public health important in Nigeria.

Key words: Anemia, Anthropometric, Feeding practices, Orphanages.

PO1225

EARLY DETERMINANTS OF CHILDHOOD OBESITY: WHAT FACTORS CONTRIBUTE TO ITS DEVELOPMENT SIMULTANEOUSLY IN URUGUAYAN CHILDREN 6-23 MONTHS?

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Background and objectives: The roots of the obesity pandemic require an early focus on the life cycle to prevent accelerated growth and childhood obesity so as to prevent its impact on health throughout life. This paper aims to study the factors that contribute to the childhood obesity simultaneously in Uruguayan children aged 6-23 months.

Methods: Analytical-cross. 1619 children were studied in a nationwide survey. Multivariate analysis was performed using multiple logistic regression. Test: Chi2. Processing: Anthro-Plusv1.0.2. Statistical analysis: SPSSv15.

Results: Children were distributed evenly by gender (50.7% male) and age. The 11, 9% were obese (> BMIZ 2DS) and 1.9% severely obese (> 3 BMIZ DS). Risk factors (RF) were included in the equation: rapid weight gain (Z score P/E variation > 0.67) OR: 8.12 (4.74 to 13.91); obese mother OR: 3.69 (2.06 to 6.63), macrosomia OR: 3.40 (1.29 to 8.99), cesarean OR: 1.76 (1.10 to 2.82), no consumption of fruit OR 1, 78 (1.03 to 3.05) and growth retardation in height (stunting) OR: 2.90 (1.28 to 6.57). The low birth weight (LBW), stunting and low ponderal index (PI <10 p) at birth, like not being breastfed were RF for rapid weight gain. Gestational Diabetes (GDM) and excess weight gain during pregnancy increased the risk of macrosomia. These latter, obesity and maternal age> 35 years increased the risk of cesarean delivery. Failure fruit consumption was associated with low income. LBW infants whose mothers had low height and pre-pregnancy underweight showed more chances of stunting and it increased almost three times the likelihood of obesity.

Conclusions: The high prevalence of childhood obesity emphasizes the need to focus prevention efforts as early as possible in the lives of children. This work contributes on identifying RF in which would correspond to act.

Key words: childhood obesity, rapid weight gain, stunting, breastfeeding.

PO1226

EFFECT OF A NUTRITION EDUCATION INTERVENTION ON CONSUMPTION OF FRUITS, VEGETABLES AND FISH IN FAMILIES

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Background and objectives: In Chile there have been different initiatives to address the problem of childhood obesity, especially from nutrition education in schools. For this purpose, different types of educational materials have been used, but only a few cover preschool and school children including their families. The objective of this study was to assess the impact of a nutrition education intervention on fruits, vegetables and fish consumption in pre-school and school age children families.

Methods: A three months education intervention was developed, with a pre-post evaluation in 22 intervened families and 29 controls from public schools in Santiago, Chile. A food-frequency questionnaire on fruits, vegetables and fish, and a survey on food and nutrition knowledge, attitudes and practices were applied. The intervention consisted in six 90 minutes cooking workshops, including the utilization of videos and photovoice for those who cooked in the families.

Results: showed a significant more consumption of fruits, vegetables and fish in the intervened than in the control group (test de Kolmogorov-Smirnov, test de Wilcoxon, p<0, 05). Comparing pre-post consumption by group, significance differences were for the intervened group in all cases (test de Wilcoxon for paired samples, p<0, 05). In parents, fruit consumption increased 135.8 g, vegetables 19.5 g, and fish 10, 2 g per day. In children, the increase in fruits was 92.1 g, vegetables 65.9, and fish 5.2 g per day. All the intervened families (n=22) introduced a significant healthy food improvement at home.

Conclusions: Results showed that it is possible to change food habits in families with the implementation of a nutrition education intervention including cooking workshops, videos and photovoice.

Key words: nutrition education; fruits, vegetables and fish consumption; cooking workshops.

PO1228

IRON AND CANCER RISK - A REVIEW OF THE EPIDEMIOLOGICAL EVIDENCE

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Background and objectives: Iron has been suggested as a risk factor for different types of cancer due to its prooxidant activity which can lead to more oxidative stress and DNA damage. Our purpose was to systematically review and analyze the link between iron intake and body iron status and the risk of developing cancer.

Methods: In this article, using the PUBMED database, we gathered information on dietary iron, heme iron, iron biomarkers, and cancer risk from 54 studies (38 prospective and 16 case-control) published between 1995-2012.

Results: From the six studies studying colorectal cancer and heme iron intake, two found a positive association with cancer risk and one was statistically significant while the other four studies reported no association. Within the same cancer type, three out of the four studies investigating the association between serum ferritin and colorectal cancer found a statistically significant negative association. This same effect was found in a gastric and an esophageal cancer study. Three out of four studies researching the association between esophageal cancer and heme iron intake reported a positive association (two were statistically significant). For gastric and lung cancer, two out of three studies for each cancer type found a positive association between heme iron intake and cancer risk (one each was found to be statistically significant).

Conclusions: Despite the heterogeneity of the results found in this review, there is some tendency towards the positive association between heme iron intake and cancer risk. Moreover, data on iron biomarkers was insufficient. Nevertheless, serum ferritin clearly showed a negative association with gastro-intestinal cancer risk. For this reason, more studies combining research on iron biomarkers, dietary iron intake and also genetic output need to be conducted for better understanding the role of iron on cancer development.

Key words: cancer, iron, dietary, heme, biomarkers.

PO1229

EFFECTIVE GOVERNANCE AND POLICIES TO IMPROVE NUTRITION OUTCOMES: A CROSS COMPARISON OF NINE COUNTRY CASES

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Background and objectives: Undernutrition chronically afflicts 171 million children worldwide which has lifelong negative consequences. One of the underlying reasons why undernutrition persists is because of the lack of credible and sustained government commitment to tackle the issue. Yet, understanding the motivations, institutions, and dynamics of nutrition government and non-government actors remains an underexplored area in advancing the nutrition agenda.

Methods: This study used a political economy approach to compare the formulation and implementation of government nutrition strategies in nine countries. In order to identify the drivers of nutrition governance, a framework was developed focusing on three key factors: Intersectoral cooperation between government sectors and nongovernment agencies, vertical coordination across different levels of government, and sustainable funding to encourage policy coordination, implementation and ownership. The available data includes original stakeholder interviews and nutrition statistics available in each of the case studies.

Results: The study looks at the formation and maintenance of relevant policy coalitions behind effective nutrition policies. There is a set of institutional factors that facilitate improved government commitment. Depending on the context, effective coalitions around nutrition may be facilitated with the presence of decisive political leadership, cooperation across different government sectors, and effective coordination of interventions from the national to the local sphere. Finally, the comparative study argues that abundant nutrition funding is a necessary but not sufficient condition for success; a critical factor is the actual coordination and allocation of funding sources, including greater government participation, to ensure effective delivery of nutrition interventions and increased accountability.

Conclusions: In the context of global efforts, e.g. the Scaling Up Nutrition movement, this is a critical time to understand how governance works best to improve nutrition outcomes, and how various stakeholders can support government officials in sustaining political commitments over the long term.

Key words: governance, commitment, accountability, financing, undernutrition.

PO1230

THE ALADINO STUDY: A NATIONAL STUDY OF PREVALENCE OF OVERWEIGHT AND OBESITY IN SPANISH CHILDREN IN 2011

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Background and objectives: The monitoring of the child obesity epidemic requires the use of accurate, up-to-date information. The aim of the present work was to analyse the prevalence of overweight and obesity in Spanish children using different sets of cut-off criteria.

Methods: This cross-sectional study involved 7569 boys and girls aged 6-9 years. All were weighed, measured, and asked questions about their socio-economic background, food habits and physical activity. The BMI of each was calculated and the prevalence of overweight and obesity determined by age and sex using Spanish reference tables, IOTF reference values, and WHO growth standards. The McNemar test for independent samples was used (comparing two sets of data each time) to determine the significance of the differences in the prevalence values of overweight and obesity returned using these different sets of cut-off criteria.

Results: The prevalence of overweight in boys ranged from 13.9% to 26.5%, and in girls from 13.8% to 25.6%, depending on the cut-off criteria. Similarly, the prevalence of obesity in boys ranged from 11.5% to 21.8%, and in girls from 11.9% to 16.2%. Independent of the criteria used, the prevalence of overweight was found to be greatest among 9 year-olds in both sexes. The prevalence of obesity was highest among these same children when using the Spanish reference tables or WHO criteria, but among 7 year-olds (both sexes) when using the IOTF reference values.

Conclusions: The results show that overweight and obesity remain widespread among Spanish children, underscore the need for periodic studies on their prevalence, and the necessity of coming to consensus on the definition of overweight and obesity cut-off criteria.

Key words: Childhood Obesity, Prevalence, Body Mass Index, Reference values.

PO1231

ABDOMINAL OBESITY AS PREDICTOR OF OTHER CARDIOMETABOLIC RISK FACTORS. STUDY IN TWO URBAN POPULATION GROUPS: COTONOU (BENIN) AND PORT-AU-PRINCE (HAÏTI)

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Background and objectives: The nutrition transition increases cardiometabolic risk factors (CMRFs) like abdominal obesity, dyslipidemia, dysglycemia, hypertension and insulin resistance. We aimed to compare the prevalence of CMRFs and to assess the relationship of abdominal obesity with other CMRFs in two urban black population groups with a common African heritage but living in two different countries, Benin and Haiti.

Methods: Our cross sectional study included 452 apparently healthy men and women, 200 from Cotonou and 252 from Port au Prince (PAP), aged 25y to 60y. Criteria for abdominal obesity (Waist circumference > 94cm in men and >80cm in women), hypertension, dyslipidemia and hyperglycemia were those of the International Diabetes Federation. Insulin resistance was defined as the 75th centile of HOMA for the study population. Biochemical analyzes were performed in the same laboratory (Nancy, France).

Results: Mean age of subjects was 36.9±10.3y in Haitians and 38.9±9.8y in Beninese. Abdominal obesity was observed in 83% of Beninese women versus 67% of Haitians and in 22% of Beninese men versus 9.6% of Haitians. The prevalence of high blood pressure was 26.5% in Beninese and 20% in Haitians (p=.088). Low HDL-cholesterol was highly prevalent in both cities but significantly higher in PAP, 89% versus 79% in Cotonou (p=.003). Controlling for age and gender, in subjects with abdominal obesity, the odds ratio for high blood pressure was 5.3 in Beninese and 4.8 in Haitians, the odds for insulin resistance was 6.0 in Beninese and 5.2 in Haitians, and the odds for low HDL-cholesterol was 3.5 in Beninese and not significant in Haitians.

Conclusions: CMRFs were widespread and abdominal obesity was predictive of high blood pressure and insulin resistance in both population groups and it was associated with atherogenic blood lipid profile only in Benin.

Key words: Abdominal obesity, cardiometabolic risk factors, Benin, Haiti.

PO1232

EATING BEHAVIOUR PATTERNS AND BMI IN PORTUGUESE HIGHER EDUCATION STUDENTS

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Background and objectives: Our aim was to determine prototypical patterns of eating behaviour among Portuguese higher education students, and to relate these patterns with BMI.

Methods: Data from 280 higher education students (63.2% females) aged between 18 and 27 years were analysed. Several eating behaviour dimensions (emotional and external eating, flexible and rigid restraint, binge eating, and eating self-efficacy) were assessed, and eating styles were derived through cluster analysis. BMI for current, desired and maximum self-reported weights and the differences between current and desired BMI and between maximum and current BMI were calculated.

Results: Women scored higher in emotional eating and restraint, whereas men showed higher eating self-efficacy. Men had higher current, desired and maximum BMI. Cluster analysis showed three eating styles in both male and female subsamples: "Overeating", "High self-efficacy" and "High restraint". Unlike the other pairs, the two high restraint clusters show relevant differences. Relationships between eating styles and BMI are presented and discussed.

Conclusions: Restrictive women and men differ on important eating behaviour features, which may be the cause of differences in the relationships with BMI. Eating self-efficacy seems to be a central variable moderating the relationships between other eating behaviour dimensions and BMI.

Key words: Eating behaviour; Eating styles; Body Mass Index.

PO1234

EXPERIENCES FROM A COMPREHENSIVE COMMUNITY NUTRITION PROGRAM IN TWO DISTRICTS IN KENYA. LESSONS FOR NATIONWIDE MNP SUPPLEMENTATION ROLL OUT

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Background and Objectives: Kenya has high stunting rates (35%) and is experiencing rise in diet-related non-communicable diseases. Kenya joined SUN in 2012. Third strategic objective of NNAP 2012-2017 includes scaling up and strengthening of existing strategies of MNP supplementation at all levels. MNP supplementation in Kinango and Mwingi District was part of a comprehensive community nutrition program. A survey was also conducted in Kinango district to assess health and nutritional status of under-five children.

Methods: Cross-sectional survey used two-stage cluster sampling method (SMART) in 3 divisions of Kinago District. Total of 430 households (43 clusters) were visited and 583 children from 6 to 59 months were part of anthropometric survey.

Results: Survey revealed that GAM and stunting prevalence amongst children under-five years old are 10.9% and 50%, respectively. Early initiation of breastfeeding within 1 hour of birth for children born in past 24 months was 43.5%. 13% of children less than 6 months of age were exclusively breastfed in past 24 hours. Only 18% of children aged 6 – 23 months met minimum dietary diversity in past 24 hours. MNPs supplements are well accepted by mothers which covers more than 2800 under-five children. Mothers observed positive changes like improved appetite and less prone to illness. After initial positive impacts, program coverage expanded from 8 to 23 health facilities. Outreach activities brought health services nearer to mothers and their children.

Conclusions: Prevalence of malnutrition is higher than national figure. IYCF practices are far from optimal and might exacerbate nutritional status even further. MNPs are required to improve quality of food fed to children. Strengthened outreach activities increased MNP coverage. As such, nation wide MNPs supplementation in Kenya seems feasible. Strengthening outreach activities can also be used as entry point in addressing underlying causes.

Key words: Stunting, IYCF, Kenya, MNPs, SUN

PO1235

METHODS OF INFLUENCE: A CONTENT ANALYSIS OF THE CANADIAN FEDERAL MENU LABELLING POLICY COMMUNITY

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Background and objectives: Policy-makers may lack the access, time, and skills required to critically appraise nutrition research related to addressing population health problems. As such, the stakeholders engaged in any nutrition issue (i.e. the policy community) have an important role in bringing potential food policy solutions to the attention of public policy-makers. However, this is a poorly understood process. This research aims to clearly describe the methods a policy community uses to create political will for healthy public policy.

Methods: Documents pertaining to Bill C-398, a Canadian federal menu labelling bill, were identified from the academic and unpublished/grey literature using a defined search strategy. Messages pertaining to the bill were extracted and coded to record the sender, the target audience, the major themes, and how the message was sent. Content analysis protocol, including a second coder, was used to analyze the results.

Results: A total of 246 unique messages were identified from 103 documents. The menu labelling policy community was made up of 31 stakeholders, the most active of whom were consumer public interest groups (26% of messages). The majority of messages were targeted to federal politicians (24%), but members of the media (23%) and general public (15%) were also frequent recipients. Major themes identified were: defining and describing the problem and potential solutions, explaining the bill, its intended outcomes, and the technical feasibility of enacting it, and identifying support. Messages were sent through 35 channels, but participating in interviews (14%), creating online documents (12%), and writing letters (11%) were the top three.

Conclusions: Individual policy communities are complex and employ diverse methods to influence political will. Results from this project may help nutrition advocates identify gaps in their current approaches to knowledge translation for policy-makers.

Key Words: content analysis; healthy public policy; menu labelling; policy community.

PO1236

TRACE ELEMENTS OF COLON CANCER – A CASE CONTROL STUDY

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Background and objectives: The pathogenesis of a number of diseases like cardiovascular diseases, diabetes and cancer has been associated with changes in the balance of certain trace elements.

Methods: In the present study we aimed to investigate the levels of trace elements like calcium, copper, iron and zinc in colon cancer patients in comparison with healthy controls. Serum samples were collected from 256 colon cancer patients and 180 healthy age and sex matched controls. Trace element levels were detected using commercially available kits and an Auto-Analyzer (ChemWell 2910, Awareness Technology, and USA).

Results: The concentrations of calcium, copper and iron were not significantly different in patients in comparison with healthy controls. The concentration of zinc was significantly lower in colon cancer patients ($p = 0.001$) as compared to normal subjects. Conclusins:Deficiency of zinc may play a role in the development of colon cancer or may contribute to damage already underway. Zn may represent an independent risk factor for colon cancer and therefore a possible target for prevention.

Key words: Colon cancer; Trace elements; Calcium; Copper.

PO1237

BOLSA FAMILIA PROGRAM: NUTRITIONAL STATUS AND DIET QUALITY OF WOMEN IN A RURAL AREA OF THE NORTHEAST BRAZIL

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Background and objectives: The Bolsa Família Program is the largest program of conditional cash transfer in Brazil, and its major goal is to reverse the current food insecurity. In spite of that, there are few studies that shows nutritional status and food habits for this population in rural area. This study aimed to describe the nutritional status and diet quality of women enrolled in the Bolsa Família program in Campo do Brito, rural area of Sergipe State, Northeast Brazil.

Methods: Cross-sectional study with women enrolled in Bolsa Familia Program in the municipality of Campo do Brito, rural area of Sergipe State, Northeast Brazil. A total of 301 beneficiaries, aged 19 years or more, were interviewed. A 24 hour-recall was applied to assess diet quality and the Healthy Eating Index (HEI) was used as a parameter to categorize the group into consumption levels. To assess the nutritional status of this po¬pulation, we measured weight (kg), height (cm), and calculated the body mass index (BMI).

Results: According HEI, 79, 1% of the population has a diet that requiring adjustments. The median score of each component of the HEI shows a low intake of pulses, milk and dairy products, and high intake of cereals, beans and meat. Overweight prevalence was 30, 6% and 18, 9% from obese.

Conclusions: Bolsa-familia program help to promote nutritional food security.Studies that evaluate diet quality and nutritional status are essential to support the implementation of nutrition education programs aimed at the core of the problem present in the populations studied.

Key words: Nutritional status, diet quality, overweight.

PO1238

HIGH PREVALENCE OF HOUSEHOLD LEVEL FOOD INSECURITY AND ITS DETERMINANTS IN AN URBAN SLUM POPULATION IN NORTH INDIA

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Background and objectives: India has the world's largest population living in slums and these have largely been an under-served population. Various studies have been conducted to assess food insecurity at global level; however, the literature is limited as far as India is concerned. The present study was conducted with the objective of estimating the prevalence of food insecurity at household level and it's determinants in an urban slum population of northern India.

Methods: This cross-sectional study was conducted in an urban resettlement colony of South Delhi, India. A pre-designed, pre-tested, semi-structured questionnaire was used. Food insecurity was assessed using Household Food Insecurity Access Scale (HFIAS). Logistic regression analysis was performed to determine the factors associated with food insecurity.

Results: A total of 250 women were interviewed through house to house survey. Majority of the households were having a nuclear family (61.6%) with mean family size being 5.5 (SD ±2.5) and the mean monthly household income being INR 9784 (SD ±631). Nearly half (53.3%) of mean monthly household income was spent on food. The study found that a total of 77.2% households were food insecure (49.2% households mildly food insecure, 18.8% households moderately food insecure and 9.2% of the households severely food insecure). Education of the women handling food [0.37, 95% CI 0.15 – 0.92; 0.03] and number of earning members in the household [0.68, 95% CI 0.48 – 0.98; 0.04] were associated with lesser chance/odds of being food insecure.

Conclusions: The study demonstrated a high prevalence of food insecurity in the marginalized section of the urban society in India. The government of India needs to adopt urgent measures to combat this problem.

Key words: Food insecurity; Urban slum; Prevalence; Determinants; North India.

PO1239

DEVELOPMENT AND VALIDATION OF A FOOD SELF-EFFICACY SCALE

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Background and objectives: Self-efficacy refers to the beliefs in the ability to organise and implement the action plans needed to achieve a certain result and the feeling of control over the behaviours and environment. It determines the initiation, maintenance and cessation of strategies or behaviours, being a good predictor of eating behaviour. Despite its potential in terms of research, prognosis and evaluation of interventions, we are unaware of instruments to assess global features

of food self-efficacy validated for the Portuguese population. The aim of this work is to develop and validate a scale to assess general features of food self-efficacy ("Escala de Auto-Eficácia Alimentar Global").

Methods: We evaluated a sample of 275 higher education students, and the analysis was performed separately for the subsamples of females and males. The items were created through the adaptation of the six items of the self-efficacy subscale of the "Inventário Clínico de Auto-Conceito" (Serra, 1986).

Results: The analysis led to the maintenance of five of the six items initially considered. The scale shows an unifactorial structure, and the proportion of total variance explained by the principal components extracted is higher than 64%. It also shows good internal consistency, with values of Cronbach's alpha above 0.85. The study of relations with other measures showed evidence of its construct, convergent, and discriminant validities.

Conclusions: The "Escala de Auto-Eficácia Alimentar Global" showed good psychometric properties, and may prove to be an useful tool for the prognosis and the evaluation of interventions related to the change in eating habits.

Key words: Eating self-efficacy; Scale; Development; Validation; Psychometric properties.

PO1240

MALNUTRITION AND ITS CORRELATES AMONG PRIMARY SCHOOL CHILDREN IN FOGERA DISTRICT, RURAL ETHIOPIA

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Background and objectives: Malnutrition is a major public health concern affecting a significant number of school children influencing their health, growth and development, and school academic performance. The objective of the study was to determine the nutritional status of school children in terms of stunting, underweight and thinness at Fogera woreda, Northwest Ethiopia, 2012.

Methods: Institutional and community based cross sectional study was conducted from June to December, 2012. The study included 790 primary school children who were selected from the source population by multi stage random sampling technique. Data were collected through interview with parents with a standardized and pretested questionnaire, microscope, physical examination and anthropometric measuring and data were entered and analyzed using SPSS version 16.0 and AnthroPlus softwares. Binary and Multivariate logistic regression analyses were used to identify factors associated with malnutrition among school children.

Results: Prevalence of malnutrition was high among school children aged six to fourteen years old (mean age 11.4 ± 2.1 years); Study contents include questionnaire surveys, anthropometric measurement, observation and laboratory methods. Finally 790 school-age students took part in study. The results showed that the overall prevalence of stunting was stunting, underweight and thinness were 243 (30.7%), 96(59.7%) and 294 (37.2%). Rice consumption, family size, Family radio, infection, vaccination and latrine availability were significantly associated with malnutrition.

Conclusions: The study found high prevalence of malnutrition and parasitic infection among primary school children. De-worming, vaccination, family planning, latrine construction and utilization, rice production and prevention and early treatment of infection are essential to reduce the risk of malnutrition.

Key words: malnutrition, school children, Fogera, Ethiopia.

PO1241

MODIFYING EFFECTS OF MATERNAL NUTRITION STATUS ON THE RESPONSE TO MULTIPLE MICRONUTRIENTS SUPPLEMENTATION ON PRETERM AND NEONATAL MORTALITY IN CHINA

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Background and objectives: Nutritional status of peri-pregnancy affect the health and survival rate of the new born. Maternal mid-upper arm circumference (MUAC) is currently the best tool for screening pregnancy women eligible for supplementation programmers. We assessed the modifying effects of baseline maternal MUAC on responses to micronutrient supplements in pregnancy on gestational age and neonatal mortality.

Methods: A cluster randomized double-blind controlled trial conducted in two rural counties in north-western China. All pregnant women in villages were randomly allocated from enrolment until delivery to daily supplementation with folic acid (control), iron/folic acid, or multiple micronutrients (MMN) with a recommended allowance of 15 vitamins and minerals. MUAC was categorized as indicator of maternal nutritional status for the lower (<23.5 cm) and normal (≥23.5

cm). Analysis was by intention to treat with GEE models to adjust for the cluster randomized design.

Results: In the pregnant women with MUAC <23.5 cm, MMN supplement significantly increased the duration of gestation by 0.29 weeks (95% CI: 0.12 - 0.45), reduced preterm birth by 35% (RR 0.55, 95% CI: 0.32 - 0.93), and reduced neonatal mortality by 58% (RR 0.42, 95% CI: 0.19 - 0.90) compared to folic acid. Iron/folic acid significantly increased the duration of gestation by 0.27 weeks (95% CI: 0.09 - 0.45), reduced early preterm birth by 59% (RR 0.41, 95% CI: 0.17 - 0.98), and reduced neonatal mortality by 54% (RR 0.46, 95% CI: 0.22 - 0.96) compared to folic acid. Iron/folic acid and MMN supplements had no significant effects on women with MUAC ≥23.5 cm.

Conclusions: Women with poor nutritional status had higher responses of perinatal outcomes to antenatal micronutrient supplementations in rural China. In these women standard iron/folic acid provided similar protection for neonatal survival than MMN supplements.

Key words: micronutrients, randomized controlled trials, mid-upper arm circumference, neonatal death.

PO1242

LIFESTYLE PATTERNS ARE CORRELATED WITH SIGNS OF THE METABOLIC SYNDROME IN KILIMANJARO REGION, TANZANIA

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Background and objectives: A shift in lifestyle patterns towards energy-dense foods and low activity levels leads to an increase in signs of the metabolic syndrome in East Africa. In the Kilimanjaro Region, Tanzania, nearly 35% of women are already overweight or obese, accompanied by increased blood glucose and lipid levels. The current study assessed food intake, physical activity, and health indicators to identify signs of the metabolic syndrome in Tanzania.

Methods: A cross-sectional study with a standardized survey was conducted in several urban and rural areas around Moshi, Kilimanjaro Region, 2012. Women and men between 18 and 65 years with no diagnosed diseases were randomly selected. Dietary intake and physical activity were assessed by a food frequency and physical activity questionnaire, respectively, and two 24 hour recalls each. As health indicators for the metabolic syndrome, body mass index (BMI), waist-to-hip-ratio (WHR), blood pressure, fasting blood glucose (FPG), and -cholesterol were measured.

Results: Out of four derived dietary patterns, the roots and tuber diet showed significantly positive correlations with FPG. Intake of carbohydrates, polyunsaturated fats, dietary fiber, and physical activity level were negatively correlated with BMI. Alcohol consumption was significantly positively correlated with blood pressure. Of the total 105 participants in the data analysis, 59% had high blood pressure, 17% were classified as pre-diabetic, 8% as diabetic, and 23% were obese (BMI >30 kg/m^2). Almost 10% had at least three of these metabolic syndrome signs simultaneously.

Conclusions: Lifestyle patterns are correlated with an alarming high number of obesity and secondary outcomes. Nutrition- and social settings need to be studied and addressed with preventative action plans to stem the merging signs of the metabolic syndrome.

Key words: lifestyle patterns, metabolic syndrome, Tanzania.

PO1243

INTERDISCIPLINARY COLLABORATION BETWEEN SOCIAL WORKERS AND DIETICIANS TO IMPROVE NUTRITIONAL STATUS AND LIFE QUALITY OF CHILDREN IN RISK

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Background and objectives: Physical well-being will not be understood without social welfare and vice versa. Interdisciplinary work between Social Workers and Social Educators (SW) and Dieticians (D) is an obvious necessity, especially when it comes to social vulnerable populations, but it does not occur in real life. Nutrition is not just a biological aspect it is related to poverty and social psycho aspects. Furthermore, equity in health is involved in the field of social justice in different ways, and must be understood as a multidimensional issue. To establish the bases for an interdisciplinary work between SW and D an innovative, multidisciplinary and multicultural educational program, that faces students to real situations that require social and dietary action for success, was held.

Methods: TS and D Students from 5 European universities, participating in the Erasmus Intensive Program: Quality of Food Intake and Social Exclusion were challenged, by some Institutions that work with children at risk of social exclusion, to develop an educational program aimed to improve the nutritional status of the children. They should empower the stakeholders into healthy eating habits, taking into account the socio-economic and cultural environment, as well as use food

as a tool to improve independence, self-esteem, socialization and social integration.

Results: The collaboration between students of both disciplines resulted in programs adapted to the real situation, taking into account the sociocultural environment, and that exceeded to simple nutritional recommendation. The proposed activities (games, workshops, theatre)tried to improve the nutrition status of children while facilitating the integration of families and their involvement in the care of children (multicultural fairs, games with families, parent's council)

Conclusions: Interdisciplinary collaboration facilitated mutual understanding between both professionals and increased their competences in health education intended for vulnerable groups. Collaboration is viable and productive.

Key words: Nutrition education, Social exclusion, children at risk.

PO1244

ADULTS' KNOWLEDGE OF FAT AND CHOLESTEROL

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Background and objectives: Having insufficient and/or incorrect information about fat and cholesterol is known to increase the prevalance of some chronical diseases. This study is planned and conducted in order to identify the adults' knowledge of fat and cholesterol and the factors affecting it.

Methods: The study sample consists of 1710 subjects (M:531, F:1179) who agreed to participate among the ones who apply to Family Health Centers in different regions of Ankara. Data collection were made using a questionnaire which contains questions about demographical data and fat and cholesterol knowledge (30 questions of fat and 25 questions of cholesterol). The confidence bounds of fat and cholesterol questions are calculated and Chronbach's Alpha values are 0.634 and 0.749 respectively. Total fat and cholesterol scores were calculated giving "1" point for each correct answer and "0" point for each incorrect answer. Data evaluation was made using SPSS program.

Results: 33.0% of the participants were high school graduates and 69.2% of them were married. According to BMI classification, 36.9% of the participants were in normal range and 60.2% of them were pre-obese and obese. The mean score of fat knowledge has found 18.20±3.96 and cholesterol knowledge has found 13.99±4.29. Female participants' mean fat ($p<0.05$) and cholesterol ($p<0.001$) scores were higher then the males'. There has found a statistically significant difference between both mean scores and BMI caused by obese subjects ($p<0.05$) whose mean fat score was lower and mean cholesterol score was higher than normal range subjects. A positive correlation identified between education level and mean fat score ($p<0.001$).

Conclusions: Having information about fat and cholesterol is closely related to BMI, gender and education. It's concluded that it's essential to provide subjects with nutrition education continuously.

Key Words: Turkey, Fat, Cholesterol, Knowledge.

PO1245

SITUATIONAL ANALYSIS AND EXPERT EVALUATION OF THE NUTRITION AND HEALTH STATUS OF INFANTS AND YOUNG CHILDREN IN SUB-SAHARAN AFRICA

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Background and objectives: The poor feeding practices of pregnant women, infants and young children contribute to the burden of malnutrition, and subsequently to childhood morbidity and mortality in sub-Saharan Africa. Gaining insight into the nutritional and health status of infants and children will help to focus future nutrition programs and actions. This review aims to provide an overview of the nutrition and health status of infants and young children in five sub-Saharan African countries (Ivory Coast, Senegal, Cameroon, Kenya and Nigeria)

Methods: Published and gray literature was critically reviewed and enriched with the views of local experts from academia, hospitals and institutions in order to assess infants' and children's diet and health in the African countries. Subsequently, the Africa Nutriday Conference was held in Senegal

(November 2011) to discuss key challenges, action plans and recommendations for future research.

Results: In sub-Saharan Africa, the under 5-year mortality rate is high, mainly because of deaths from diarrhea, malaria and pneumonia. Malnutrition is the main contributor of this high burden of disease, with vitamin A and iron continuing to be the most important nutritional deficiencies in the region. Paradoxically, there is at the same time a rising prevalence of overweight and obesity. Education for parents and health care professionals is urgently needed in order to increase their knowledge on breastfeeding, vaccination programs and over-and undernutrition. Moreover, an integrated health and nutrition surveillance program is required both to identify micronutrient deficiencies and to recognize early signs of overweight. These data will inform nutrition education and food fortification programs in the target population.

Conclusions: Different countries in sub-Saharan Africa face similar nutrition and health issues and are currently not sharing best practices, nutrition programs and scientific studies optimally. There is a need for a close collaboration between scientists and policy makers within and between countries.

Key words: Nutrition, children, adolescents, hospitals.

PO1246

DIETARY PATTERNS AND COGNITIVE DYSFUNCTION IN A PROSPECTIVE STUDY OF 70-YEAR-OLD SWEDISH MEN

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Background and objectives: With the global increase in life span dementia disorders are increasing in prevalence and nutritional intake is one modifiable life style factor that may play a role in this context. We therefore studied the association of dietary patterns with the 12-year incidence of Alzheimer's disease (AD), all-type dementia, and all-type cognitive impairment in elderly Swedish men.

Methods: Dietary habits in 1138 men from the Uppsala Longitudinal Study of Adult Men (ULSAM study) were determined by a 7-day food record. Adherence to the following dietary patterns were assessed: i) recommendations according to WHO guidelines, ii) a Mediterranean-like diet score (MDS) and iii) a low carbohydrate high protein diet score (LCHP). All-type cognitive impairment was defined as the combined incidence of all-type dementia and cognitive decline, measured with Mini Mental Test. Cox proportional hazard regression and logistic regression with multivariable adjustments was used.

Results: Altogether 84, 143 and 198 developed AD, all type dementia or all-type cognitive impairment, respectively. A LCHP-resembling pattern was weakly related to all-type dementia and all type cognitive impairment, whereas adherence to MDS appeared as protective for all type cognitive impairment. When only adequate reporters of energy intake according to Goldbergs cut-off (n=564) where considered, a high adherence to MDS was highly protective even after adjustment for energy intake, education level, ApoE4 carriage, marital status, smoking and physical activity (OR 0.32, 95% CI 0.11, 0.89).

Conclusions: A high adherence to a Mediterranean like dietary pattern among older Swedish men was associated with a more than halved risk for all-type cognitive impairment during a 12-year period. A combined intake low in carbohydrates and high in proteins may associate with a risk of developing cognitive dysfunctions.

Key words: Dietary pattern, dementia, alzheimers disease, Epidemiology.

PO1247

A SCHOOL MEAL STUDY: COMPARING PLATE WASTE AND LIKINGS OF PACKED LUNCH AND LUNCH BASED ON THE NEW NORDIC DIET

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Background and objectives: The majority of Danish children do not eat in accordance with the national dietary guidelines. The OPUS School Meal Study is a school-based intervention study testing the health effects of the New Nordic Diet (NND). The aim of this sub-study was to compare edible plate waste and self-reported likings between packed lunch from home and the served NND meal.

Methods: The OPUS School Meal study is a cluster-randomized controlled 2-period cross-over study consisting of two three-month periods: an intervention period (NND) and a control period. 187 children (8-11y) at two schools were as-

signed to the sub-study. Edible plate waste was measured by weighing individually meals for 5 consecutive days before and after lunch at the end of each dietary period. Self-reported smiley ratings from a web-based dietary assessment software for children were compared to edible plate waste. The data were modelled in two steps, a generalised linear mixed model was fitted for the probability of waste/no waste, and secondly a linear mixed model for positive waste data was fitted.

Results: 74% of all meals (N=1558) had edible plate waste (>5g). Looking at all lunches the odds for leaving edible plate waste was 11 times higher for NND than for packed lunch ($P < 0.001$). Looking at the meals with edible plate waste (N=1060) the amount was not significantly different between meal types; the median (IQR) for NND was 85.0 (36.5; 150.0) and for packed lunch 70.0 (40.0; 119.0). Lunches rated as 'really bad' or 'bad' in the self-reported likings had more waste than lunches rated 'really good' ($P < 0.001$).

Conclusions: The odds of having edible plate waste were significantly higher for NND meals compared to packed lunch. Liking of school meals are an essential determinant in order to reduce edible plate waste.

Key words: School-intervention, New-Nordic-Diet, packed-lunch.

PO1248

CONSUMPTION OF MEDITERRANEAN DIET COMPONENTS IS ASSOCIATED WITH LOWER CARDIOVASCULAR RISK. DATA FROM ALIMENTATE SANO, A CROSS-SECTIONAL INTERNET SURVEY

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Background and objectives: Self-administered online food intake surveys offer new opportunities to assess dietary intake at population levels.Aliméntate Sano (AS, www.alimentatesano.cl) is a website in Spanish that promotes and educates on healthy lifestyles, including Mediterranean dietintake, to prevent chronic diseases. It has a personal and private record of self-reportedlifestyle habits and health status. Our goal was to evaluate the ability of this website tool to detect a relationship between Mediterranean diet (MD)intake and risk of cardiovasculardisease (CVR).

Methods: Diet quality was measuredthrough a validated MDscore(MDS).CV risk was assessed by presence of metabolic syndrome (MS)components: waist circumference (WC), blood pressure (BP), HDL cholesterol, triglycerides (TG) and glycemia (G). Dataof 3,219usersover 20 years old, who answered MDSand reported valid MS components, were analyzedtocorrelateMD food groupsandMScomponentsusing one-wayANOVAadjustedfor sexandage.

Results: People who consumed ≥3 vegetable or ≥2 whole cereals servings/day had significant lower BP, WC, TG and G. In contrast, people with high sugar consumption had significant increasedlevels of BP, WC, TG and G than people with moderate and low sugar consumption. In addition, there was aninverse correlationbetween legumeconsumption andWC. Fatty red meatand/or processed meat consumption was associated with higher levels of BP, WC; TG and G; while lean red meat and poultry showednoassociation withMS.Among dairy foods,low fat and fermenteddairy product intake was inversely associated with BP, WC; TG and G, whereas consumption of whole dairy waspositively associated with MS.

Conclusions: This cross sectional internet survey shows that high consumptionof foods recommended by Mediterranean diets is associated with lowerCVRmeasuredby the presenceMS components. Supported by FundaciónBanmédica.

Key words: Mediterranean-diet, cardiovascular-risk, metabolic-syndrome.

PO1249

EAT, SLEEP, WORK, PLAY: RELATIONSHIPS AMONG HEALTH-RELATED BEHAVIORS OF YOUNG ADULTS BY WEIGHT STATUS

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Background and objectives: Few studies have examined how health behaviors relate to weight status in college students, a population at risk for weight gain. This study examined relationships among health-related behaviors (i.e., sleep duration, fruit/vegetable intake, exercise level, and work time [based on credit load and hours of paid employment]) and socio-demographic characteristics by weight status (non-overweight [BMI <25] vs. overweight [BMI>=25]) of college students (N=1252; 18-24 years) from 9 U.S. universities.

Methods: Valid, reliable measures administered online were: Pittsburgh Sleep Quality Index (PSQI), Three-Factor Eating Questionnaire (TFEQ), Satter Eating Competence Inventory (ecSI), National Cancer Institute Fruit/Vegetable Screener, International Physical Activity Questionnaire. Participants also reported height, weight, race, course credit load, and hours worked weekly.

Results: Bivariate logistic regression analyses revealed that gender (female), race (non-white), older age, lower ecSI Contextual Skills scale score, higher TFEQ Emotional Eating scale score, and higher PSQI Sleep Quality scale score were significantly ($p<0.05$) associated with overweight status. These variables were subsequently entered into a multivariate logistic regression model with overweight status as the outcome variable of interest. Regression results indicated that gender (female; OR=1.84, CI: 1.39-2.43), older age (OR=1.35, CI=1.21-1.50), and lower SECI Contextual Skills score (OR=0.96, CI:0.92-0.99), and higher PSQI Sleep Quality scale score (OR=1.08, CI:1.02-1.14) are significantly ($p<0.05$) associated with overweight status.

Conclusions: Findings suggest that obesity prevention interventions for college students should include an education component to enhance contextual skills associated with eating competence (e.g., planning regular meals, considering nutritious selections) and emphasize the importance of overall sleep quality.

Key words: young adults, health, behaviors, sleep.

PO1250

A SYSTEMATIC REVIEW AND META-ANALYSIS EXAMINING 'A POSTERIORI' DIETARY PATTERNS AND RISK OF TYPE 2 DIABETES.

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Background and objectives: Dietary pattern (DP) analysis may help to elucidate diet-disease relationships, such as the relationship between eating behavior and risk of type 2 diabetes mellitus (T2DM). This review and meta-analysis was performed to examine the association between a posteriori-derived DP and risk of T2DM.

Methods: MEDLINE and EMBASE were searched for articles published up to July 2012 and data was extracted by two independent reviewers. Prospective studies examining DP, derived by principle component analysis, and T2DM risk were eligible for meta-analysis. Multivariate-adjusted odds ratios were combined, using a random-effects meta-analysis.

Results: Nine prospective studies involving 309, 430 participants and 16, 644 incident cases of T2DM were included for meta-analysis. Two broad DPs ('Healthy/Prudent' and 'Unhealthy/Western') were identified based on food factor loadings published in original studies. Pooled results indicated a 15% lower T2DM risk for those in the highest category of 'Healthy/Prudent' pattern compared with those in the lowest category (95% CI:0.80, 0.91; $P < 0.0001$). Compared with the lowest category of 'Unhealthy/Western' pattern, those in the highest category had a 41% increased risk of T2DM (95% CI: 1.32, 1.52, $P < 0.0001$).

Conclusions: Food intake is an important determinant for T2DM risk independent of other lifestyle factors, including body weight. A DP characterized by increased intake of fruit, vegetables and complex carbohydrate and reduced intake of refined carbohydrate, meat, processed meat and fried foods is likely to reduce the public health burden of T2DM. However, an optimal DP for T2DM prevention is not fully elucidated at this time.

Key words: Dietary pattern, diabetes, meta-analysis.

PO1251

PHYSICAL ACTIVITY IN PRESCHOOL CHILDREN MEASURED WITH ACTIHEART MONITORS

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Background and objectives: There are scarce records of physical activity in children of developing countries.

Methods: With this objective, 77 preschoolers (5.9 y of age, 37 girls, 40 boys) were evaluated according to WHO growth standards; total daily energy expenditure (TEE) was measured by Actiheart monitors, each 15 seconds during two week-days and 1 week-end-day, values were weighed for a week, and cleaned with the software of the University La Plata, Argentina.

Results: Boys with similar age and BMI, showed higher TEE values than girls (1489 vs.1372 kcal/d; p= 0, 03), and also per kg body weight (68, 5 vs. 59; p=0, 04). As a consequence of the boys´ higher BMR (1013 vs. 944 kcal/d, p=0.014), the PAL values of boys and girls were low (1, 44 and 1, 45) and not different (p=0.87). Normal vs. overweight boys showed higher TEE (72 vs. 57 kcal/kg, p=0.000005) in spite of the higher BMR of the overweight ones (1195 vs 957, p= 0.00000). Overweight boys expended less time than the normal ones in moderate+heavy physical activity (35 vs. 101 min/d, p=0.011) and showed lower values of energy expended in physical activity (AEE, 16 vs. 23 kcal/kg/d, p=0.03), and similar Physical Activity Level (PAL, 1.40 vs. 1, 47, p=0.42); but not girls (58 vs. 94 min/d, p=0.19) (AEE, 17.2 vs. 17.9 kcal/kg/d, p=0.75) (PAL, 1.49 vs. 1, 38, p=0.23).

Conclusions: Cuban preschool children showed all a low physical activity level; half of them did not accomplish the daily physical activity recommendation.

Key words: physical activity, preschool children, accelerometry, heart rate, Actihearts

PO1252

INTERNATIONAL NETWORK FOR FOOD AND OBESITY/NCD RESEARCH, MONITORING AND ACTION SUPPORT: BENCHMARKING FOOD ENVIRONMENTS TOWARDS HEALTHIER DIETS

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Background and objectives: The World Health Organization (WHO)'s monitoring of risk factors for non-communicable diseases (NCDs) does not include 'upstream' monitoring of many aspects of food environments that influence population diets. INFORMAS (International Network for Food and Obesity/NCDs Research, Monitoring and Action Support) is a global network of public-interest organisations and researchers that aims to monitor, benchmark and support public and private sector actions to create healthy food environments and reduce obesity and NCDs. This monitoring of public and private sector policies, and their impacts on the healthiness of food environments, seeks to complement existing WHO monitoring efforts.

Methods: Monitoring areas are divided into process, impact and outcome modules. The two process modules focus on monitoring and benchmarking the policies and actions of the public and private sector. The seven impact modules focus on monitoring and benchmarking the impact of those policies and actions on key aspects of food environments, such as food composition, labelling, promotion, provision, access, availability, affordability, and trade and investment. The three outcome modules focus on monitoring and evaluating changes in behavioural, dietary, physiological and metabolic risk factors, as well as health outcomes. Some aspects of these outcome components are being developed by WHO as part of their global NCD monitoring framework.

Results: The development of protocols and pilot testing is planned for 2013-2015. The monitoring framework will be trialled in large and small, and high- and low-income countries globally. Within five years, it is expected that all countries will be invited to collect their own data and contribute those data to a global database for benchmarking food environments.

Conclusions: Benchmarking data and good practice exemplars will be communicated to policymakers, civil society and the food industry with the aim of stimulating improvements in the healthiness of food environments.

Key words: Food environments, non-communicable diseases, benchmarking.

PO1253

THE INFORMAS FRAMEWORK FOR MONITORING AND BENCHMARKING HEALTHY AND UNHEALTHY FOOD AVAILABILITY IN RETAIL FOOD ENVIRONMENTS

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Background and objectives: The International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) is setting benchmarks for creating healthy food environments and reducing obesity and NCDs. One of the INFORMAS modules concentrates on monitoring and benchmarking the availability of healthy and unhealthy foods and non-alcoholic beverages in retail food environments. Certain dimensions of both the community and the consumer food environment are associated with food purchasing behaviour and dietary quality.

Methods: A step-based framework was developed to monitor and benchmark the availability of healthy and unhealthy foods and non-alcoholic beverages in communities and within food outlets. Each country can select an approach based on local resources and capacity available.

Results: Within the 'minimal' approach, density of food outlets in a defined geographic area, and linear shelf space of fresh fruits and vegetables (FV) and energy-dense, nutrient-poor foods (EDNPF) within outlets will be measured. In the 'expanded' approach, density of food outlets within a specified buffer around residents' homes and schools, and both shelf-space and placement (end-of-aisle and check-outs) of all FV and EDNPF within outlets will be measured. In the 'optimal' approach, relative density of healthy and unhealthy food outlets within a specified buffer around residents' homes and schools, presence or absence of food outlets within predefined distances to homes and schools, placement and cumulative shelf space of healthy and unhealthy foods within outlets will be measured. The framework is designed to support monitoring of retail food environments over time and comparison between countries.

Conclusions: Systematic monitoring of healthy and unhealthy food availability in retail food environments and their potential positive and harmful impacts on nutrition is essential for the development of effective policy approaches aimed at reducing the burden of obesity and NCDs.

Key words: Retail food environment, benchmarking, food access, food availability, food placement.

PO1254

EFFECTIVENESS OF COOKING DEMONSTRATION, SMALL ANIMALS AND KITCHEN GARDENS PROMOTION BY COMMUNITY COOPERATIVES ON CHILD NUTRITION, A CASE OF RWANDA

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Background and objectives: Malnutrition is one of the leading social and developmental problems in Rwanda. The level of malnutrition in the country remained very high stunting level of 44% and underweight prevalence of 11.4%. The government of Rwanda and its partners are committed to reduce the burden of malnutrition in the country and establishment and capacity building of community cooperatives one of the successful approaches. The purpose of this study was to share the WV program impact in reducing the burden of malnutrition in rural communities in Rwanda.

Methods: the assessment was conducted using program and health facilities report review. In addition the key informant interview and focus group discussion were held with key partners working with World Vision and the beneficiaries. The cooperatives deliver key health and nutrition messages and conduct cooking demonstrations and establishment of kitchen garden and small animal production. Primary and secondary data were analyzed manually.

Results: between 2009–2012 the program trained 14, 339 community health workers in 29 World Vision operational areas. These cooperatives weighed 47, 740 children during the growth monitoring and promotion sessions, identified and referred under weight to enroll in to the nutrition program. Among the referred children 27828 were successfully rehabilitated, a graduation rate of as high as 86.5% in some areas, children. Ruhuha health center data showed drop of acutely malnourished children by 70% (1936 – 638) and malnourished pregnant mothers by 75% (553 – 130). In some communities the underweight prevalence has reduced from 46% to 7% in 2011 and as low as 0.3% in 2012. Cooperatives avail vegetables and eggs to the nutrition education sessions.

Conclusions: use of local community health workers organization successfully rehabilitation of malnourished children through availing nutritious foods. Other countries in the region need to learn from this experience.

Key words: community cooperatives, cooking demonstration, rehabilitation.

PO1255

EATING DISORDER CHARACTERISTICS AMONG GERMAN MALE AND FEMALE TRIATHLETES

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Background and objectives: Triathlon is a popular sport in Germany and the number of memberships in Triathlon Clubs, which belong to the German Triathlon Union, is rising. This sport is known to be associated with lean body mass, but the occurrence of eating disorders in triathlon is unknown. The aim of the present study was to characterize active triathletes and to investigate the occurrence of eating disorders in comparison to the general population.

Methods: All Participants of four selected leisure triathlon events in north-western Germany received an standardized online questionnaire prior to the competition. Inclusion criteria were defined as not more than 20 training hours per week. Data collection included first three scales of the Eating-Disorder-Inventory 2 (EDI-2) as well as the extent of training, anthropometric data and motivation for triathlon.

Results: 284 triathletes (82 women, 202 men) average age 38.5 years (women 36.8 ± 10.4 years; men 39.2 ± 11.1 years) participated in the study. Mean BMI was calculated with 21.6 ±2.7 kg/m^2 in women and 24.0 ±2.3 kg/m^2 in men. 26.7% of males were overweight, 1.5% obese. Triathletes scored higher on EDI-2-scales than the control group of Thiel et al. (1997). Women scored higher than men, younger than 30 year old participants scored higher than over 30 year old participants.

Conclusions: The present study shows a higher rate of eating disorder characteristics among triathletes. Due to methodical limitations the question, if eating disorders are the motivation for triathlon or if eating disorders are a consequence of triathlon, could not be answered. It is recommended to develop low-threshold intervention programs to promote healthy nutrition in triathlon for primary prevention of eating disorders.

Key words: triathlon, eating disorder, Eating-Disorder-Inventory 2 (EDI-2), BMI, primary prevention.

PO1256

FACTORS AFFECTING THE REHABILITATION OUTCOME OF SEVERELY MALNOURISHED CHILDREN AMONG SEMI-NOMADIC COMMUNITIES IN SOUTHERN ETHIOPIA

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Background and objectives: Malnutrition is one of the priority health and developmental challenge in the country. Understanding the underlying causes is important in the design and implementation of both emergency and non-emergency programs. World Vision Ethiopia conducts nutrition survey in its program areas to assess the nutrition situation and understand the need and measure impact of its interventions. The purpose of this study is to assess the factors that affect the rehabilitation outcome of under nutrition children among the semi-nomadic communities in rural Ethiopia.

Methods: a two stage cluster sampling method was employed to conduct the nutrition assessment. 591 children of 6-59 months old from 50 villages were included for anthropometric measurement. Household interviews were also conducted in 250 households and community interviews were also conducted in 50 villages (clusters). The program provided therapeutic interventions. Data was analyzed using the ena /SMART/ and SPSS software.

Results: by the end of its eight months intervention the prevalence of global acute malnutrition (GAM) among the surveyed population reduced from 10.7% (7.8 - 14.6 95% C.I) to 7.1 % (4.8 - 10.4 95% C.I.). The prevalence of severe acute malnutrition (SAM) reduced from 1.0% (0.5 - 2.1 C.I.) 0.3 % (0.1 - 1.4 95% C.I.). According to the key informants the main contributor for this change was relatively improved crop production and livestock performance. The morbidity rate for common childhood infectious diseases (Diarrhea, malaria and ARI), though low and the low coverage vitamin A supplementation remained unchanged during the course of the program.

Conclusions: nutritional interventions contribute to reduce the nutrition status. Future program to consider interventions that addresses common childhood illnesses and improve services such as Vitamin A supplementation and immunization to maximize the impact.

Key words: under nutrition, childhood illnesses, vitamin A supplementation and acute malnutrition.

PO1257

ANTHROPOMETRIC PROFILE AND PREVALENCE OF OVERWEIGHT AND OBESITY IN A POPULATION OF UNIVERSITY STUDENTS

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Background and objectives: Obesity is a major modifiable risk factor for the development of chronic non communicable diseases, such as diabetes mellitus and cardiovascular disease (the two leading causes of death in Mexico). According to the National Survey of Health and Nutrition (ENSANUT 2012), overweight and obesity affect 7 in 10 Mexican adults. The aim of this study was to evaluate the prevalence of overweight and obesity in a population of university students at the Autonomous University of Puebla.

Methods: A study was conducted on 974 students of which 517 (51.7%) were men and 457 (45.7%) women aged between 18 and 25 years old. They were weighed and their height measured. They were given a questionnaire on food frequency, dietary habits and physical activity. The statistical treatment of the data was performed using the computer program R-sigma Babel 2000. The Student t test was used to compare the distribution between sexes for quantitative parameters such as weight, height and body mass index (BMI).

Results: We found an average weight of 67.97 ± 12.42Kg, an average BMI of 24.29 ± 2.95 kg/m2 significantly lower ($p < 0.001$) in women. The percentage of underweight students was 1.54%, the normal weight of 60.37%, the 34.91% of overweight and obese 3.18%, with no difference by gender. The frequency of fast food consumption increased with increasing BMI, from a daily intake of 6.67% to 9.68%. 84% of students usually have breakfast while the rest do not

Conclusions: Only five out of ten adult undergraduate students at the Autonomous University of Puebla had adequate nutritional status, this is a smaller proportion than reported in ENSANUT 2012; however, the data provided by the national survey covered an older group.

Key words: Nutritional status, BMI, obesity.

PO1258

STUDENT WELLNESS AND ADVOCACY PROJECT: ENGAGING YOUNG MINDS

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Background and objectives: Obesity has been identified as one of the ten leading health indicators resulting in the call for action to reduce the number of children in this category. Childhood obesity continues to be a growing concern in all segments of the population regardless of ethnicity, income, and location. Recent report has indicated that the overall population increase in obesity has slowed, however, monitoring and intervention is still warranted. To aid in the continued fight against childhood obesity, a culturally tailored school based nutrition and physical activity intervention project was implemented in six rural low income middle schools in a southeast Texas County.

Methods: The design and development of the curriculum administered was guided by the contextual data analyses from pre-administered focus groups and structured interviews that were completed within the selected population. The school based intervention was conducted among 4th grade students over a period of 9 months, and included 298 children between the ages of 9 and 10 years old. At the culmination of the intervention period, children were selected from each school to participate in focus group sessions to evaluate the program effectiveness. Forty three percent of the children who participated in the intervention represented minority groups and over 60% were from homes with less than $30, 000 annual income. Qualitative data were analyzed using Atlas ti.

Results: indicated that a majority of the participants retained the knowledge imparted during the intervention. Children were able to convey relevant nutrition information to their parents at home and even while food shopping.

Conclusions: Overall the children demonstrated improved nutrition knowledge, skills, and understanding. They were more physically active but indications suggested no change in afterschool television viewing and video game activities. Funding was made possible by Grant # 1P20MD0002295 from the National Center on Minority Health and Health Disparities obesity nutrition children physical activity.

Key words: Young, wellness, nutrition.

PO1259

ACUTE RESPIRATORY INFECTIONS IN CHILDREN LIVING IN HIV-AFFECTED COMMUNITIES IN GHANA

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Background and objectives: Acute respiratory infections (ARI) remain one of the leading causes of morbidity. They account for 17% of deaths in children under the age of five years. We examined the incidence and days ill with ARI among infants of women of different HIV status: HIV positive (HIV-P), HIV negative (HIV-N) and unknown HIV status (HIV-U).

Methods: Pregnant women (n=492) were recruited from three antenatal clinics in Ghana and their infants were followed from birth to 1 year of age. Data on ARI (presence of cough or difficulty in breathing, with or without fever) was collected weekly.

Results: Incidence of ARI was 0.81±0.03 episodes/100-d at risk. Overall total days ill with ARI was 7.52±0.37 days ill/100-d observed. There was no difference in both incidence (HIV-P 0.86±0.07 episodes/100-d at risk, HIV-N 0.77±0.05 episodes/100-d at risk, HIV-U 0.83±0.06 episodes/100-d at risk, P=0.807) and total days ill with ARI (HIV-P 7.06±0.67 days ill/100-d observed, HIV-N 7.29±0.60 days ill/100-d observed, HIV-U 8.20 ±0.66 days ill/100-d observed, P=0.189) by maternal HIV status.

Conclusions: Interventions to reduce morbidities from acute respiratory infections in HIV-affected communities should focus on all children, irrespective of their mother's HIV-status.

Key words: Acute Respiratory Infections, HIV, Ghana.

PO1261

MALNUTRITION AND ITS RISK FACTORS AMONG PERSONS WITH DISABILITIES IN MALAYSIA

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Background and objectives: Population with disabilities are susceptible to malnutrition and limited data has been documented especially for those with low socio-economic background. A cross-sectional study was conducted to assess the nutritional status of persons with disabilities (PWD) in Kelantan, Malaysia; and to identify the malnutrition risk factors.

Methods: There were 462 PWD (276 children and adolescents; 186 adults) recruited from rehabilitation centres in 2010. Socio-demographic and food intake information was obtained from their primary caregivers. Body weight and height of PWD were measured.

Results: The prevalence of malnutrition, as indicated by BMI-for-age for children and adolescents and BMI categories for adults, demonstrated 20.3% were underweight while 22.7% were overweight and obese. Nutrition screening checklist documented 7.5% of respondents required others assistance for feeding; 14.7% needed food texture modification; 8.8% had difficulty in chewing; 9.3% suffered from choking; 15.3% had drooling; 66.6% had dental problems; 13.5% had food allergy; 16.0% had constipation; and 22.7% with food choosy problems. Among the socio-demographic parameters, multiple linear regression analyses demonstrated that birth weight (R=1.14), ability to ambulate by own self (R=3.51) and primary caregivers' years of education (R=0.30) were significantly associated with BMI of the children and adolescents; while birth weight (R=2.27), household size (R=0.70) and monthly household income (R=0.01) were the significant socio-demographic determinants for the adults. For the food intake characteristics, analyses showed that ability of self feeding (R=3.57), eating duration (R=0.07), having drooling (R=2.83) and dental problems (R=2.22) were significantly associated with BMI of the children and adolescents; while difficulty in chewing (R=12.29) and the need for food texture modification (R=7.43) were the significant risk factors among the adults.

Conclusions: The dual burden of malnutrition was noticeable. Identification of its risk factors may help in public health nutrition effort in overcoming this problem.

Key words: body mass index, disabilities, malnutrition.

PO1262

DISORDERED EATING, PHYSICAL ACTIVITY, BODY WEIGHT STATUS AND SELF-ESTEEM AMONG FEMALE COLLEGE STUDENTS IN MALAYSIA

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Background and objectives: Studies regarding disordered eating indicate that the prevalence of disordered eating is increasing from time to time across the world and female college students are regarded as one of the high risk group exposed to this problem. Hence, this cross-sectional study aimed to determine the prevalence of disordered eating and its relationship with physical activity, body weight status and self-esteem.

Methods: The Eating Attitudes Test-26 (EAT-26), the Rosenberg Self-Esteem Scale (RSES) and the International Physical Activity Questionnaire (IPAQ) were administered on 262 female college students aged 18 to 24 years to assess disordered eating, self-esteem and physical activity, respectively. The respondents were recruited from one nursing college and one public university in the Eastern region of Peninsular Malaysia.

Results: Most of the respondents were Malay (76.8%), followed by Chinese (16.6%), Indian (5.4%) and other ethnicity (1.2%). Based on the Asian cut-off point for Body Mass Index (BMI) classification, the prevalence of overweight (27.9%) and underweight (22.5%) respondents was quite close. There was 14.9% respondents at-risk of eating disorders. Mann-Whitney U Test showed no significant different between disordered eating group and normal eating group in terms of their physical activity, self-esteem and body weight status. However, Spearman correlation showed there was significant relationship between disordered eating and physical activity ($rs = 0.233$, $p<0.01$), as well as BMI ($rs = 0.238$, $p<0.01$).

Conclusions: higher BMI or physical activity level is linked to disordered eating. Colleges and universities can become great setting for promoting healthy eating habit. Future studies are needed to create health-promotion strategies that best suit the needs of college students as well as those young adults who not enrolled in tertiary institutions.

Key words: EAT-26, disordered eating, physical activity, college students

PO1263

ASSESSMENT OF FOOD SECURITY STATUS AMONG RURAL AND URBAN HOUSEHOLDS IN KUCHING DISTRICT, SARAWAK, MALAYSIA

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Background and objectives: Food security can be defined as the availability of and accessibility to food, acquired in an acceptable means at any given time and place in a way that could maintain health and wellbeing. Research on food security in Malaysia is still in its infancy stage, and the extent of food security situation in Sarawak, a part of Borneo Island, remains unexplored.

Methods: This cross-sectional study aimed to measure the prevalence of food insecurity and to examine the associations between food security status with demography, socioeconomic factors and coping strategies. A total of 127 mothers from low income households in Padawan and Petra Jaya areas in Kuching District, Sarawak were interviewed. Structured questionnaire was used to collect the data and information. The Radimer/Cornell Hunger and Food Insecurity measures were used to assess food security status.

Results: The information gathered from this study indicated that majority of households in this study were food insecure. The results show that 75% of the respondents interviewed were experiencing household food insecurity, whereas 58.3% having individual food insecurity and 48.8% with child hunger. Higher prevalence of household food insecurity was observed in the urban area. Meanwhile, individual food insecurity and child hunger were more prominent in the rural area. From the variables available in this study, household income, income per capita and coping strategies showed a significant associations with food security status ($p<0.05$). onclusions: The findings suggest that food insecurity among household in this study were primarily a direct result of inadequate income to buy sufficient foods for the household members. This further suggests why more households were found to rely on non-food related coping strategies in order to acquire enough foods to feed their family.

Key words: food security, hunger, Malaysia.

PO1264

ETHNIC DIFFERENCES IN ASSOCIATION BETWEEN SERUM VITAMIN D AND PARATHYROID HORMONE CONCENTRATIONS: THE 2008/09 NEW ZEALAND ADULT NUTRITION SURVEY

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Background and objectives: Suppression of serum parathyroid hormone (PTH) concentration is a potential indicator of vitamin D requirement. Evidence shows that the decline in serum PTH in Black Americans is sharper and occurs at lower concentrations of serum 25-hydroxyvitamin D than in White Americans. Our purpose was to examine and compare the relation between serum PTH and 25OHD in three different New Zealand ethnic groups, Maori, Pacific People, and New Zealand European and Others (NZEO). Skin colour tends to be darkest in Pacific and lightest in NZEO.

Methods: Serum 25OHD and PTH were measured in 2960 individuals, 15 y or over, participating in the 2008/09 New Zealand Adult Nutrition Survey; 548 Maori, 342 Pacific, and 2070 NZEO. Survey regression analysis adjusting for age, sex, BMI, latitude, ethnicity, and date of blood sampling was used to determine the change in serum PTH concentration per 10 nmol/L increase in serum 25OHD.

Results: In participants with serum 25OHD less than 50 nmol/L, the decrease in serum PTH per 10 nmol/L increase in serum 25OHD was significantly greater in Pacific than in NZEO – ratio of decreases between Pacific and NZEO was 1.16 (95%CI, 1.03 to 1.29; P=0.012). In participants with serum 25OHD 50 nmol/L or higher, the decrease in serum PTH per 10 nmol/L increase in serum 25OHD was not significantly different between Pacific and NZEO – ratio of decreases was 0.98 (95%CI, 0.92 to 1.04; P=0.515). Thus, the decrease in serum PTH per incremental increase in serum 25OHD was significantly greater in Pacific than in NZEO only when serum 25OHD was below 50 nmol/L (P=0.011 for interaction).

Conclusions: These results suggest that maximal suppression of serum PTH occurs at lower serum 25OHD concentrations in Pacific than in NZEO.

Key words: parathyroid hormone, vitamin D requirement, national survey, ethnicity.

PO1265

ASSOCIATIONS OF MATERNAL FOLATE STATUS WITH BIRTH OUTCOMES IN AN ASIAN POPULATION: GROWING UP IN SINGAPORE TOWARDS HEALTHY OUTCOMES (GUSTO)

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Background and objectives: Insufficient maternal folate intakes have been associated with adverse birth outcomes, but the evidence is inconclusive. We aimed to further elucidate these associations in an Asian population.

Methods: The GUSTO birth cohort study comprises participants (n=1152) with a mean age of 30.4 years (SD 5.2) and ethnic composition of 54.3% Chinese, 27.3% Malay, and 18.3% Indian women. Maternal blood samples (n=999) collected during 26th-28th week gestation were assayed for plasma folate concentrations. Relationships between folate concentrations with preterm birth and neonatal anthropometry were assessed using logistic and linear regression respectively, with adjustment for important confounders.

Results: Deficient or marginal folate status (<6ng/mL) was observed in 6.1% of Chinese, 19.9% of Malay, and 13.4% of Indian women in this cohort. Higher plasma folate concentrations were associated with lower risk of preterm birth [OR=0.74 per SD increase of folate; 95% confidence interval (CI) = 0.58, 0.93] and longer gestational duration (ß=0.13 week, 95% CI= 0.02,

0.24). Similar trends were observed in analyses stratified by ethnicity (P-values for interaction >0.05). In univariate analysis, higher folate concentrations were associated with greater birth weight (ß=28.3 g, 95% CI= 0.58, 56.0) and birth length (ß=0.21 cm, 95% CI= 0.08, 0.34), but these associations were no longer apparent after adjustment for gestational duration (birth weight), infant gender, maternal age and ethnicity (birth length). Folate concentrations were not associated with neonatal head, mid-upper arm and abdominal circumferences or with neonatal triceps and subscapular skinfold thickness. Similar findings were observed when folate was modeled based on clinical cut-offs.

Conclusions: Higher maternal folate concentrations were associated with a lower risk of preterm birth, but were not independently associated with birth weight and length. The current results suggest that adequate folate intake during pregnancy remains a concern even in this high-income Asian population.

Key words: Maternal, Folate, Birth outcomes.

PO1266

KNOWLEDGE, ATTITUDES AND PRACTICES ON FOLIC ACID SUPPLEMENTATION AMONG PREGNANT MOTHERS IN A SRI LANKAN SETTING

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Background and objectives: Folic acid supplementation programme is in existence in Sri Lanka to prevent neural tube defects of foetuses and anaemia of women in childbearing age. The programme is implemented through Public Health Midwives (PHMM). After several years of implementing the programme the country is still lacking reliable data on its progress and outcome. Objective of this study was to describe knowledge, attitudes and practices on folic acid supplementation and associated factors among pregnant mothers.

Methods: A descriptive cross-sectional study was carried out in a health unit in Sri Lanka in 2011. Data were collected from a systematic random sample of 524 pregnant mothers through an interviewer administered questionnaire representing all the antenatal clinics of the health unit.

Results: Awareness of folic acid was 96.4% (n=505). Though the majority (81.9%, n=429) have received knowledge on folic acid from PHMM, overall knowledge on folic acid was 'poor' in 84.9% (n=445). Ninety-six percent (n=503) have used folic acid at any stage of pregnancy, but only 46% (n=241) have used it before conception. Among the mothers who used folic acid before conception, majority (88%, n=212) have bought it from a private pharmacy. Poor knowledge was associated with lower age, belonging to an ethnicity other than Sinhalese, living in urban or estates and low education. A lower rate of utilization of folic acid before and during pregnancy was associated with low education, unplanned pregnancies and not receiving advice from healthcare workers. Parity 2nd or higher, belonging to an ethnicity other than Sinhalese and living in estates were also predictors of poor preconceptional folic acid use.

Conclusions: Planned health promotion campaigns, preventing unplanned and teenage pregnancies, distributing folic acid through government clinics during preconceptional period and developing monitoring systems for folic acid supplementation programme are recommended.

Key words: Folic acid, pregnancy, preconception, Sri Lanka.

PO1267

IMPROVEMENT OF PHYSICAL FUNCTIONS AND NUTRITIONAL STATUS IN ELDERLY PERSONS BY LONG-TERM TRAINING FOR PREVENTIVE CARE

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Background and objectives: We have examined changes in physical function and also the correlation between physical function or mastication ability, or comprehensive QOL and nutritional status, in elderly who received long-term training for preventive care.

Methods: Forty elderly aged 65 years or older who have been trained at our fitness club (RTG). Sixteen elderly in RTG who were able to participate in a 3-year exercise evaluation have been examined the efficacy of our training program on physical ability. The items of physical fitness tests were divided into ten items including the knee extension strength and one-leg standing time with eyes open. The average nutrient intake of energy was calculated by using a meal questionnaire for diet content of 3 days prepared to participants. The masticatory performance was evaluated by using color-chewing gum. The assessment of QOL was performed by using SF-8TM questionnaire.

Results: The knee extension strength and one-leg standing time with eyes open were significantly increased following the

training. We recognized a significant positive correlation between the masticatory performance and knee extension strength, and between the masticatory performance and average nutrient intake of energy for 3 days. Furthermore, there were significant negative correlations between their initial values and changes resulting from training. In addition, there was a significant positive correlation mental component summary score in the SF-8TM questionnaire and BMI in the elderly received the long-term training.

Conclusions: These results of this study demonstrate that our long-term training was effective for improving physical ability and maintaining the masticatory performance and good nutrient status in the elderly. It is suggested that long-term training would be useful for preventive care in elderly persons, especially those with lower physical function. Furthermore, it was clear that good mastication led to better physical function and comprehensive QOL.

Key words: elderly, long-term training, physical function, nutrition, mastication.

PO1268

PREVALENCE AND FACTORS ASSOCIATED WITH ANEMIA IN THAI ELDERLY

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Background and objectives: Anemia is an important health problem in elderly people but it is mostly overlooked. This study aimed to study the prevalence and factors associated with anemia in Thai elderly.

Methods: Data from the multistage cross-sectional National Health Examination Survey (NHES) IV of Thai older adults aged 60 years and higher conducted in 2009 were used.There were 22, 847 which had blood test results and other selected factors assessed by interviewed using standard tools. Anemia was defined due to the World Health Organization criteria as hemoglobin levels below 12g/dL in women and below 13 g/dL in men.

Results: The prevalence of anemia in Thai elderly was 40.3% in overall, 34.5%, 48.4%, and 60.7% in the group of 60- 69, 70-79, and >80 years old, respectively. Multiple logistic regression analysis showed that people with older age, female, depression, having care giver, poverty, chronic kidney disease are more likely to have anemia than those without these conditions, significantly. Herbal used elderly are less likely to have anemia.

Conclusions: Due to high prevalence of anemia in Thai elderly, it is a significant severe public health problem. Health team should keep in mind and properly manage in old and very old persons and all who had the risk factors.

Key words: Elderly, anaemia, nutrition, NHED.

PO1270

GENDER DIFFERENCES IN FOLATE STATUS OF AN ADULT POPULATION IN GHANA

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Background and objectives: Folate deficiency has been associated with neural tube defects, certain cancers and vascular disease. Low concentrations of folate have been associated with elevations in plasma homocysteine. We conducted a cross-sectional study to compare blood folate and homocysteine concentrations in men and women living in a coastal area in Ghana.

Methods: A total of 140 healthy individuals (men - 86; women -74) participated in this study. Subjects in this study were part of a larger study to compare folate status of a first generation migrant Ghanaian population in the UK with an urban population in Accra. Anthropometric measurements were taken and dietary intakes were determined using three 24 hour recalls. Blood samples were collected for determination of serum and erythocyte folate concentrations and the methylenetetrahydrofolatereductase (MTHFR) 677C ? T polymorphism.

Results: Results showed that serum and erythrocyte folate were significantly lower in men compared to women ($p < 0.05$).

This was accompanied by significantly higher homocysteine concentrations in males ($p < 0.001$). There was no significant difference in folate intakes between gender ($p > 0.05$) however, folic acid supplement use was significantly higher in females than males (18.9% vs. 5.8%, $p < 0.001$). A significant association was found between dietary folate and erythrocyte folate ($p < 0.01$). Male sex was the main predictor of plasma homocysteine concentrations in this population ($p < 0.001$).

Conclusions: Findings of this study suggest that women living in a coastal area in Ghana have improved biomarkers of folate, although there were no differences in dietary folate intakes between gender. Intervention programmes to improve folate status of men in this population are needed.

Key words: folate status, homocysteine, Ghana.

PO1271

EFFICACY OF A SHORT INTERVENTION PROGRAM TO IMPROVE FRUIT AND VEGETABLE ACCEPTANCE AMONG CHILDREN

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Background and objectives: Eating habits, which are determinant for health, are established during childhood. 80% of children from Vitoria-Gasteiz do not eat enough vegetables and 60% don't eat enough fruit. Effective intervention programs are needed to improve these foodstuffs eating. The objective of the present work was to improve fruit and vegetable (FV) acceptance among children aged 6-12 years from Vitoria-Gasteiz City.

Methods:A short intervention program, was carried out in the municipal market. The program which consisted in three workshops (nutritional, dietetic, sensorial and culinary aspects of FV), allows us to work on food choice determinants: motivation (nutritional and dietetic knowledge), abilities (dietetic, culinary, sensorial), opportunity (environment), reward (salad, fruit) and models (teachers, parents). After the workshops, children visited the greengrocer's and were given a piece of fruit for the next day breakfast. Instructions were given to parents and teachers for the positive reinforcement. Questionnaires were used to evaluate the process, the program impact on FV choice determinants and intention to consume FV.

Results:914 children participated in the program. 51% and 54% acquired nutritional and dietetic knowledge respectively. 22%, 23% and 40% acquired culinary, sensorial and dietetic abilities. After the program, 77% showed intention to eat more fruit (18% even new and unknown fruits) and 60% to eat more vegetables. 43% ate the fruit in the next day breakfast (38% ate it before). 74% of parents found that their children were more interested in eating more FV.

Conclusions: The program has positive effects on acceptance of fruit and vegetables. Motivation or knowledge is easier to change than abilities. Promoting the consumption of vegetables is more difficult than promoting the consumption of fruit.

Key words: children, eating habits, food choice determinants, fruit and vegetable intake Research funded by University of the Basque Country UPV/EHU and Vitoria-Gasteiz City Council.

PO1272

PHYSICAL ACTIVITY LEVEL OF HEALTHY ADULT WOMEN IN VALLADOLID (SPAIN)

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Background and objectives: Both a balanced diet and a regular physical activity are important to promote and maintain health (European Public Health Commission, 2007). That is important for women because there are biological factors related to health explained from a gender (masculine) point of view (Rohlfs 2000). Adult women should be considered as a vulnerable group, and must be analyzed specifically to be reoriented towards healthier habits.

Key words: Physical activity, women, health. To study the physical activity during both working hours and leisure time of women between 40 and 60 years old in the city of Valladolid (Spain).

Methods: A sample of 500 women was selected through random sampling. They were asked to fill the Global Physical

Activity Questionnaire (WHO 2008) which includes activity in work and leisure.

Results: Activity at work: Light: 32.4%. Moderate: 56.5%. Heavy: 6.4%. Not listed: 4.0%. Activity during leisure time: Light: 63.2%. Moderate: 28.0%. Heavy: 5.8%. Not listed: 4.0%. Classification of Physical Activity: SEDENTARY: 0.8%. LIGHT: 64.2%. MODERATE: 29.0%. HIGH:1.6%.

Conclusions: Women physical activity can be classified as "light" in most cases. It would be necessary to implement actions to promote its increase, especially during leisure time with moderate activities such as walking or swimming. Those activities will help in improving the health of women.

Key words: physical activity, adults, women, health.

PO1273

EXCESSIVE RED AND PROCESSED MEAT CONSUMPTION IN SÃO PAULO, BRAZIL: DIET QUALITY AND ENVIRONMENTAL IMPACT

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Background and objectives: Red and processed meat consumption has been negatively associated with diet quality in some countries. Furthermore, livestock production has been linked to negative environmental impacts, like greenhouse gases emission. The aim of the present study was to evaluate red and processed meat consumption and also to assess the impact of this consumption on the diet quality and on the environment in São Paulo, Brazil.

Methods: A cross-sectional population-based survey among a representative sample (n=1677) of adults and elderly people living in Sao Paulo, Brazil, was conducted in 2003. Diet was assessed by Multiple Source Method, using two 24-hour dietary recalls. The recommendation of 500g/week of red and processed meat consumption was considered excessive consumption. To investigate the relationship between meat consumption and diet quality we used the Brazilian Healthy Eating Index Revised. The environmental impact was analyzed according to estimates of CO2 equivalents emission from meat production (production of 1kg of Brazilian beef generates about 44 kg of CO2 equivalents).

Results: The mean of red and processed meat intake was 110g/day (138g/day for men and 81g/day for women) and about 70% of population consumed more red and processed meat than what is recommended. Diet quality was inversely associated with excessive red and processed meat consumption in men. The greenhouse gases emission from meat consumption in São Paulo, in 2003, were estimated at approximately 18, 071, 988 tons of CO2 equivalents, representing about 5% of total CO2 emitted by agriculture in Brazil in 2003.

Conclusions: The excessive red and processed meat consumption, associated with poorer diet quality and important environmental impact observed, support initiatives and policies to advise to reduce red and processed meat consumption within the recommended amounts, as part of a healthy and environmentally sustainable diet.

Key-words: red and processed meat; food intake; diet quality; environmental impact.

PO1274

NUTRITION OF CHILDREN WITH NEUROLOGICAL DISORDERS AND MENTAL RETARDATION FROM SOCIAL ESTABLISHMENTS IN BULGARIA

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Background and objectives: Children with neurological disorders and mental retardation are at risk for nutrition and nutritional status. The most common deficits in these children are reduced average daily intake of energy and nutrients: protein, vitamins (vitamin D, vitamin B12, folate) and minerals (calcium, copper, phosphorus, magnesium, zinc). The aim of the study is to assess the food offered in social establishments in Bulgaria.

Methods: In November 2010, the survey on nutrition of children aged of 3 to 19 years old with neurological disorders and mental retardation from 12 social establishment in Bulgaria was carried out. The weekly menu and corresponding food balance sheet from 4 seasons were analyzed. The results were compared with Reference Values for Energy and Nutrients Intake for healthy children with moderate physical activity.

Results: The main results reveal that the average daily Intake from offered food for - Energy, Vitamin B1, Folate, Vitamin D, Iron, Magnesium, Zinc and Calcium are under the recommendation for the children from two studied groups (3-7 and 7-19 years old) and Sodium is over the recommended levels. In the weekly menu the wholegrain products, milk and milk products, fruit and vegetables, meat and fish are insufficient and unbalanced presented. There are increased risk for deficiency of main nutrients and impaired nutritional status of children.

Conclusions: The results are basis for methodical guideline material and recommendations for improving nutrition of children with neurological disabilities and mental retardation from social establishment in Bulgaria.

Key words: children with neurological disorders, children with mental retardation, nutrition, requirements.

PO1275

"SALT REDUCTION IS HEALTHY, BUT MY INTAKE IS FINE" INTERNATIONAL RESEARCH REVEALS BARRIERS FOR PROGRESS IN SALT REDUCTION.

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Background and objectives: Salt reduction is important for reducing hypertension and risk of cardiovascular events, nevertheless worldwide salt intakes are consistently higher than recommendations. Consequently strategies to reduce intake are required, however effective strategies require an understanding of salt intake behaviours, and limited information is available on this. As such, a multinational study was conducted to derive knowledge on salt intake and salt reduction characteristics and behaviours in the general population.

Methods: Participants, aged 18-65years, were recruited from Germany, Austria, Hungary, India, China, South Africa, and Brazil (n=5, 987: stratified by age-group and gender). Information was collected on: salt intake and openness to change, perceptions of intake and key sources of salt, knowledge of intake recommendations, beliefs and attitudes towards salt reduction, responsibility and communication preferences.

Results: While salt reduction was seen as important and healthy, over one third of participants were not interested in salt reduction and the majority were unaware of recommendations. Salt intake was largely underestimated, and there was a lack of awareness of the sources of dietary salt. Across all countries participants saw themselves as the main person responsible for their salt intake, but also acknowledged the role of a variety of key players. In order to improve salt reduction participants wanted to learn more about why salt was bad for health, and what the main sources in the diet were.

Conclusions: Strategies to reduce salt intake need to raise interest in engaging in salt reduction – through improving awareness, and increasing understanding of levels of intake and sources of salt in the diet. Similarities and differences were noted between the countries, indicating that while some aspects of salt reduction can be globally implemented, local tailoring is required to match the stage of salt reduction that the population is in.

Key words: salt reduction, cardiovascular disease, behaviour.

PO1276

DELPHI METHOD TO IDENTIFY EDUCATIONAL MATERIALS ON HEALTHY FOOD FOR TEACHERS, SCHOOL-AGE CHILDREN AND THEIR PARENTS.

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Background and objectives: Delphi method applied to get expert consensus about healthy food topics to include in educational materials for preschool and school-age children, their parents and teachers is described.

Methods: The questionnaire was developed with the results of surveys and focus groups in children, parents and teachers made previously in a research project. The questionnaire was mailed to 54 experts in nutrition, education and communication in a first round. The results were analyzed and forwarded in a second round with the subjects without consensus with 38 responses.

Results: The cycle was completed by a validation conducted through a questionnaire with two groups of teachers and two groups of parents (total 20 parents and 23 teachers). Results prioritized audiovisual educational materials on the writings, favoring participatory activities such as cooking workshops, games, activities over the passive, such as information at parent meetings, delivery of educational materials and conferences of experts. There was consensus on education in health behaviors such as not giving them money to carry to school for buying non healthy snacks, make healthy food choices on family outings and recreational activities associated with healthy eating during weekends; prefer healthy food prepared at home instead of the processed food; restrict eating out candy and prefer family meals without watching TV and food instead of taking a snack in the evening.

Conclusions: These results are critical to design educational materials on healthy eating plans to change current eating

habits that are contributing significantly to increase childhood obesity. Acknowledgements: This study was funded by FONDECYT project Nº 1110044.

Key words: Delphi method, healthy eating, nutrition education, eating habits.

PO1277

CONSUMPTION OF MACRO AND MICRONUTRIENTS IN CHILDREN BETWEEN 6 AND 23 MONTHS OF AGE IN THE HIGHLANDS OF PERU

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Background and objectives: The period of infant growth between 6 and 23 months is critical in developing countries, with high prevalence of chronic malnutrition and iron deficiency anaemia. Investigations on food consumption in the Andean region are not common despite their importance for food and nutrition policy formation. This study examines the extent to which macro and micronutrient consumption levels compare with standard requirements in the province of Vilcashuaman, Ayacucho, in Peru.

Methods: The study is descriptive, using a random subsample of 50 conglomerates (one child per conglomerate), which belong to a multistage stratified probabilistic sample, by conglomerate, with a level of confidence of 95% and 5.08% maximum error. A food consumption survey was applied, combining the 24 hour recall method and direct weighing of food portions, from January to March, with mothers as informants.

Results: 3 age groups are presented, from 6 to 8, from 9 to 11 and from 12 to 23 months of age, and intake from complementary foods is considered. Average calorie consumption was 186 Kcal/day; 310 Kcal/day, and 517 Kcal/day respectively, and that of protein was 5.54 g/day; 9.2 g/day and 15.1g/day respectively. Average iron consumption was 1.8 g/day, 2.6 g/day and 4.4 g/day respectively, and that of vitamin A was 525.6 RE/day; 252.8 RE/day and 320.8 RE/day respectively. Considering that food consumption of these age groups also includes a portion of breast milk, 38% of children manage to cover their caloric requirements, 82% cover recommended protein levels, 12% those of iron, and 66% those of vitamin A.

Conclusions: A high percentage of children from 6 to 23 months of age in rural areas show deficient consumption of calories and iron, as well as protein and vitamin A deficiencies, which impede proper child growth and development.

Key words: calories, protein, iron, vitamin A, rural.

PO1278

IRON DEFICIENCY ANAEMIA IN CHILDREN IN RURAL DISTRICTS OF PERU

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Background and objectives: Iron deficiency anaemia is a severe public health problem in Peru. Few studies have investigated the situation in rural areas. This study examines anaemia and associated factors in 4 rural districts in the region of Ayacucho.

Methods: The study is descriptive and analytic, with a two stage probabilistic sample with a level of confidence of 95% and 5% accuracy. Hemoglobin levels in 297 children from 6 to 35 months were measured with a HemoCue® photometer hemoglobin detection system, with adjustments for altitude. A survey and qualitative recall for child food consumption for the previous day were implemented.

Results: 74% of children from 6 to 35 months suffer from iron deficiency anaemia (<11 g/dl Hb). The prevalence is higher in those from 6 to 12 months (90%). In relation to mothers' knowledge, 83% do not know the causes and consequences of anaemia and 92% do not know preventative measures. Regarding food consumption, 45% of children ingested food rich in iron, 8% consumed an iron-absorption enhancer and 53.2% consumed iron-absorption inhibitors, mainly herbal teas. The study identified less anaemia in children whose mothers work for income compared to those whose mothers do not (67% vs 77%; p=0.001). Within the group of anaemic children rates of moderate and severe anaemia were higher for those whose mothers do not know preventative measures (65% vs 46%; p=0.02), those who do not consume enhancers (67% vs 36%; p=0.000) and those who do consume inhibitors (72% vs 55%; p=0.000).

Conclusions: Iron deficiency anaemia in children under three is high in rural areas. Factors associated with the prevalence of anaemia are the child's age and the mother's participation in salaried work. Factors associated with the severity of anaemia are knowledge regarding preventative measures, and consumption of enhancers and inhibitors.

Key words: anaemia, rural, enhancers, inhibitors.

PO1279

REVIEW OF FOOD-BASED DIETARY GUIDELINES IN LATIN AMERICA AND THE CARIBBEAN AND EMERGING RECOMMENDATIONS

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Background and objectives: Food-Based Dietary Guidelines (FBDG) are important in the promotion of healthy diets and lifestyles and can play a critical role in countries' efforts to improve dietary patterns and public health. FAO carried out a study to assess progress made by Latin America and Caribbean (LAC) countries in the development, implementation and evaluation of FBDG.

Methods: National responsible officers for FBDG in 33 countries were requested to complete a questionnaire and provide their published FBDG. This was supplemented by a literature review to evaluate information relating to the implementation and evaluation of FBDG in LAC.

Results: Twenty-four countries in the LAC region have developed FBDG; to date 11 have revised them, messages show a shift in orientation from addressing undernutrition and micronutrient malnutrition to obesity and NCDs, with frequent focus of messages on: 'maintain a healthy weight', 'reduce salt or fat consumption', reflecting the nutrition transition that the region is experiencing. Often guidelines use ambigous terms (i.e. increase/decrease consumption) and do not specify quantities and portion sizes, making it difficult for people to put them into practice. While most countries (15) have implementation plans, these are not comprehensive enough and lack the necessary political and financial support to reach the public at large. FBDG are rarely evaluated thus their impact remains unknown; also the published literature on implementation in the LAC region is very limited. Some LAC countries are initiating novel approaches through integrating FBDG into a broader health promotion strategies (e.g. Chile "Elige Vivir Sano" program) involving diverse sectors backed up by high level political support.

Conclusions: To halt the rising tide of obesity and NCDs, improvements are needed in the implementation and evaluation of FBDG. Emerging recommendations are discussed for consideration by countries when updating their FBDG.

Key words: Food-Based-Dietary-Guidelines, healthy diets and lifestyles, NCDs prevention.

PO1280

THE SCHOOL FRUIT SCHEME IMPACT ON FRUITS AND VEGETABLES CONSUMPTION BY CHILDREN IN POLAND.

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Background and objectives: The main objective of evaluating the UE School Fruit Scheme was to determine its impact on the eating habits of children, especially on fruits and vegetables consumption.

Methods: The evaluation of the School Fruit Scheme was performed among third-grade pupils (9 years old) from 58 randomly selected primary schools before launching the distribution of fruit and vegetables (October 2010) and at the end of the fruits and vegetables distribution period (May-June 2011). The study was conducted in schools participating in the School Fruit Scheme (intervention group) and in schools not participating in the Scheme (control group). Evaluation of fruits and vegetables consumption was based on the 3-day food record method.

Results: At the end of the School Fruit Scheme, fruits consumption, vegetables consumption and total fruits and vegetables consumption on school days and weekends days was significantly higher in the intervention group than in the control group but was still under recommendations. At the end of the Scheme the total consumption of fruit and vegetables on school days in the intervention group was 21% higher in comparison to the control group.

Conclusions: The evaluation results show that the Scheme has a very strong potential and is an appropriate tool to improve the eating habits of children towards consuming more fruit and vegetables for the future.

Key words: intervention, school, fruits vegetables consumption, children, public health.

PO1281

THE SCHOOL FRUIT SCHEME IMPACT ON SELECTED NUTRITION BEHAVIOURS OF PARENTS IN POLAND.

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Background and objectives: The main objective was to determine the UE School Fruit Scheme impact on the nutrition behaviours of parents especially their attitudes towards child nutrition.

Methods: The analysis was performed among third-grade pupils (9 years old) from 58 randomly selected primary schools before launching the distribution of fruits and vegetables (October 2010) and at the end of the fruits and vegetables distribution period (May-June 2011). The study was conducted in schools participating in the Scheme (intervention group) and in schools not participating in the Scheme (control group). The analysis of parents habits was undertaken by means of a children's questionnaire.

Results: After the intervention, children from the group participating in the Scheme significantly statistically more often responded that their parents encouraged them to eat vegetables (p<0, 0001) and to eat fruit (p<0, 0001) daily or almost every day. A child's participation in the School Fruit Scheme may have had a positive effect on its parents' behaviour and on encouraging parents to more frequently remind their children about eating vegetables/fruits. Positive changes related to children bringing vegetables to school were observed only in the group participating in the School Fruit Scheme (11.7% before the Scheme vs 18.6% towards the end of the Scheme; p<0, 0001). The mean calculated on the basis of answers reflecting the frequency of providing children with prepared, ready-to-eat sliced fruit between meals was significantly greater in the intervention group than in the control group after the Scheme's completion (p=0, 03).

Conclusions: The Scheme influenced some of the parents' dietary habits, especially their attitudes towards child nutrition e.g. encouraging children more frequently to eat fruits and vegetables, serving children sliced fruit between meals more frequently or packing vegetables into children's lunchboxes more frequently.

Key words: intervention, fruits and vegetables, schools, nutrition behaviours, parents.

PO1282

FOOD KNOWLEDGE AND FOOD CONSUMPTION IN SCHOOL-AGE CHILDREN, PARENTS AND TEACHERS: A COMPARATIVE ANALYSIS

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Background and objectives: The objective was to conduct a comparative analysis about food knowledge and food consumption in pre-school and school-age children, their parents and teachers, to establish a baseline for a nutrition education intervention model in schools.

Methods: Surveys were conducted to pre-school and school-age children, their parents and teachers about healthy and non healthy food knowledge and food consumption.

Results: showed an excellent healthy food knowledge and food consumption in children (100% recognized fish, fruits and vegetables as healthy food). In parents, despite a good knowledge about healthy food, consumption was unhealthy: 30.8% of pre-school parents drank more than 2 soft drinks per day, compared to 64.7% of basic school parents (p<0.001). Teacher's food consumption was also unhealthy: 64% ate more than two portions of bread per day, 36% salty snacks and 64% sweet snacks during the week, and 55% consumed hamburguer or pizzas at least twice per week. Distribution of food during the day showed that 98% of parents had breakfast; 96% had lunch, and 77% had an afternoon snack with a lot of bread and soft drinks, and just 55% had dinner. 69% of pre-school age parents ate dinner compared to 44% of school-age parents (p<0.01). Pre-school age parents did not give money to their children to buy snacks at the school; however, a third of the school-age parents gave money to their children (p<0.05). This fact demonstrates a major care for healthy food in pre-school age children that is not maintained during the first school grades.

Conclusions: This study shows how to design nutrition education programs, considering the present food knowledge and food consumption of pre-school and school age children, their parents and teachers. Acknowledgements: This study was funded by FONDECYT project Nº 1110044.

Key words: food knowledge, food consumption, nutrition education, school food programs.

PO1283

HOSPITAL SUPPORT FOR MALNOURISHED CHILDREN

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Background and objectives: Malnutrition which is a consequence of disease and inadequate food intake is one of the main problems of health and well-being affecting children 6 to 59 months in Burkina Faso. The objective of this study is: determining provenance geographic and social of ill children, identify health structures which refer the malnourished children at the Saint Camille CREN.

Methods: it is a longitudinal study which focused on data of 60 children in nutritional rehabilitation at the medical center CREN Saint Camille. For the collection of data, two methods have been used: individual maintenance where individual informed consent has been asked to all the mothers of the children and observation.

Results: During the study period, the annual average of the admission is 600 children. The classic excess morbidity of women has been found (52% of girls compared with 48% of boys). The socio-economic level of the mothers it appears that 80% do not have a job or access to a regular income. The low income of the parents and their lack of knowledge of the nutritional needs of the children explain the maximum recruitment of the malnourished in these groups. Dietary therapy cured rate is 86.7% for an average length of stay of 28 ± 6 days. They have on average 6, 8 g / kg/day during the stay at the CREN. Ignorance, poverty and family difficulties prevent the parents to provide the child malnutrition, care and adequate food.

Conclusions: It is very important that persons dealing with children have appropriate recommendations for infant and young child, and both illness feeding, they know the path to follow for the management of malnourished.

Key words: Support, malnutrition, Burkina Faso.

PO1284

DO WE NEED TO CORRECT SERUM FERRITIN FOR INFLAMMATION TO ASSESS IRON DEFICIENCY IN OBESITY-RIDDEN SETTINGS? EXAMPLE IN URBAN MOROCCO

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Background and objectives: Many developing countries are already facing high levels of overweight/obesity, along with still high levels of iron deficiency (ID). Although causes of inflammation as infectious/malaria/parasitic diseases are no longer widespread, new reasons to correct serum ferritin (SF) concentrations, such as adiposity-induced inflammation, should be taken into consideration. Objective was to assess the extent of underreporting of ID when using uncorrected SF vs. corrected SF according to adiposity.

Methods: A cross-sectional survey in the area of Rabat used a random sample of 811 women aged 20-49y. Corrected SF was SFx0.65 when inflammation (C-reactive protein>5mg/L). ID was SF<15µg/L. Adiposity was assessed by BMI (normal BMI<25, pre-obese 25<BMI<30, obese BMI>30 kg/m2), waist circumference and body fat. Differential effect of SF correction on ID status based on adiposity was assessed by models including adiposity x correction interactions and accounting for repeated measurements.

Results: Prevalence of pre-obesity was 33.0%, of obesity 34.0% and of inflammation 26.7%. Adjusted for socio-demographics or not, inflammation was strongly linked with adiposity (9.6%, 23.7% and 46.1% in normal, pre-obese and obese subjects, respectively, P<0.0001). Not correcting SF underestimated prevalence of ID (37.2% vs. 42.1%; difference=-4.9%, P<0.0001). The difference increased with adiposity (-1.3%, -4.3% and -9.1% in normal, pre-obese and obese subjects, interaction P=0.0002). False negative ID cases (SF not corrected vs. corrected) reached 22.4% in obese women vs. 3.0% in normal-BMI. Analogous results were observed for other adiposity measures.

Conclusions: Using corrected SF avoided failure to detect ID in about one woman out of five because she was obese. In

middle-income countries concerned by ID and obesity, assessment of ID with a single indicator still needs to use corrected SF even if infectious diseases are no longer widespread but because overweight/obesity has become the main cause of inflammation.

Key words: Adiposity-induced inflammation; Women; North Africa; Health/nutrition transition.

PO1285

NUTRITIONAL STATUS IN THE CUBAN POPULATION MORE THAN 15 YEARS OLD OF THE III NATIONAL SURVEY OF RISK FACTORS

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Background and objectives: The world-wide tendency of the body weight and adiposity increase promotes the population studies in different countries.

Methods: Data of the Body Mass Index and the Waist/Hip ratio obtained from a complex sample design by multi-stage conglomerates, in men and women of III the National Survey of Factors of Risk carried out in Cuba, older than 15 years. The nutritional status in the urban and rural zone of the country was evaluated. Objectives: Analyze the changes of the nutritional status in Cuban population by ages, sex, zone of residence and other socio demographic characteristics.

Results: Lower body weight is present in the 7, 6% [IC: 6, 9-8, 3] of the total population, normal weight is 47, 6% [IC: 46, 2-48, 9]. The 44, 8% [IC: 43, 4-46, 3] of global overweight and the 15, 0% [IC: 14, 0-16, 1] of the obesity, indicate that the excess of body weight has been increased in Cuba in the last decade. The global overweight in men (41.16% [IC: 39.2-43.1]) is less than in women (48.3% [IC: 46.6-50.0]), to expenses mainly of a higher prevalence of the obesity in these last ones. Approximately a quarter of the population has a greater proportion of body fat deposited around the waist, more elevated in feminine sex; the risk for a waist increased by central adiposity excess exists even with normal weight. The higher percentage of overweight appears in people with university instruction and married, of different labor activities. Higher prevalence of overweight and obesity in the urban zone stand out.

Conclusions: The Cuban population has reduced its prevalence of low weight, but it was increased the obesity in the last years significantly.

Key words: Nutritional status, Obesity, Risk Factors.

PO1286

EVIDENCE FOR A NEED TO REVIEW CURRENT RECOMMENDATIONS: SEDENTARY BEHAVIOUR AND PHYSICAL ACTIVITY IN URBAN SOUTH ASIAN WOMEN

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Background and objectives: Despite Asians being at a higher risk of type 2 diabetes mellitus than non Asians, the relative effects of physical activity and sedentary behaviours on glycaemic status among South Asians are unclear. Our aims were to describe physical activity and sedentary behaviours in urban Sri Lankan women of South Asian ancestry, and examine their relative contribution to glycaemic status.

Methods: 2800 women (30-45 years) from urban Colombo were selected by random cluster sampling and screened for dysglycaemia. All newly diagnosed drug naive dysglycaemics (n=272) were recruited, and a further 345 normoglycaemic women were randomly selected from each cluster. Glycaemic status was confirmed by HbA1c. Physical activity and sedentary behaviours were assessed by International Physical Activity Questionnaire (IPAQ). TV viewing time, demographic data, diet and anthropometry were recorded. Contribution of variables to dysglycaemia was assessed through logistic regression analysis.

Results: Mean energy expenditure on walking (2648.5 ± 1023.7 MET-min/week) and on moderate and vigorous physical activity (4342.3 ± 1768.1 MET-min/week) for normoglycemic and dysglycaemic women (walking;1046.4 ± 728.4, moderate and vigorous physical activity; 1086.7 ± 1184.4 MET-min/week) exceeded WHO recommendations. 94.3% spent > 1000 MET-minutes/week on physical activity. Mean sitting and TV time for normoglycaemic and dysglycaemic women were 154.3 ± 62.8, 38.4 ± 31.9, 312.6 ± 116.7 and 140.2 ± 56.5 minutes/day respectively. Both, physical activity and sedentary behaviour contributed to dysglycaemia, after adjusting for family history, diet, systolic blood pressure and BMI.

Conclusions: Although compared to recommendations, physical activity was high and sedentary behaviours were low, both were associated with glycaemic status. Urban South Asian women are at risk of dysglycaemia at lower levels of sedentary behaviour and greater physical activity than western popula-

tions, indicating the need to re-visit current classifications in physical activity guidelines for South Asians.

Key words: Physical activity, sedentary behaviour, Asia.

PO1287

EFFECTS OF ECONOMIC TRANSITION ON DIETARY FAT INTAKE AMONG CHINESE ADULTS

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Background and objectives: To explore effects of economic changes on dietary fat intake among Chinese adults.

Methods: Data of the China Health and Nutrition Survey from 1991 to 2009 were used. Dietary data were collected by using 3 consecutive 24-hour recalls in combination with weighing methods. Tertiles of urbanization scales and per capita annual household income were used to measure economic changes over time.

Results: Average fat intake among Chinese adults increased from 62.7 grams/day (g/d) in 1991 to 77.2 g/d in 2009. Fat intake increased faster in low urbanization group (from 54.0 g/d to 72.1 g/d) than in high urbanization group (from 72.1 g/d to 80.8 g/d). It was increasing constantly in low urbanization group while it increased before 2000 and declined thereafter in high urbanization group. More than half of Chinese adults consumed 30% or more energy from fat, including 39.8% population in low urbanization group and 47.6% in low income group in 2009. The patterns and trends were similar among income and urbanization tertiles.

Conclusions: This study presents extra evidence that increased income is pushing Chinese adults away from traditional low-fat diet to high-fat diet, particularly in low income and urbanization populations.

Key words: fat intake, urbanization, income.

PO1288

CONSUMER ACCEPTABILITY AND EFFECTIVENESS OF SIX MENU CALORIE LABELING FORMATS ON FOOD CHOICES USING MOBILE TABLET TECHNOLOGY

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Background and objectives: In an effort to reduce national obesity epidemic, placement of calorie information on restaurant menus has been approved as national law in certain countries. With increasing proportions of foods consumed away from home, such legislation serve to provide simplified and visible nutrition information at points of purchase. This study aimed to determine the most acceptable and effective nutrition labeling format for use in restaurant settings.

Methods: Using mobile tablet technology, five different nutrition labeling formats were tested including combinations of numeric calorie labels, Traffic Light (TL) system and % Daily Intake system (%DI), plus a control group without calorie information. Using a local restaurant menu, 126 participants made their food selection and completed a post selection questionnaire on perceived attractiveness and influence of each labeling formats on their food decision process. Each participant was exposed to a single labeling format and calorie content of each participant's selection was calculated to determine actual impact of calorie labeling on food choices.

Results: Overall participants indicated a strong support for inclusion of nutrition information on restaurant menus using tablet technology. Comparisons of different labeling format using One way ANOVA indicated a significant overall difference between labeling groups in terms of attractiveness $F(4, 100) = 4.353$, $p=.003$. The response for attractiveness was highest amongst TL color coding groups. The attractiveness was significantly increased if color coding was combined with %DI information. The results revealed a positive correlation between attractiveness and perceived influence on food choice for the TL groups. ($r=0.712$, $p<0.001$). The findings indicated no significant effect of calorie labeling on total calories selected.

Conclusions: Tablet technology can be used to provide valuable nutrition transparency to consumers, in a format that's easy to understand and use while making food decisions in restaurant settings.

Key words: Menu calorie labeling, food choice, technology

PO1289

SEASONAL CHANGES IN IRON AND VITAMIN A STATUS AMONG WOMEN IN RURAL SOUTH-EAST PERU

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Background and objectives: Dietary diversity (DD) is a long term strategy to tackle micronutrient deficiencies in resource-poor populations but may be influenced by seasonal food availability. In isolated regions, qualitative food scores are a proxy indicator of diet quality. In this context, micronutrient status based on biochemical data also needs to be assessed using field-friendly methods. Objective: A) To assess iron and vitamin A status, and DD and their seasonal changes among women of childbearing age in the post-harvest (post-S) and farming season (farm-S). B) To examine whether the micronutrient status is associated with DD.

Methods: A repeated cross sectional study was carried out with 167 women aged 15 – 49 in post-S and 157 in farm-S during 2007. DD was assessed with a qualitative 24h recall in each season. Haemoglobin (Hb) and soluble transferrin receptor (sTfR) for iron status, retinol binding protein (RBP) for VA status, and inflammation indicators were measured using dried blood spot assays.

Results: Prevalence of anemia was 51.4% and 43.6% in each season, but only 12.6% and 4.0% of the women had a low iron status, respectively. Vitamin A status was marginal in 11.5% and 28.2% of the women. A significant seasonal decrease in sTfR (amelioration of the iron status) and RBP (impaired VA status) concentrations could be identified. Two women had VAD (2.8%) in farm S. Lower DD was associated with lower Hb concentrations, while animal source foods (ASF) were correlated with higher Hb and RBP levels ($p < 0.05$), and gathering of herbs with better VA status ($p < 0.01$)in post-S only.

Conclusions: Anemia in this population is still highly prevalent and might not be related to iron deficiency only. Seasonality alters iron and VA status. Even qualitative dietary assessments detected an association between consumption patterns and nutritional status.

Key words: anemia, dietary diversity, vitamin A.

PO1290

LOGIC MODEL OF THE INITIATIVE LINKING THE BRAZILIAN NATIONAL SCHOOL FEEDING PROGRAMME AND FAMILY FARMING

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Background and objectives: The application of logic models in the evaluation of process and outcomes of public policies is highly recommended. The Brazilian National School Feeding Program (PNAE) has more than 50 years of existence and to date, there is no knowledge of the development of logic models to support it. The program has undergone important changes, one them being the strong connection with family farming. Since 2009, with the implementation of the Law 11.947, at least 30% of the resources transferred to the states and municipalities for PNAE should be used in the procurement of foods directly from family farmers. The implementation of this initiative is underway and it is important to evaluate how the process is taking place and its possible effects in schools and for local producers. The objective was to build a logic model focusing on the initiative linking PNAE with family farming.

Methods: Key informants who participated in the drafting of the Law were interviewed. Information on the origin, objectives, target audience, actions implemented and expected results of the initiative were collected, analyzed and systematized.

Results: The information obtained subsidized the development of a graphical representation of the logic model (which will be presented in the event) which allowed the identification of the main components of the initiative linking PNAE and family farmers, in an articulated way. It also allowed the systematization of the expected results, supporting the identification of intermediate and final results, and direct and indirect effects, both for schools and students, as for local farmers.

Conclusions: The development of the logic model has been important to identify the main elements of this initiative and has helped in the identification of the best performance indicators to use in its process and outcome evaluation.

Key words: Evaluation, logic model, PNAE, school feeding, family farming.

PO1291

PREVALENCE OF INADEQUATE INTAKE OF FOLATE IN BRAZIL AFTER MANDATORY FORTIFICATION: RESULTS FROM THE FIRST NATIONAL DIETARY SURVEY

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Background and objectives: evidence that folic acid decreases the incidence of neural tube defects led to mandatory food fortification in more than 50 countries, including Brazil. Our aims were to estimate the prevalence of folate inadequacy (POFI) according to life-stage and socio educational status.

Methods: data from two non-consecutive food records from the National Dietary Survey/Household Budget Survey (HBS) 2008-2009 (33, 004 individuals over 10 years old) were used to estimate the usual dietary intake amounts of folate in mcg DFE - dietary folate equivalents, using the National Cancer Institute method to account for within person variance and the EAR (Estimated Average Requirement) cut-point method was used to calculate the POFI.

Results: Overall POFI was 29.3%. In women of childbearing age, the POFI was 36.7%, and in women over 50 y was higher than 40%. In men, POFI ranged from 14% in the youngest to 36% in the eldest group. The median intake of folate was < 400 mcg for women in all age groups. The 95th percentile of folate intake was 740 mcg.

Conclusions: In Brazil, public policy aiming to prevent POFI

has been achieving positive results. Fortification with folate enhanced folate intake in all sex age groups, while maintaining the intake in a safe range. However, our data suggest that further actions need to be taken to assure that women in childbearing age accomplish the recommended intake of 400 mcg/d.

Key words: folate, folic acid, food fortification, survey.

PO1292

FOLATE AND OTHER ONE CARBON METABOLISM RELATED NUTRIENTS AND RISK OF BREAST CANCER

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Background and objectives: Adequate intake of folate appears to protect against cancer, however, it might act as a cancer promoting agent under circumstances of excessive intake. We conduct a systematic review and meta-analysis of the relationship between folate and metabolically related vitamins B12 and B6 and breast cancer.

Methods: Seventeen cohort studies, identified from a Pubmed search up to December 2012, presented results on folate, B12 and B6 and breast cancer risk. Summary relative risks estimates (RR) and 95% Confidence Intervals (CI) for the highest versus the lowest level (HxL) and for linear dose–response analysis were estimated using a random effects model.

Results: Total folate intake ranged from 45 to 1082 mcg/d. Intake of dietary folate and folic acid supplements were not related to breast cancer risk. The summary relative risks per 100 mcg/d intake increase were 1.00 (95% CI: 0.99, 1.02; I2: 56%) for dietary and supplemental folate and 0.98 (95% CI: 0.95, 1.02; I2:56%) for dietary folate. The RR for 2ng/ml/d increase in blood levels was 1.00 (95% CI: 0.93, 1.09; I2: 64%). No association was observed in HxL meta-analysis. The analysis for B12 (dietary, supplemental and blood levels) and B6 intake yielded null results. Stratified analysis for total folate by folate intake level, age at first birth, parity, familial cancer, alcohol intake, smoking, BMI and energy intake displayed no significant associations.

Conclusions: The reviewed evidence does not support the hypothesis of an effect of folate, B12 and B6 vitamins on breast cancer incidence. Acknowledgement: TN, DC, AV have been funded by the World Cancer Research Fund International (Grant number: 2007/SPO1). DMLM, by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (Grant no. 202537/2011-0). The views expressed are the opinions of the authors. They may not represent the views of the funders.

Key words: breast cancer, folate, meta-analysis, B vitamins.

PO1293

IT'S UTILIZATION, NOT SPATIAL ACCESS TO FOOD STORES THAT MATTERS, ESPECIALLY IN RURAL AREAS

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Background and objectives: With a few notable exceptions, the majority of food environment research is urban-centric and has not ventured into unincorporated and rural areas. Furthermore, much of the research on the environmental determinants of food choice and dietary intake focuses on spatial access to the retail food environment, especially larger supermarkets. However, distance to a food store alone may not reveal the way in which individuals interact with the food environment. Thus, the question becomes not one of estimating spatial access defined as distance, but what patterns of utilization exist? And, how does utilization vary within an area?.

Methods: Two 2006 datasets were linked: 1) a community health assessment of 1, 169 adults in six rural Central Texas counties (demographics, perceived community food environment, food security, location of store where most groceries were purchased, and travel for medical/dental services) and 2) ground-truthed identification and geocoding of all supermarkets and convenience stores in the 11, 567 km2 region. Analyses included descriptive statistics, correlations, and hierarchical regression analyses for grocery purchases outside the 6-county region compared with shopping within the region.

Results: 34% of survey participants shopped outside the 6-county region. The odds for shopping outside the region were greater for adults who could not afford to eat balanced meals, traveled a greater distance for multiple services, and lived greater than 14.4 miles to the nearest large supermarket.

Conclusions: Although the nearest food store that marketed fresh and canned fruits and vegetables was located within the 6-county region, more than one-third of participants shopped outside the region and many combined shopping trips with traveling outside the region for medical and dental services. Understanding environmental influences on dietary health must go beyond potential spatial access and take into consideration patterns and determinants of utilization.

Key words: food environment, food store utilization, rural.

PO1294

NIGERIAN WOMEN PARTICIPATING IN AN INTEGRATED MICROCREDIT AND mHEALTH BREASTFEEDING PROMOTION INTERVENTION WERE MORE LIKELY TO ADOPT INTERNATIONAL BREASTFEEDING RECOMMENDATIONS

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Background and objectives: International breastfeeding recommendations are intended to reduce morbidity and mortality in infants living in resource-limited settings. Only a small proportion of mothers in northern Nigeria follow the guidelines. This study tested if providing group breastfeeding counseling during routine microcredit meetings and sending cell phone breastfeeding messages would promote recommended breastfeeding practices in Bauchi state, Nigeria.

Methods: We conducted a cluster-randomized controlled trial within the context of women's microcredit. Several small groups of microcredit clients (with 5-6 women) met together monthly with their credit officer, who conducted seven monthly breastfeeding learning sessions with them. Randomization occurred at the level of the monthly meeting groups. Text and voice messages were sent out weekly to a cell phone provided to each small group. Pregnant clients were recruited at baseline and interviewed again when their infants were >6 months. Logistic regression models adjusted for clustering were used to estimate the odds of performing behaviors in the intervention versus control group.

Results: Among the women who completed the final survey (n=390), there were no significant differences in breastfeeding intentions at baseline. Post-intervention, reported practices were:exclusive breastfeeding to six months (51% intervention, 34% control); initiation of breastfeeding within one hour of delivery (70% intervention, 47% control); and giving fluids other than milk during the first three days of life (14% intervention, 30% control). The odds of exclusive breastfeeding (OR 2.4, 95% CI 1.4, 4.0) and timely breastfeeding initiation (OR 2.6, 95% CI 1.6, 4.1) were increased while the odds of giving non-breastmilk fluids in the first days of life (OR 0.4, 95% CI 0.2, 0.7) were decreased in the intervention versus control group.

Conclusions: A face-to-face and mhealth breastfeeding promotion intervention provided in the context of microcredit increased the likelihood that women adopted recommended breastfeeding practices.

Key words: breastfeeding, microcredit, mhealth.

PO1295

VITAMIN D INTAKES OF CHILDREN DIFFER BY INCOME AND RACE/ETHNICITY IN THE UNITED STATES, 2007 TO 2010

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Background and objectives: Vitamin D status is a public health concern in the United States (U.S.), and differences in vitamin D intake may contribute to health disparities of children from different race/ethnic groups. Mehotds: Total, dietary and supplemental vitamin D intakes of 6226 children age 1 to 18 years in the U.S. were estimated and compared by income (low, medium, high) and race/ethnicity. Vitamin D intake was estimated utilizing 24-h dietary intake recalls and dietary supplement use questionnaires from the 2007-2010 National Health and Nutrition Examination Survey. Statistical analyses of weighted data were performed using SAS (V 9.2) to estimate vitamin D intake (means ± SE).

Results: The race/ethnic distribution of children was 62% Non-Hispanic (NH) White, 23% Hispanic, and 15% NH Blacks. One-third of the children (33% ± 1.6) were in the low income category. Race and ethnic intake differences controlling for income, gender and age were assessed by ANCOVA. Total (dietary and supplement) vitamin D intake was greater in the high (7.9 ± 0.3 ug/d) income versus the low (7.2 ± 0.2 ug/d) income category. Total vitamin D intake of Non-Hispanic (NH) White children (8.1 ± 0.2 ug/d) was greater than Hispanic children (7.5 ± 0.1 ug/d) and NH Black children (5.9 ± 0.2 ug/d) (P <0.05). Although supplements were consumed by 80% of the children, the majority (73 % ± 0.9) were not meeting the Estimated Average Requirement for vitamin D from diet and supplements.

Conclusions: Public health efforts should target health messages especially to Black and Hispanic parents to increase vitamin D intake of children. Sponsored by a Texas Woman's University Chancellor's Research Fellowship grant.

Key words: vitamin D, children, income, ethnicity.

PO1296

METABOLIC SYNDROME IN HEALTHCARE PERSONNEL FROM THE UNIVERSITY OF ANTIOQUIA-COLOMBIA: LATINMETS STUDY

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Background and objectives: Hypertension (HTN), atherogenic dyslipidemia, an increased glycemia in a fasting state, and abdominal obesity (AO), constitute a cluster of risk factors for cardiovascular disease named metabolic syndrome (MS). The objective of this research was to analyze the prevalence and distribution of MS and its components in healthcare personnel from the University of Antioquia.

Methods: Cross-sectional study conducted between 2010 and 2011. The collected data included anthropometrical, biochemical, socio-demographic, and lifestyle variables. The MS was diagnosed using the harmonized IDF/AHA definition. Descriptive and analytical statistical analyses were performed, including Chi2 tests, and α=0.05.

Results: 285 volunteers (29.1% men) with ages between 20-61 years were included. 31.6% of participants were overweight (Body Mass Index BMI higher than 25 kg/m2. AO (29.8%) and HTN (29.8%) were the most frequent components of MS. Global prevalence of MS was 17.5% (95%CI:13.1;22). There was no significant difference between men and women in terms of the prevalence of AO (women 30.7%, men 27.7%; p>0.05), and low HDL (women 28.7%, men 24.1%; p>0.05), but the other diagnostic components were more prevalent in men. Except for the HDL, all the diagnostic components of MS were associated with being overweight by BMI. There was a lower presence of MS among women (OR 0.328; 95%CI:0.175;0.614; p<0.05), and a positive gradient with age and income. Likewise, the prevalence of MS was higher among smokers and those who are overweight (p<0.05). After adjusting for age, MS was associated with sex (OR 0.348; 95%CI: 0.178;0.680) and being overweight (OR 14.592; 95%CI: 6.343;33.570).

Conclusions: The most frequently observed components of MS in the studied sample were AO and HTN. BMI, sex, and socio-economic status are important independent risk factors associated with MS.

Key words: Metabolic syndrome, cardiovascular disease, socio-demographic risk factors, Body Mass Index, healthcare personnel.

PO1297

THE INFORMAS FRAMEWORK FOR MONITORING FOOD MARKETING TO CHILDREN

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Background and objectives: The International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) is setting benchmarks for creating healthy food environments. This paper describes the framework for assessing the extent of children's exposure to food marketing and the nature of these promotions. A standardised framework is needed to allow comparisons between countries, between companies and between different time periods.

Methods: A review of studies measuring the nature and extent of food marketing was undertaken to identify approaches to monitoring across media platforms. This was supplemented with detailed methods used by the authors in national and international monitoring studies since 2007 to describe food marketing across multiple media, including television, print, internet and outdoor advertising.

Results: Food marketing studies indicate children in both high and low/middle income countries are exposed to large volumes of unhealthy food promotions on different media. Active monitoring using a standard assessment tools is currently underway in a range of countries, including China, Mongolia, Malaysia, Philippines and these 2012/3 data will be released. A step-wise approach to monitoring food marketing is proposed, suitable for differing levels of engagement and resources. This framework includes monitoring activities that assess the frequency of food promotions across different media and time points, and measures of persuasive appeal of promotions.

Conclusions: Globally, children are exposed to high volumes of unhealthy food promotions. The monitoring framework proposed here will assist in the implementation of the World Health Organization's set of recommendations on the marketing of foods and non-alcoholic beverages to children, which recognise the need for reducing the impact of unhealthy food marketing to children.

Key words: food; non-alcoholic beverage; marketing; monitoring; public health.

PO1298

MODELLING HEALTH BENEFITS OF FOLIC ACID FORTIFICATION IN NEW ZEALAND

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Background and objectives: Higher intakes of folic acid in women are associated with a decreased risk of neural tube defect affected pregnancies (NTD). Accordingly, many Governments internationally have introduced mandatory folic acid fortification of cereal products. In 2012 the New Zealand government reviewed its folic acid fortification standard. The objective of this study was to estimate the effects of folic acid fortification of bread, in line with two proposed policy options, on the prevalence of NTDs in New Zealand to inform the review.

Methods: Two policy options were compared: mandatory fortification of bread at 140 ug per 100 g of bread; and lower proportions of bread fortified at 200 ug/100 g. A stochastic model was developed to estimate the effect of increased intake of folic acid through fortification of bread on the prevalence of NTDs. Available survey data on bread consumption and serum folate status were used to calculate the change in folate status post-fortification in a simulated population of women. Changes in folate status were applied to published equations to estimate reductions in NTDs from baseline prevalence rates.

Results: Mandatory folic acid fortification of bread, at 140 ug/100g, was estimated to result in a mean reduction of 17 (95%CI 14, 20) NTDs per year. Fortification of 70% of bread at 200 ug/100g resulted in a larger reduction than the equivalent proportion at a lower concentration (140 ug/100g), preventing 15 (95% CI: 13, 17) compared to 9 (95%CI 7, 11) NTDs per year, respectively.

Conclusions: Mandatory fortification had the greatest impact on reducing NTDs. However, fortifying a lower proportion of bread at a higher concentration had a similar impact. The effectiveness of folic acid fortification of bread can be improved either through increasing the proportion of bread fortified or level of fortification.

Key words: folic acid, fortification, neural tube defects.

PO1299

EVALUATION OF A COMMUNICATION STRATEGY ON CENTRAL ADIPOSITY

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Background and objectives: Obesity is increasing in the Republic of Panama, having a fourfold increase in prevalence among adults in the last 26 years. Recent studies revealed that six out of every ten adult Panamanians are overweight and were able to determine the relationship with cardiovascular diseases. A mass media campaign was carried out to increase awareness in the population about the consequences of excess body fat, focusing the communication strategy on central adiposity due to its cardiovascular risk. The objectives of this work were to assess the understanding of the campaign's message, to know the perception and awareness of the population regarding the consequences of central adiposity and to identify the most watched communication media.

Methods: a survey was conducted among 1, 378 persons, with a non-probabilistic sample, by quotas, in all the 9 provinces and the 3 indigenous region of the country.

Results: 75.8% responded having seen or heard the Campaign; among these, 86.5% remembered the message correctly and 99.0% believed that fat around the waist was a health problem. Among those who saw the campaign, 82.5% responded having seen it on television, 23.4% on the radio and 9.6% in billboards.

Conclusions: Mass media campaigns, with well-defined objectives, are able to have an impact on the knowledge about a health problem and its consequences. Television has a high penetration in Panamanian households. Respondents reported having interest in the subject and requested follow-up to the mass media campaign, with topics aimed at decreasing central adiposity.

Key words: 'central adiposity', 'educational campaign in nutrition', 'mass media'.

PO1300

LOW BIRTH WEIGHT: COMPARISON OF TWO BIRTH COHORTS IN SÃO LUIS, NORTHEASTERN BRAZIL, 1997/98 AND 2010

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Background and objectives: To analyze factors associated with LBW in São Luis comparing two birth cohorts with an interval of 12 years.

Methods: 2, 426 births were analyzed in 1997/98 and 5, 040 in 2010. The dependent variable was LBW considered birth weight (<2, 500 g) and without LBW (> 2, 500 g). To verify the association of independent variables and LBW, multiple logistic regression was performed. Data were also obtained from SINASC to analyze stillbirths rate and LBW historical series from 1996 to 2010.

Results: LBW, intra-uterine restriction growth (IURG), preterm birth, maternal smoking and parity rates remained stable. Despite stabilization of LBW rate in the two cohorts, data derived from SINASC showed increasing rates of LBW until 2001 then a decline after that. Significant reduction was observed in rates of small for gestational age, teenage mothers, mothers with up to 4 years of education, family income up to the minimum wage and mothers who did not have prenatal care. There was an increase in mothers over 35 years with 12 or more years of schooling and who underwent prenatal properly. It was also observed a decrease in the rate of stillbirths coinciding with the period of highest elevation in the rate of LBW.

Conclusions: The stability of LBW rate in São Luis can be explained because IUGR and preterm birth rates remained stable in spite of improvement in maternal education, assistance to prenatal and delivery care. However, this apparent stability hides amid increased the period to 2001 and change in the pattern of the components of LBW, because in 2010 increased the proportion of births without LBW, preterm and not without IUGR. The rise and fall in the rate of LBW were parallel to the reduction of the stillbirth rate period, suggesting improvement in medical care.

Key words: Low birth weight. Prematurity. Cohort studies.

PO1301

DIETARY HABITS AMONG PRESCHOOL CHILDREN IN SEVERAL AREAS IN JAPAN

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Background and objectives: Dietary habits during childhood have been widely studied, but epidemiologic data of recent dietary habits are insufficient in Japan, especially that for preschool children. We have planned a detailed dietary survey to examine the recent dietary pattern and other diet-related factors among preschool children living in Japan.

Methods: The survey began in March–June 2012. Subjects were enrolled by the network of society of dietitians and public health center. Their mothers and/or guardians (i.e., the person who prepared the child's diet) completed a questionnaire and dietary records. The questionnaire included questions about the child's physique, meal frequency, eating-out habits, use of supplements, and precooked/instant foods. It also included questions about the children's family, such as household income, number of family members, number of siblings, and characteristics of the mother and/or guardian (age, occupation, and education).

Results: A total of 467 children, aged 2–6 years and living in 13 prefectures in Japan (Hokkaido, Iwate, Miyagi, Gunma, Niigata, Ishikawa, Chiba, Tokyo, Kanagawa, Hyogo, Hiroshima, Kochi, and Kagoshima) participated in this study. Briefly, the characteristics of the mother and/or guardian as follows: median age was 36 years (range, 22 –60 years), 53% were full-time housewives, 71% graduated from a university or college, 46% had an annual household income of 4–8 million yen. Additionally, almost 98% children had breakfast every day, 50% ate out less than once per week, 62% ate precooked foods almost once a month, and 7.2% used supplements.

Conclusions: We conducted a survey to reveal the recent dietary habits among preschool children. Basic data collected from several areas are apparently insufficient in Japan. This study provides useful epidemiologic data. Acknowledgements: This study was supported by research grants from Advanced Research Programs in National Institute for Environmental Studies, Japan.

Key words: Dietary habit, preschool children, Japan.

PO1302

ELEMENTS OF SOCIAL FRANCHISING IMPROVE THE QUALITY OF INFANT AND YOUNG CHILD FEEDING COUNSELING SERVICES IN GOVERNMENT CLINICS IN VIETNAM

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Background and objectives: Evidence indicates that social franchising improves the quality of health services in developing countries but this approach has not been tested for nutrition services. Under the Alive & Thrive (A&T) initiative, elements of social franchising, particularly, standardized and branded services for infant and young child feeding (IYCF) counseling were introduced in 800 government-owned health centers as the first step towards establishing a social franchise service. This study assessed the role of the A&T interventions in shaping the quality of the counseling facilities and services.

Methods: Using a cluster-randomized design, process-related data were collected 12 months after implementation, to compare A&T-supported facilities (A&T-F, n=20) to standard facilities (SF, n=12) across 3 dimensions of service quality: structure, process and outcome that capture the quality of facilities, service delivery and client perceptions and use. Data collection included facility inventories (n=32), provider surveys (n=96), counseling observations (n=137), client exit interviews (n=137), and in-depth interviews with mothers (n=48).

Results: Structure: A&T-F facilities were more likely to have a well equipped room (65.0% vs. 10.0%) for nutrition counseling than SF. Process: A&T-F providers had slightly better knowledge of optimal IYCF practices, substantially better interpersonal counseling skills and offered longer and more focused counseling sessions. Outcome: While overall utilization was low given the early stage of implementation, utilization by pregnant women was satisfactory at 48.9%, compared with utilization by mothers with older infants (1.4%). Client satisfaction was not different between A&T-F and SF, but users valued the A&T-F facilities for problem solving on feeding issues.

Conclusions: Incorporating elements of social franchising significantly enhances the quality of nutrition counseling services within government primary health facilities. This model has the potential to improve IYCF practices provided utilization of services increases substantially.

Key words: social franchise, counseling, infant and young child feeding practices, quality of care, Vietnam.

PO1303

FATTY ACID INTAKES, PLASMA FATTY ACIDS AND MORTALITY: AN AUSTRALIAN PROSPECTIVE STUDY

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Background and objectives: High intakes of total fat and saturated fat are associated with increased mortality from cardiovascular disease (CVD) and cancer, whereas high intakes of omega-3 may reduce risk of CVD mortality. We aimed to examine the association between intake of major types of fatty acids, plasma polyunsaturated fatty acids and mortality from all causes, CVD, or cancer.

Methods: A 16-year prospective study was conducted in a community-based sample of Australian adults (25–79 years). Mean fatty acid intakes were estimated from food frequency questionnaires collected in 1992, 1994 and 1996. Plasma phospholipid fatty acid levels were measured in 1996. Death data from 1997-2012 were determined from the National Death Index. Hazard ratios (HR) and 95% confidence intervals (95% CI) were calculated according to tertiles of intake and plasma level.

Results: Of 1185 participants, 167 (14%) died during the follow-up period. Causes of death included cancer 60 (5%), CVD 67 (6%) and other causes 60 (5%). After adjusting for confounders, participants with the highest intakes of total fat (HR 2.14; 95% CI 1.08–4.23, p-trend=0.03) and saturated fat (HR 2.38; 95% CI 1.17–4.87, p-trend=0.02) had the highest risks of cancer mortality compared with the lowest tertiles. Intakes of total omega-3, omega-6, eicosapentaenoic (EPA) or docosahexaenoic acid (DHA) were not associated with mortality from any cause. Higher plasma EPA tended to reduce the risk of mortality (HR 0.69; 95% CI 0.46-1.04, p-trend=0.09). No other significant associations were observed.

Conclusions: Increasing intake of total fat and saturated fatty acids increased the risk of cancer mortality whereas high intakes or high plasma concentrations of omega-3 fatty acids did not show any effect. Food sources of fatty acids, omega-3 to omega-6 ratio, sex-specific effects and interaction with history of medical conditions will be explored.

Key words: Fatty acids, mortality, omega-3, omega-6.

PO1304

STOCKPILES AND FOOD SUPPLY AFTER GREAT EAST JAPAN EARTHQUAKE IN FEEDING FACILITIES

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Background and objectives: Public concerns on stockpiles have increased after recent disaster worldwide. The purpose of this study was to clarify the stockpiles of food and drinking water before the Great East Japan Earthquake. In addition, food supply in feeding facilities after the Great East Japan Earthquake was also investigated.

Methods: Questionnaire survey was conducted to dietitians who belong to the Japan Dietetic Association in Iwate, Miyagi and Fukushima prefecture between August and October 2012. The questionnaire included items on types of feeding facilities, stockpiles of food, drinking water and food for special dietary uses (FOSDU) before the Great East Japan Earthquake. Situations of supply of food were also asked by period (within 3 days and 4 days to 1 month after the Great East Japan Earthquake).

Results: The surveys were completed by 435 dietitians (response rate: 21.8%). Dietitians who worked at feeding facilities and answered types of facilities where they belonged were included for analysis. 39.9% of subjects belonged to hospital, 32.5% belonged to facilities for elderly, 12.5% belonged to school and 15.1% belonged to other facilities. More than 70% of subjects in hospital and facilities for elderly answered that they had stockpiles of food and water. In school, 6.3% answered they had stockpiles of food and 23.5% answered they had stockpiles of drinking water. About situations of supply of food, supply of water, rice and vegetables were raised to 70%, but supply of dairy products was 40% within a month after the Great East Japan Earthquake.

Conclusions: Stockpiles of food and drinking water were varied by feeding facilities. Situations of food supply were different depending on food groups. These findings are helpful to consider future stockpiles of feeding facilities.

Key words: stockpiles, food supply, feeding facilities, Great East Japan Earthquake.

PO1305

CHARACTERISTICS OF SOLO-EATING AMONG YOUNG JAPANESE: DIFFERENCES IN MEAL OCCASIONS AND CONTEXTS

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Background and objectives: Recent studies show that solo-eating practice (eating alone) leads people's unhealthy eating behaviors and health outcome, e.g., overeating and depression. However, contexts of solo-eating practices in various meals (i.e., breakfast, lunch, dinner and snacking) have not yet reported. The aim of study is to identify characteristics of solo-eating practice in various meals.

Methods: A total of 753 university students (men 40.2%) who completed questionnaires were analyzed. Solo-eaters were defined by eating alone more than 2 times/day. The relationships with social (e.g., living arrangement, income), lifestyle (e.g., duration of sleep, wake-up/bed time, in/out campus activity, part-time job), psychological (e.g., self-rated health, fear of awareness), and contexts of each solo-eating practices (e.g., occasions, place, duration, and frequency) were examined.

Results: Among participants, 307 solo-eaters (men 41.0%) were identified. In multiple logistic regression analysis, several factors were associated with a high frequency of solo-eating [Odds Ratio (95% Confidence Interval); living alone 4.04 (2.74-5.97), early wake-up (before 6 a.m.) 0.50(0.32-0.80), scholarship recipients 1.73(1.17-2.54), and higher income (> 40,000 yen per month) 1.50 (1.01-2.21), respectively]. For contexts of solo-eating practices, less vegetable eater for breakfast[2.82 (1.31-6.06)], those who always think of meal balance for lunch[2.27 (1.01-5.10)], those who keep eating as long as food is available for dinner [1.93 (1.07-3.48)], and those who snack in less than 5 minutes [1.48 (1.02-2.15)] were significantly associated with solo-eating.

Conclusions: The present study revealed different characteristics for solo eating in meals. This finding provides in-depth understanding of solo-eating practice among young people, and contributes to more effective development of nutrition education guideline.

Key words: Solo-eating (eating alone), Japanese, University student, Food intake

PO1306

ABDOMINAL OBESITY ASSOCIATED TO FOOD INSECURITY IN YOUNG ADULTS FROM TABASCO, MEXICO

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Background and objectives: Food security, FS is a high priority issue for all nations, its main objective is to promote physical and economic access to safe and nutritious food in order to cover specific needs for an active and healthy lifestyle. A menace to food security is the failure of a sufficient supply and availability of adequate food which can generates a food gap between supply and demand. Globalization has helped to close such gap, especially in urban areas; however, access to certain foods may not be suitable for healthy eating, for example food offered at coffee shops of universities. The globalizing phenomenon increase diseases such as metabolic syndrome and abdominal obesity AO, which has proven to be an indicator of metabolic risk. The aim of this study is to determine the correlation between the degree of food insecurity and abdominal obesity in young adults from a university of Tabasco.

Methods: Evaluation of anthropometric parameters and dietary intake by 24 hours reminders. The study describes the food offered at the university's coffee shops analyzing breakfast, snack and lunch content.

Results: 197 people 75.5% female and 24.5% male with a mean age between 30.47 ± 10.92 years old. Findings: 80.9% of AO; food consumption: 69.2% sugary drinks, 35.8% carbonated beverages, 27%pastries, 66.7% red meat, 37.1% fish, 65.4% chicken, 70.4% milk, 51% fries, 86.2% vegetables, 69.8% fruits, 30.2% nuts and 85.5% cereal. People without AO consumed less sugary drinks and have a higher fruits, vegetables, milk, and cereal intake.

Conclusions: As a result of a positive correlation between AO and consumption of foods with low nutritional level, limited availability of food with adequate nutritional quality produce food insecurity. Nutrition intervention programs are needed to promote FS and close the food gap between supply and demand of nutritious foodabdominal-obesity, food-insecurity.

Key words: Obestiy, youth, Tabasco.

PO1307

CONTRIBUTION OF A SCHOOL MEAL TO ENERGY AND NUTRIENT INTAKES OF SELECT FILIPINO SECONDARY SCHOOL STUDENTS

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Background and objectives: Currently, Filipino school canteens serve meals consisting mostly rice, meat or fish, and minimal fruits and vegetables. Nutri-meals, representing major food groups, were developed to increase energy intake and nutrient balance, while maintaining the liking of the meal. The study aims to assess the energy and nutrient intake and liking of nutri-meals compared to regular school meals.

Methods: About 112 Filipino students aged 13-16 years participated in the study. The first two weeks of the study, students consumed the regular school meal for 5 d/wk (baseline), followed by 7 weeks of nutri-meal consumption. Actual consumption of meals was calculated by weighing plate waste per dish which was subtracted from the portion size served. Consumption was converted into nutrient intake using USDA and local food composition tables. Differences in nutrient intake between regular and nutri-meals were calculated with mixed model ANOVA. Liking was measured directly after every meal using a self-administered questionnaire to a random subsample of 22 students.

Results: Preliminary results showed that students consumed significantly more vegetables (+ 80±1 g), fruits (+ 77±1 g), fish (+ 19±0.3 g) and less meat (-17 ±0.5 g), all $P<0.001$) from nutri-meals compared to regular meals. Consequently, intakes of energy (+ 125±3 kcal), protein (+ 2.8±0.1 g), and micronutrients from the nutri-meals were significantly greater, all $P<0.001$, except for zinc (- 0.37±0.02, $P<0.001$). Data of the liking questionnaire is currently being analysed.

Conclusions: The school meals were effective in increasing energy and nutrient intake. However, it remains difficult to meet energy and nutrient requirements, due to factors such as budget restrictions for school meals and food preferences of the students. Further optimization of the school meal composition is needed, and micronutrient fortification and nutrition education are essential strategies to address the nutrient gap.

Key words: school meal, dietary intake, adolescents.

PO1308

THE INFORMAS FRAMEWORK FOR ASSESSING THE IMPACT OF TRADE AGREEMENTS ON FOOD ENVIRONMENTS AND OBESITY RISK

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Background and objectives: The International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) was established to monitor and support upstream actions for creating healthy food environments to reduce the burden of obesity and NCDs. The INFORMAS Trade and Investment module is concerned with monitoring the risks and benefits to food environments and diets from trade agreements. Trade underlies many of the upstream drivers of contemporary food environments, because it shapes the availability, price, nutritional quality, and promotion of foods for human consumption.

Methods: Based on a systematic review of the published literature on the relationship between trade agreements, food environments and diets, a framework was developed to monitor the actual and potential impacts of trade agreements on national food environments.

Results: The proposed monitoring system encompasses a set of guiding principles, recommended procedures for data collection and analysis, and quantifiable minimal, expanded, and desirable indicators relating to the form and scope of trade agreements, trade in goods, trade in services, foreign direct investment, and policy space and governance. The framework is intended to be used by countries during both the negotiation and implementation phase of a trade agreement to assess how the provisions may facilitate or inhibit healthy food environments, and to identify potential measures to mitigate the adverse impacts, and enhance the positive impacts, of that agreement. The framework is designed to support monitoring of impacts over time and, where possible and relevant, comparison between jurisdictions.

Conclusions: When conducted in the context of a multilevel obesity monitoring system, as proposed by INFORMAS, systematic monitoring of trade agreements and their potential positive and harmful impacts on food environments is essential for the development of effective policy approaches aimed at reducing the burden of obesity and NCDs.

Key words: Obesity, Trade agreements, Food environments, Monitoring.

PO1309

EFFECTS OF EXERCISE TRAINING AND DETRAINING ON FATTY LIVER IN ZUCKER FATTY RATS.

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Background and objectives: Exercise training is commonly recommended for prevention and amelioration of obesity and lifestyle-related diseases. We have recently shown that exercise training with diet-restriction may improve fatty liver in obese rats. The aim of this study was to investigate whether the exercise training-induced improvements in fatty liver of Zucker Fatty rats are influenced by detraining.

Methods: Male Zucker Lean rats were used as control (LC). Male Zucker Fatty rats were divided into 3 groups; Obese (OB), Trained (TR) and Detrained (DTR) groups. The LC and OB rats had free access to food, the TR and DTR rats had food intake restricted to 78 % of the OB group level. The TR and DTR rats were exercised voluntarily on the wheel ergometer with a load of 30 % on their body weight every day. Following 4 weeks of exercise training, DTR rats were kept inactive (i.e., detrained) for 2 weeks with free access to food. After 6 weeks, all rats were prepared for experiment. The liver was excised and weighed. Hepatic tissue was prepared for transmission electron microscopy.

Results: OB rats became overweight, exhibited elevated levels of hepatic triglycerides, and electron micrographs revealed numerous lipid droplets in the hepatocytes. Voluntary wheel running attenuated weight gain and reduced serum glucose and triglycerides in TR rats compared with OB rats. Hepatocytes from TR rats also showed reduction of lipid droplets. However, detraining increased body weight, elevated serum triglycerides, and further accumulated lipid droplets in the hepatocytes.

Conclusions: Exercise-induced improvements observed in fatty liver were not long lasting, since they were reversed toward the obese rat levels after 2 weeks of detraining.

Key words:¡¡exercise training, detraining, fatty liver, electron microscopy, obesity.

PO1310

EFFECTS OF EXERCISE AND DIET RESTRICTION ON THE EXPRESSION OF HEPATIC FAT/CD36 IN ZUCKER FATTY RATS

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Background and objectives: We recently reported that diet restriction may facilitate fatty liver while voluntary exercise may suppress fat accumulation in the liver of fasted fatty rats. Fatty acid translocase (FAT/CD36) is a key protein involved in regulating the uptake of fatty acid (FA) in the liver. The purpose of the present study was to investigate the effects of exercise and diet restriction on FAT/CD36 protein expression in the liver of Zucker fatty rats.

Methods: Male Zucker lean rats were used as the control group (L, n = 8). Male Zucker fatty rats were divided into obese (Ob, n = 8), diet restriction (DR, n = 8), and diet restriction+exercise (DR+Ex, n = 8) groups. The rats in the L and Ob groups had free access to food. Food intake in the DR and DR+Ex groups was restricted to 67% and 70% of the Ob group level, respectively. The rats in the DR+Ex group voluntarily exercised on a wheel ergometer with a load of 30% of their body weight. After 6 weeks, all rats were prepared for the experiment. Blood was collected to measure serum leptin and free fatty acid (FFA) levels. Liver tissue samples were excised to measure the hepatic triglyceride (TG) content and the FAT/CD36 expression level.

Results: Hepatic TG content, serum FFA, and serum leptin levels were significantly higher in the DR group than in the Ob group whereas significantly lower in the DR+Ex group than in the Ob group. Hepatic FAT/CD36 expression was significantly higher in the DR group than in the Ob and DR+Ex groups.

Conclusions: These results suggest that hepatic FAT/CD36 expression may contribute to the effect of exercise and diet restriction on fatty liver.

Key words: Fatty liver, obesity, lifestyle diseases.

PO1313

ASSOCIATION OF PHYSICAL ACTIVITY WITH EATING HABITS AND KAUP INDEX IN PRESCHOOL-AGED JAPANESE CHILDREN.

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Background and objectives: The results of recent lifestyle surveys in Japan have indicated that Japanese children take nutritionally inadequate meals, and are physical inactive. We have developed a physical activity (PA) questionnaire for the evaluation of PA status of adults. The purpose of this study was to determine whether habitual physical activity was associated with food habits and Kaup Index in preschool-aged Japanese children using our PA questionnaire for children and food-frequency questionnaire.

Methods: We surveyed 980 nursery-school children (1-5 years old), all residents of Funabashi city (a suburb of Tokyo). We assessed their PA and food intake (FI) with original questionnaires answered by their mothers. Furthermore, we assessed their mothers PA with the questionnaires for adults. Based on the results of the questionnaires, we estimated a PA score and a FI score. A one-way ANOVA was used to compare the differences among the three classes of PA scores.

Results: Mean PA score of children was 15.8 (range: 4-23, max: 26). Mean PA of their mothers was 13.8 (range: 2-25, max: 28). Mean FI score of children was 26.7 (range: 6-55, max: 60). Mean Kaup Index (KI) of children was 15.7 (range: 9.8-32.7). There was a significant difference in PA score of children among the three classes of PA score of their mothers. There were significant differences in both FI score and KI among the three classes of PA score of children.

Conclusions: Physical activity levels of preschool-aged children were affected by their mothers' active lifestyle. High PA score associated with high FI score, and low KI in preschool-aged Japanese children. A more active lifestyle may improve eating habits and anthropometric characteristics of children.

Key words: preschool-aged children, physical activity, food intake, Kaup Index.

PO1314

PROMOTION AND ASSESSMENT OF NUTRITION AND HEALTHY LIFESTYLE IN THE WORKPLACE: PHILIPPINES' DOST EXPERIENCE

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Background and objectives: The Department of Science and Technology (DOST) in the Philippines conducted a wellness activity which aimed to promote healthy lifestyle among employees. The event promoted the tagline, "Science in Wellness. Wellness in Science", to emphasize the scientific way to wellness, and that people in the science community should achieve good nutritional well-being and practice healthy lifestyle both in the workplace and outside.

Methods: The event was open to all DOST employees. A fun run and aerobic dancing sessions were organized. All participants were given fitness passes. A total of five fitness stations were set up, including BMI and blood pressure assessment booths and nutrition counselling. Participants received rewards if they received services from the five fitness stations as indicated by the five stamps in the fitness pass. To further promote healthy eating, nutritious breakfast was distributed among the participants.

Results: The event was participated in by 645 employees and executive officials of the Department. Participants were asked about their fitness goals and the top three responses were to live longer (13.5%), increase stamina (13.2%) and look great (12.9%). Some said they want to lose weight (11%) and increase strength (10.4%). In terms of BMI, 61.2 percent were normal, 28.7 percent were overweight, 4.8 obese, and 5.3 percent were underweight. In terms of blood pressure measurement, 77.1 percent were normal, 12.0 percent were pre-hypertensive, while the rest were hypertensive. Those who were found overweight, obese and hypertensive were given health and nutrition counseling by doctors and nutritionists, respectively.

Conclusions: The active participation of employees showed commitment to live a more fit and healthy lifestyle. Other activities to complement the event and support sustainability of the employees' pledge to practice healthy lifestyle must be implemented.

Key words: nutrition promotion, wellness, employee fitness.

PO1315

DIETARY FAT AND BREAST CANCER SURVIVAL: A SYSTEMATIC REVIEW AND META-ANALYSIS.

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Background and objectives: A positive association between dietary fat and breast cancer risk has been previously reported but its influence upon survival is unclear. As the number of breast cancer survivors increases worldwide, the aim of this review and meta-analysis is to critically appraise the published literature and conduct meta-analyses to clarify the association between dietary fat and breast cancer survival.

Methods: Articles published up to March 2011 that examined dietary fat and breast cancer recurrence/survival were identified from searches in MEDLINE and EMBASE. Meta-analyses were conducted in which we evaluated the risk of all-cause or breast cancer specific death in women in the highest compared with the lowest categories of intake and per 20 gram increase in total and saturated fat intake (g/day). Multivariable adjusted hazard ratios (HR) and 95% CIs from individual studies were weighted and combined using a random-effects model to produce a pooled estimate.

Results: Fifteen prospective cohort studies investigating total fat and/or saturated fat intake (g/day) and breast cancer mortality were included. There was no difference in risk of breast cancer specific death (n=6; HR=1.14; 95% CI: 0.86, 1.52; P=0.34) or all cause death (n=4; HR=1.73; 95% CI: 0.82, 3.6; P=0.15) for women in the highest versus lowest category of total fat intake. Breast cancer specific death (n=5; HR=1.63; 95% CI: 1.19, 2.24; P<0.01) was however higher for women in the highest versus lowest category of saturated fat intake. No trends were observed per linear (20 gram) increase in intake of total or saturated fat.

Conclusions: The results of this systematic review and meta-analysis suggest that a lower saturated fat intake is associated with a lower risk of breast cancer death. Modification of dietary intake, to reduce saturated fat intake may therefore be warranted.

Key words: Breast cancer survival; dietary fat.

PO1316

AUTUMN VITAMIN D STATUS IN 782 EIGHT-ELEVEN YEAR OLD DANISH CHILDREN - PRELIMINARY RESULTS FROM THE OPUS SCHOOL MEAL STUDY.

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Background and objectives: Low vitamin D concentrations are frequently reported among groups of children and adolescents at northern latitudes, particularly during winter. Negligible solar UVB radiation from October-March at latitudes above ~52°N is acknowledged as a major determinant. Few studies have focused on status and determinants of vitamin D in Nordic school children during autumn where UVB has recently peaked. Objective: To evaluate and identify determinants of vitamin D status in 782 healthy 8-11 year old Danish children (55°N) during September-November.

Methods: Cross-sectional baseline study from the OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet) School Meal Study, including 3rd and 4th graders from nine schools. In autumn 2011, a fasting blood sample was drawn and serum 25-hydroxyvitamin D (25(OH)D) analysed (CLIA). Background interviews were conducted and anthropometry, puberty stage, dietary intake and intake of dietary supplements registered. Data analyses by linear mixed model.

Results: Serum 25(OH)D ranged from 15.2 to 132 nmol/l, with mean of 60.8 nmol/l±18.7. Twenty-six per cent of the children had concentrations between 25-50 nmol/l, while 2.4% had concentrations <25 nmol/l. 25(OH)D was inversely associated with age, was higher in boys, Caucasians, children who had ancestral roots in Denmark, who took dietary supplements >3 days a week (n=305), or whose parents had educational levels >16 years, (All p<0.05). Also, 25(OH)D was lower in November compared to September and October (p<0.05). BMI, waist circumference, dietary vitamin D intake and puberty stage were not associated with 25(OH)D.

Conclusions: A substantial number of children did not reach the recommended 50 nmol/l of serum 25(OH)D despite the recent seasonal peak in solar UVB radiation. Body composition and dietary intake of vitamin D was not found to be determinants in autumn.

Key words: Vitamin D, Children. OPUS is supported by a grant from the Nordea Foundation.

PO1317

RELATIONSHIP BETWEEN BONE MINERAL DENSITY AND ALCOHOL CONSUMPTION IN KOREAN MEN

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Background and objectives: In recent days, interest in osteoporosis in men is increasing. One of the risk factors, drinking, is a common problem in Korean men. However, there are controversies about the relationship between alcohol consumption and bone mineral density (BMD). No study using large-scale data has been reported in Korea.

Methods: A cross-sectional study was performed on 2, 421 men aged over 40-93y from the fourth Korea National Health and Nutrition Examination Survey in 2008-2009. Alcohol intake was calculated by self-administered questionnaire and BMD was measured by dual energy x-ray absorptiometry. ANOVA was used to find the relationship between alcohol intake and BMD, and ANCOVA was done after adjustment for age, body mass index (BMI), education, house income, smoking status, calcium intake, physical activity and serum 25-hydroxyvitamin D level.

Results: With increasing alcohol intake, BMD increased significantly in the lumbar spine, femur total and femoral neck (p for trend=0.028, p for trend <0.001, p for trend <0.001, respectively). But, after adjustment for age, statistical significance disappeared in all three bone sites (Lumbar; p for trend=0.606, Femur total; p for trend=0.342, Femoral neck; p for trend=0.549). In addition, after adjustment for age, BMI, education, house income, smoking status, calcium intake, physical activity and serum 25-hydroxyvitamin D level, no significant relationship was reported in all three bone sites (Lumbar; p for trend=0.451, Femur total; p for trend=0.150, Femoral neck; p for trend=0.343).

Conclusions: In Korean men, after adjustment for age and other confounders, no significant relationship was reported between alcohol intake and BMD

Key words: Osteoporosis, Alcohol, Bone density.

PO1318

THE ATTITUDES, INTENTIONS, PERCEPTIONS AND BEHAVIOUR OF OBESE PEOPLE IN RELATION TO THEIR WEIGHT, WESTERN AUSTRALIA 2009

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Background and objectives: Obesity is rising annually in Western Australia. Knowledge of intentions, influences, steps and difficulties around losing weight is critical to developing effective interventions. This study aims to identify how obese people perceive themselves in relation to their weight.

Methods: The 2009 Nutrition Monitoring Survey conducted telephone interviews with a random sample of 1284 adults aged 18 to 64. Self-reported height and weight, perceptions and intentions regarding weight loss and knowledge of the health effects of being overweight were measured. BMI was calculated using the WHO methods adjusted for over-reporting of height and under-reporting of weight. Data were weighted for probability of selection and adjusted to the 2009 age, sex and area of residence distribution of the population.

Results: Chi Square and WALD tests were used to determine significant differences. Ten percent of obese adults (BMI > 30) thought their weight was 'about right'. Compared with people who are not obese, obese people reported no willpower to exercise (3.8 vs 9.6 p<.001) and no willpower to eat better (4.3 vs 11.3 p<.001). A fifth of obese adults weighed more now than 12 months ago, and 19% of these were currently doing nothing about their weight. Only 12.7% of obese adults reported being influenced by a doctor to lose weight. Obese people were more likely to report difficulties losing weight compared with those who were not obese (0.9 vs 1.3; F=30.9 p<.001). Knowledge of health effects of excess weight was low.

Conclusions: Knowing what obese adults find difficult about losing weight is important for development of interventions. Over optimistic perception of current weight and poor knowledge of the health effects of excess weight may be barriers to change. Acknowledgements: Healthway funded Curtin University to assist the translation of research into practice.

Key words: obesity, perceptions, attitudes, behaviour.

PO1319

NNR 2012: NORDIC NUTRITION RECOMMENDATIONS – INTEGRATING NUTRITION AND PHYSICAL ACTIVITY

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Background and objectives: The Nordic countries have collaborated in setting guidelines for dietary composition and recommended intakes of nutrients for several decades. The Nordic Nutrition Recommendations (NNR) are based on current scientific knowledge taking into consideration the current nutritional situation in the Nordic countries. The NNR constitute the scientific basis for planning and assessing diets for population groups, and form the basis for the development of national guidelines for food-based dietary guidelines and physical activity in the Nordic countries. The NNR give reference values for the intake of and balance between individual nutrients which, based on current scientific knowledge, are adequate for development and optimal function and reduce the risk of development of certain diet-related diseases. The NNR are currently being updated using an evidence-based approach. Systematic reviews (SR), covering years 2000—2012, have been applied, including a quality assessment of all pertinent studies and grading of the overall evidence for selected nutrients/topics. Previous editions mainly focused on setting dietary reference values (DRVs) for the intake of, and balance between, individual nutrients. The current 5th edition puts the whole diet in focus and more emphasis is given to the role of dietary patterns and food groups contributing to the prevention of diet-related chronic diseases. Also, the NNR emphasize the importance of adequate physical activity that in combination with a food pattern supports maintenance of a healthy body weight in the long-term. Most of the recommendations from the 4th edition (2004) are proposed to remain unchanged. Proposed changes include increased recommended intakes (RI) for vitamin D and selenium. Also, more emphasis is put on quality of fats and carbohydrates and their dietary sources. NNR 2012 will be launched in June 2013, after being subject to an open public consultation. All information about the project is available at www.nnr5.org.

PO1320

INCREASING THE NUTRITIONAL IMPACT OF THE INDONESIAN CONDITIONAL CASH TRANSFER PROGRAM: EVIDENCE FOR SOCIAL PROTECTION POLICY

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Background and objectives: The government of Indonesia implements a Conditional Cash Transfer (CCT) program targeted at very poor households, with pregnant or lactating women, and children conditioned on the use of basic health and education services. Initial reviews of the program showed higher protein intake by beneficiaries. This presentation aims to highlight the nutritional requirements and gaps of the target families of the CCT program and proposes interventions to increase the nutritional impact of the program.

Methods: A calculation of the macro-and-micronutrient requirements of an average beneficiary family of four was conducted and broken down by family members based on age, sex, and activity. The results were then compared with national & international standards to estimate gaps and develop recommendations.

Results: The main identified gaps are low intake of energy, protein and iron leading to anemia of women of reproductive age and children under the age of five. To address these, a series of focused interventions are proposed: provision of 15 kg of fortified rice/family/month; 6 kg of eggs/month; multiple micronutrients for the mother and child under-five; deworming for children 12-59 months; zinc for diarrhea for children 6-59 months; and an additional cash transfer of USD 10/month. The rice and the egg contribute to nearly two-thirds of the energy and protein adequacy of the mother respectively, and fulfilling the adequacy of both nutrients for the children under-five. With the provision of the above, the household would only need to complement USD 25 monthly to cover nutrients for other family members.

Conclusions: Development of a series of interventions to address identified nutritional gaps within a piloted study.

Key words: Conditional Cash Transfer, Indonesia, Nutrition.

PO1321

THE EFFECT OF AN INDIVUALLY TAILORED NUTRITION INTERVENTION FOR DUTCH PARENTS ON DIETARY INTAKE AND PHYSCIAL ACTIVITY OF THEIR CHILDREN

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Background and objectives: Parents are an important role model of a healthy diet for their primary schoolchildren. To improve the diet of parents, an intervention strategy was evaluated. The objective of our study was to determine the effect of an individually tailored nutrition intervention for parents on dietary intake and physical activity of their children.

Methods: In total, 165 Dutch participants with children aged 4-12 were randomized to intervention or control group. During five visits distributed over a six-month intervention period, the dietician provided dietary counselling based on motivational interviewing and the Dutch guidelines for a healthy diet. During the six-months the dietician also sent the participants three personalised e-mail messages based on the participant's goals and dietary intake. The dietary counselling and the e-mails were focused on the parent taking the family setting into account. The control group did not receive any treatment. Before and after the intervention period, participants filled in a questionnaire on dietary intake and physical activity of their child.

Results: The fish intake of the children in the intervention group increased by 1.1 portions per month and the fruit and vegetable intake by 1.4 and 1.6 portions per week, respectively. These increases were significantly larger than in the control group. In addition, the intake of soda decreased by 2 glasses and the intake of snacks by 1.8 portions per week, and physical activity increased by 30 min per week. However, these changes were not significantly different from the control group.

Conclusions: The present study is one of few studies studying the effect of an intervention tailored to the diet of the parent on the dietary intake of their children. We conclude that focussing on the parents' diet is beneficial on fish, fruit and vegetable intake of children.

Key words: intervention, dietary intake, parents, children.

PO1322

THE IMPORTANCE OF HAVING INTEREST IN COOKING AND VEGETABLES AND FRUIT INTAKE FOR CHEWING CONSCIOUSNESS IN PRIMARY SCHOOLCHILDREN

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Background and objectives: The chewing ability is one of important factors for good health and thus for developing and educating dietary good habits. Recently, the decrease in chewing abilities of children is discussed. We examined their chewing consciousness and its relation to daily and dietary habits through questionnaire survey.

Methods: Questionnaire survey about daily and dietary habits was done in 592 children (294 males and 298 females, 11-12 years old) from four primary schools at the Kansai area in Japan. When high score was allotted in their better habits, there were significantly positive correlations between gCC: chewing consciousness and gHIC: having interest in cooking h or gFVFI: frequency of vegetables and fruit intake h. According to each category score, they were divided into high and low score groups. Statistical analysis in contingency tables was done by chi-square test. And then the multiple regression analysis, as CC or gLMLA: learning motivation and learning attitude h with a dependent variable, was done.

Results: In the higher score group of HIC, scores of FVFI, CC, and LMLA were significantly higher than those in the lower score group of HIC. In the higher score of FVFI, scores of HIC, g playing sports and studying well h, and also CC were significantly higher than those in its lower score group of FVFI. The multiple regression analysis, as CC with a dependent va-

riable, indicated that CC was affected by HIC and FVFI with 27 % coefficient of determination. Also, LMLA was affected by FVFI, g self-efficacy h, g refrain from between meals and eating outside h, and CC with 23% coefficient of determination.

Conclusions: The present analytical results indicated that the chewing consciousness was affected by having interest in cooking and frequency of vegetables and fruit intake, and the learning motivation and learning attitude was affected by FVFI and CC.

Key words: chewing consciousness, cooking, vegetables.

PO1323

HOW MEALS INTAKE BEHAVIOURS ARE RELATED TO FRUIT AND VEGETABLES CONSUMPTION IN SPANISH ADULTS?

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Background and objectives: Despite the strong evidence that fruit and vegetables are health promoters against chronic diseases, their intake is reduced in many countries. Therefore, we aimed to identify meals intake behaviours, which might lead to a recommended consumption of fruit (RCF) and vegetables (RCV).

Methods: During the events "Jornadas de Prevención en Salud" in four Spanish cities in 2008, we collected data from 958 women and 543 men (aged 20-89) about their daily intake of fruit and vegetables, the number and kind of meals, and snacking patterns between meals. A recommended intake was assumed when more than one ration of fruits (RCF) and vegetables (RCV) was consumed. We used x^2-tests to determine differences within RCF and RCV in the categories of the meals intake behaviours variables.

Results: A greater number of persons showed a RCF when compared with the RCV (75, 9% vs. 38, 0% in women; 71, 3% vs. 28, 5% in men). Consuming four/five meals daily vs. three meals, breakfast, forenoon and afternoon meals, and abstaining from snacking, leads to a higher frequency of women with a RCF, whereas the number of women having a RCV is greater when five meals daily and forenoon meal (p<0, 05) are consumed. A higher number of men achieve RCF when having four/five meals daily, breakfast and afternoon meal. The same applies for the RCV, but with the forenoon meal instead of the breakfast (p<0, 05).

Conclusions: The investigated meals intake behaviours are related with the number of persons consuming the recommended servings of fruit and vegetables, but which of them leads to a higher RCF and RCV depends on sex.

Key words: meals intake behaviours, fruit and vegetables consumption, Spanish adults Acknowledgements: The "Universidad Autónoma de Madrid" supported this work by providing a studentship to one of the authors.

PO1324

NON-EXERCISE ALGORITHMS TO ESTIMATE CARDIORESPIRATORY FITNESS: ASSOCIATIONS WITH MORTALITY AND NON-FATAL CARDIOVASCULAR DISEASE

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Background and objectives: Unlike other risk factors, cardiorespiratory fitness (CRF) is not routinely measured as it requires trained personnel and specialized equipment. The purpose of this study is to predict risk for non-fatal cardiovascular disease (CVD) and disease-specific mortality using CRF algorithms that do not involve exercise testing (non-exercise CRF).

Methods: Participants were 43 356 adults (21% women) from the Aerobics Center Longitudinal Study followed between 1974 and 2003. Non-exercise CRF was estimated based on sex, age, body mass index, waist circumference, resting heart rate, physical activity level and smoking status. Exercise CRF was measured by a maximal treadmill test.

Results: The mean intra-individual differences between non-exercise CRF and exercise CRF were 0.4 ± 1.7 and 0.3 ± 1.6 METs in men and women, respectively (p<0.001 in both). Bland-Altman analyses showed a tendency to underestimate at high values of CRF. During an average follow-up of 13.3 years, 1934 deaths occurred: 627 (32.4%) due to CVD and 737 (38.1%) due to cancer. In a sub-sample of 18 095 participants, 1049 cases of non-fatal CVD events were ascertained. After adjusting for potential confounders, a higher non-exercise CRF was associated with a lower risk of mortality from all-causes (hazard ratio per 1 MET increase = 0.85, 95% confidence interval = 0.82–0.88 in men; 0.87, 0.75–0.99 in women), from CVD (0.81, 0.77–0.86 in men; 0.84, 0.64–1.12 in women), from cancer (0.86, 0.82–0.91 in men; 0.99, 0.79–1.23 in women) and a lower risk of non-fatal CVD (0.89, 0.85–0.93 in men; 0.76, 0.58–0.99 in women).

Conclusions: Although non-exercise CRF method is not ideal, it predicts risk for non-fatal CVD, and all-cause and disease-specific mortality. It could be useful for identifying persons at risk and for exercise prescription for primary prevention.

Key words: fitness, mortality, cardiovascular disease, cancer, non-exercise algorithms.

PO1325

PERCEPTIONS OF FIRST YEAR STUDENTS ON FRUIT INTAKE AND EXERCISE HABITS

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Background and objectives: Consuming fruits regularly and performing exercise is a good health promoting behaviour. This study seeks to determine the perception of University students on fruit intake and exercise habits.

Methods: This was a cross sectional study involving 400 (197 males and 203 females) randomly sampled first year students resident in 4 halls/hostels on University of Ghana campus. Semi structured questionnaires on exercise habits and perception on fruit intake were administered for self completion. Anthropometric information were collected according to standard procedures and categorized according to WHO body mass index cut-offs. Statistical Package for Social Scientist (SPSS, version 16) was used to analyse data.

Results: About 84.3% consumed fruit because of perceived health benefits, 98.8% protection against development of chronic diseases while 14.5% has no reason for consuming a fruit (p =0.015), 76% consume fruit when they feel like (p= 0.004). Majority (60.0%) buys one serving of fruit to last for a day and factors that discourage fruit consumption includes unattractiveness (72.8%) and short life span (68.8%), unavailability of fruits (60.8%). A significant positive association was observed between BMI and attitude towards frequency of fruit consumption (r= 0.119, P= 0.047) although there was no difference in the perception between the sexes. More males (85.8%) than females (75.9%) perceived that they need exercise regularly to build muscle and lose weight respectively (P= 0.034). Duration and frequency of exercise were both significant (p< 0.001).

Conclusions: Perception of students on the health benefits of fruit intake was high but consume fruits when they choose. Both sexes' exercise habits are different and the outcomes of exercise sought are also different.

Key words: Fruits, perception, exercise habits, anthropometry

PO1326

ACCEPTABILITY OF YELLOW CASSAVA FOR CONSUMPTION BY SCHOOLCHILDREN IN DIDJA, BENIN

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Background and objectives: Consumption of yellow varieties of cassava with an elevated beta-carotene content may contribute to reducing the high prevalence of vitamin A deficiencies (VAD). The success of this strategy is for a large part depending on the acceptability of yellow cassava. We studied the factors determining the intention to consume yellow cassava by schoolchildren in Didja, a rural cassava consuming community in Central Benin.

Methods: A cross-sectional survey, based on an integrated model of the theory of Planned Behaviour and the Health Belief Model was conducted among 147 randomly selected caretakers of schoolchildren (6-12 years old). Multivariate analyses and correlations were used to determine associations between summed scores for model constructs.

Results: More than 90% of the caretakers had the intention to prepare yellow cassava for their children 2 or more times a week. Knowledge on yellow cassava and VAD (â=0.20, p=0.01) and perceived susceptibility of the child to develop VAD (â=0.13, p=0.05) predicted health behaviour identity with 55% of the variance explained. Cues to action (sight problems of children, recommendations of health workers, high productivity and educational campaigns about benefits of yellow cassava) determined intention to consume yellow cassava (â=0.48, p=0.00) with 11% of variance explained. Barriers and attitudes towards yellow cassava did not determine intention to consume cassava.

Conclusions: In a cassava consuming area intake of yellow cassava by schoolchildren can be promoted by (1) increasing knowledge of caretakers on ability of yellow cassava to reduce VAD, (2) raising awareness on risk their children run on VAD and (3) positive triggers to yellow cassava consumption such as recommendations from influential people and educational campaigns. Acknowledegments The project was realized in the framework of INSTAPA Project, funded by the European Union's Seventh Framework Programme [FP7/2007-2013] under grant agreement nr 211484

Key words: Biofortification, cassava, acceptability, schoolchildren, Benin

PO1327

IDENTIFICATION OF FACTORS DETERMINING CONSUMPTION OF YELLOW MAIZE BY SCHOOL-CHILDREN IN KANDI, NORTHERN BENIN

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Background and objectives: Through biofortification varieties of yellow maize with an elevated beta-carotene concentration have been developed. However, adding beta cartene may alter perception and taste of maize, determining succes of biofortification to reducing vitamin A deficienies (VAD). We studied the factors determining the intention to consume yellow maize by schoolchildren in Kandi, in northern Benin.

Methods: A descriptive cross-sectional survey, based on an integrated model of the Theory of Planned Behaviour and the Health Belief Model was conducted among 149 randomly selected caretakers of schoolchildren (6-12 years old). Multivariate analyses and correlations were used to determine associations between summed scores for model constructs.

Results: More than 60% of the caretakers had the intention to prepare yellow maize for their children daily. Perceived susceptibility of the child to attract VAD (â=-0.17, p=0.05), perceived severity of VAD (â=-0.21, p=0.03), and the value given to good health of the child (â=0.25, p=0.00) predicted health behaviour identity. Intention to consume yellow maize was associated with positive health behaviour (â=-0.22, p=0.05) and subjective norms (â=-0.21, p=0.03). A significant correlation was shown between health behaviour identity and barriers to consumption (rs=-0.29, p=0.00), but barriers had no significant influence on intention.

Conclusions: Consumption of biofortified yellow maize by schoolchildren in Kandi could be promoted by increasing the awareness about the risks their children run to develop VAD and the severity of the consequences, involving mothers, family members and local authorities. Acknowledgements The project was realized in the framework of INSTAPA Project, funded by the European Union's Seventh Framework Programme [FP7/2007-2013] under grant agreement nr 211484 Key words Biofortification, yellow maize, acceptability, Benin, VAD.

Key words: Schooldren, nutrition, beta-carotene.

PO1328

THE ROLE OF WOMEN AND THE DETERMINANTS OF CHILD NUTRITION IN THE 2009 EXTREME WEATHER EVENTS IN THE PHILIPPINES

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Background and objectives: Increasing extreme weather events (EWEs) attributed to climate change has direct and indirect effects on health and food and nutrition security. Vulnerable communities in developing countries such as the Philippines will be increasingly challenged. EWEs trigger a cascade of events that can lead to child malnutrition. The 2009 EWEs Tropical Storm Ketsana and Typhoon Parma were used as a case study to determine the factors affecting child undernutrition and to understand the role of women in the process of child nutrition preservation in natural disaster situations.

Methods: A cross-sectional study was carried out in 13 flood-affected villages of District IV Laguna Province, 18-24 months after the flooding disaster. Combined methods using structured questionnaires and in-depth interviews were administered to mothers to examine socio-demographic characteristics and explore women's disaster experiences. Clinical history and physical examination with anthropometry were conducted on 946 children to evaluate health and nutritional status using weight for age and height for age. Statistical analysis using logistic regression and thematic analyses were done.

Results: The prevalence of underweight in children was 27.3% while stunting was 36.7%. The child's age, number of siblings, birth order and their village of residence were important determinants of child nutritional status. During and after the floods, maternal care ensured preservation of child health and nutrition.

Conclusions: Child undernutrition can be an indirect consequence of flood exposure. With the future threat of climate change, policies and multidisciplinary malnutrition prevention programs in flood-prone areas should focus not only on the determinants but also consider ways to support women's contribution in the prevention of poor child nutritional outcomes.

Key words: climate change, women, malnutrition, Philippines.

PO1329

SALT CONTENT CONTROL IN PUBLIC MASS CATERING MEALS DEDICATED TO CHILDREN, ADOLESCENTS AND STUDENTS IN THE CITY OF NOVI SAD

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Background and objectives: Investigations brought evidences that salt intake was in a positive relationship with blood pressure and that children and adolescents with higher blood pressure were more susceptible to develop hypertension in adulthood. The aim of this paper was to analyze data on four-year (2008/2011) salt reduction program in meals provided by the public catering service for children, adolescentst and students in Novi Sad.

Methods: Relating to the established program, each year during the four-year period, 50, 22, 26 and 25 daily meals were taken from kindergarten, school canteens, boarding schools, student'srestauraunts, respectively. In the meal time unannounced samplers took meals from public kindergartens, schools (breakfast, dinner, snack), boarding schools and student'srestaurants (breakfast, dinner, supper). Laboratory examination of energy value and salt content in daily meals was performed using standardized and validated methods. student'st-test was applied to determine statistical differences in energy and salt content of the average daily meals at the beginning and at the end of the observed period.

Results: The average annual energy values of the controlled daily meals in kindergartens, school canteens, boarding schools and student'srestaurants for the 2008/2011 were 1025.7Â±167.19kcal/1059.83Â±152.96kcal; 1617.39Â±249.16kcal/1602.04Â±288.04kcal; 3127.07Â±403.32kcal/3005.68Â±311.59kcal and 2745.80Â±1072.19kcal/3033.39Â±248.42kcal respectively, statistically significant difference were not recorded ($p>0.05$). The average annual salt content values in daily meals in kindergartens, school canteens, boarding schools and studentâ€™s restaurants fallen from: 5.02Â±2.09g to 3.27Â±1.03g; 5.79Â±2.14g to 7.45Â±3.07g; 18.10Â±4.00g to 8.62Â± 5.08g, respectively. The decline was statistically significant ($p<0.0001$).

Conclusions: Within the observed period, the program on salt reducing in meals of controlled public facilities has been implemented successfully, salt content dropped significantly, but the established goals have not been achieved. Acknowledgment: The program was supported by the Secretariat for Health and Social Policy of the City of Novi Sad.

Key words: Salt, meals, schools, children, adolescents.

PO1330

ADOLESCENTS' VIEWS ABOUT A PROPOSED REWARD INTERVENTION TO PROMOTE HEALTHY EATING IN THE SCHOOL SETTING

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Background and objectives: A reward or incentive scheme may be an effective method to influence young people's eating behaviour but evidence regarding this approach is limited. The aim of this qualitative study was to explore the views of 11-12 year olds about a proposed reward intervention associated with their food choices in the school canteen.

Methods: Focus groups were held in ten extended schools (i.e. the most disadvantaged schools according to the areas in which their pupils live) in Northern Ireland. Focus group sessions were audio-recorded and transcribed verbatim. An analytical data coding framework was applied to transcript data.

Results: Five schools were located in urban-cities, three in urban-towns and two in rural areas. Ninety pupils took part in the focus groups (54 girls, 36 boys). There was a high degree of acceptability for the concept of a reward scheme. There was diversity in the type of rewards valued by pupils, largely defined by geographical area and socio-cultural differences; for example, pupils from rural and small urban-towns tended to emphasise more group-based and longer-term rewards, whereas pupils from urban-city schools tended to suggest more individualistic and immediate rewards. In terms of factors influencing food choice within the school canteen, the major factors were food price, value for money, taste and visual appearance. Pupils felt that factors outside of their control, such as being assigned to the second lunch sitting, availability of seating and length of queues, placed considerable constraints on their food choice.

Conclusions: This research indicates a high degree of acceptability for a proposed rewards-based intervention but has also highlighted a number of socio-cultural and micro-environmental factors that need to be considered and addressed when developing such an intervention. Acknowledgements: This research was funded by the Northern Ireland HSC R&D Office.

Key words: Focus groups, school, healthy eating, rewards.

PO1331

QUANTITY AND QUALITY OF FATS IN GLUTEN CONTAINING FOODS COMPARED TO SPECIFICALLY GLUTEN-FREE PRODUCTS

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Background and objectives: To compare the quantity and quality of fats in common gluten-containing foods (GCF) and special gluten-free products (GFP).

Methods: We conducted a prospective pilot study to determine the most frequently GCF and brands consumed by children in the general population as well as, similar GFP consumed by celiac children. Quantity and quality of fat content was obtained from different sources of information.

Results: Ten of the most frequently consumed products were analyzed: The amount of fat in the products with low lipid content such as pasta, flour or cereal was very similar in both type of product (with and without gluten) and the difference was not statistically significant ($p>0.05$ for all compared items). However, if we compare complex manufactured products, GCF have a lower fat content than GFP and this difference is statistically significant for all analyzed foods ($p<0.01$). Regarding to the quality of fats of GFP, it is noteworthy that in many of them saturated fat percentage is higher than in equivalent conventional foods, reaching values above 50% of the total lipid contents.

Conclusions: It can be asserted that celiac children consuming special gluten-free products, are at risk of a higher fat intake as compared with children consuming conventional products, and a higher percentage of saturated fats. Thus food labels should clearly specify both the fat amount and the quality; however this information is often missing and not easily accessible. These preliminary results reflect the need to control the diet of celiac children in order to avoid a fat intake exceeding the recommendations, and to ensure these children carry a balanced diet. A prospective study in a pediatric coeliac population is currently on going.

Key words: Fats, specific products, children.

PO1332

DIETARY HABITS AND GROWTH: AN URBAN/RURAL COMPARISON IN THE ANDEAN REGION OF APURIMAC, PERU

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Background and objectives: In this work we investigated the relations between dietary pattern and growth comparing children from a rural and urban area in Andean Peru, in terms of food habits and anthropometric variables to develop a model usable in context interventions against malnutrition.

Methods: A sample of 159 children (80 from urban, 79 from rural area), aged from 4 to 120 months (72, 7± 37, 5 SD) was collected. The data were investigated by a multidimensional (Principal Component Analysis followed by inferential approach) analisys to correlate anthropometric and dietary variables.

Results: Under 20 months children are more fatty than the reference population in general, and rural more than urban (Student's t-test $p < 0, 0005$). In children > 20 months is showed an higher caloric intake in the city with a marked gender dependence (Pearson $r = 0.33$, $p < 0.0001$). About malnutrition there is a statistically significant difference (Chi-square = 5.03 $p < 0.02$) in the two sets (42% in rural vs. 25% in urban). Malnutrition cannot be considered as pure quantitative extreme of dietary intake given the complex relation it has with dietary and anthropometric patterns.

Conclusions: This is a direct proof of the need to calibrate interventions on food and socio-cultural field for understand malnutrition effects on growth. The main way to do that is to start from the analysis of malnutrition not as an effect but as a "source of variation" of the studied variables. A periodic evaluations of the growth of children are a prerequisite for any Public Health intervention against malnutrition.

Key words: Multidimensional Analysis, Malnutrition, Public health intervention, Dietary habits.

PO1333

BMI AND PERCEPTIONS, ATTITUDE AND PRACTICES OF UNDERGRADUATE STUDENTS OF THE UNIVERSITY OF THE FREE STATE, SOUTH AFRICA, REGARDING EXERCISE

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Background and objectives: A sustainable pattern of participation in physical activity is important to maintain health and prevent chronic diseases of lifestyle. Studies find that adolescents typically transition from an active youth to more sedentary adult behavior patterns. This study aimed to determine perceptions, attitude and practices of undergraduate students at the University of the Free State, South Africa, regarding exercise.

Methods: A cross sectional descriptive study was conducted via a self-reported electronic questionnaire made available to all students. The questionnaire included assessment of physical activity levels with the International Physical Activity Questionnaire (IPAQ, short version), self-reported body weight and height, and knowledge, attitudes and practices regarding physical activity.

Results: The respondents (N=1311; 21±3yrs), were mostly female (54%); black (61%) or white (31%), and 69% resided off-campus (with 47% of these walking or cycling to campus). Eighty present strongly agreed that exercise is important; around 80% knew the exercise recommendations; and over 90% had correct perceptions on the role of exercise in health. Most (72%) participated in sport at school. When asked whether they exercise, most (72%) indicated that they do, and around 60% claimed that they adhere to the recommendations, listing their main motivations as physical fitness, health improvement and enjoyment. In contrast, the IPAQ revealed that 46% have low activity levels; and 39% were overweight /obese. Those admitting to not exercising, listed lack of motivation to exercise alone, time constraints and expenses as main reasons. Low social support for exercising, low use of campus exercise facilities, and various misperceptions regarding exercise were identified.

Conclusions: Although the students knew the benefits of exercise and revealed positive perceptions of and attitudes towards exercise, almost half had low actual activity levels. Misperceptions and barriers regarding exercise, which interventions should focus on, were identified.

Key words: students, exercise, knowledge, attitudes, practices.

PO1334

GUADIX, PROMOTING HEALTHY EATING HABITS FROM LOCAL GOVERNMENT

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Background and objectives: As part of the legislative powers of local government, the city of Guadix (Granada) initiated a municipal strategy designed to prevent obesity, which has subsequently been subsumed under the Health Plan I (2010-2014). Currently Guadix has acquired a leading role in the implementation and development of public policies about obesity. Objective: To prevent childhood obesity through optimization and unification of all available local resources and put the politics of health promotion in Guadix.

Methods: It has managed to develop an intersectorial common and continuing between all municipal departments that may be involved directly and indirectly in preventing obesity.

Results: Among the most highlights the participation of students, estimated at 2180, ages 6 and 17, from different educational levels, 62 percent of the activities have focused on the school while the rest about 32 per cent were distributed in the community and familiar. 6 percent of the proceedings had as objectives the health sector including the incorporation of the city in a research study on childhood obesity and restoration. Information campaigns were developed and 32, 965 people participated in outdoor activities.

Conclusions: Current date have built a healthy lifestyle based on promoting physical activity and healthy eating also have generated new lines of work under the municipal health plan.

Key words: Guadix; Healthy habits; Childhood obesity.

PO1335

TASTE SENSITIVITY AND DIETARY HABIT AMONG SCHOOLCHILDREN IN MIYAZAKI

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Background and objectives: The common problems of eating habits in children are inadequate chewing, taking no breakfast, and dislikes of certain tastes. The purpose of this study is to clarify the sense of taste and dietary habit of primary schoolchildren.

Methods: The survey was conducted from February to December 2011 on 222 schoolchildren (112 boys, 110 girls, aged 11-13 years old) in Miyazaki, Japan. Taste examination was performed using five basic tastes (sweet, salty, sour, bitter, and umami) and five g dashi h soup (Japanese soup stock: brown kelp, dried bonito, mixed brown kelp and dried bonito, dried sardines and monosodium glutamate). The questionnaire survey (55 items) consisted of four scales; namely, dietary habit and life-style. We performed statistical analysis by Chi-square test, factor analysis by the least-square method, and path analysis.

Results: The rate of all correct answer tasting was 12.6% for the five basic tastes, and 30.6% for the five g dashi h soup. The taste sensitivity was higher for salty taste than for umami and bitter taste, and higher for brown kelp taste than for dried bonito and mixed taste. The high-score group of five basic tastes showed significantly higher scores in interested in good taste, learn how to cook by books and chewing food thoroughly than the low-score group. Factor analysis was conducted and five factors were extracted; namely, interest in cooking, intake frequency of vegetables and fruits, refrainment from eating between meals, refrainment from eating out, and enjoyment of sports. The path analysis revealed that the number of correct answers for the five basic tastes had significant direct effect on the interest in cooking .

Conclusions: These results suggest that the teachers and parents should work together to develop interest in cooking and sense of taste in the schoolchildren.

Key words: sense of taste, dashi, dietary habit, schoolchildren, interest in cooking.

PO1336

USING NEW METHODS TO ASSESS COVERAGE OF DECENTRALIZED NUTRITION PROGRAMMES IN COMPLEX EMERGENCIES IN EAST AND THE HORN OF AFRICA

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Background and objectives: For a long time acute malnutrition programmes have been implemented in complex emergencies but without scientific methodologies to evaluate population access and coverage.Currently low-resource methods capable of evaluating program coverage, identifying barriers to service access have been developed. Semi quantitative evaluation of access and coverage method was used to evaluate access and coverage and investigate any barriers to uptake.

Methods: In stage 1, prior, the expression of beliefs about coverage based on qualitative and qualitative data provided by the Mind Mapping exercise. The distribution of prior coverage estimate was determined through a beta distribution of the belief of or perceived possible coverage estimates. The prior estimate of programme coverage was then further refined by determining the likelihood through conducting a wide area survey. Using an active and adaptive case-finding methodology informed and defined by the information gathered during prior building, cases of severe acute malnutrition children were identified and categorized as either being in or out of the programme.

Results: Programme Coverage was 83.2% in galckayo, Somalia, 76% in Rwanguba and 68.9% in Masisi territory of Democratic republic of Congo, 63%.in Turkana county of Kenya, 67% in Durame in Ethiopia and 67.1% in Tonj South County of south Sudan. Major barriers to access included distance, insecurity, mothers' workload, cultural issues and long waiting times at feeding centres.

Conclusions: Even in protracted and complex emergencies, nutrition programmes can produce good quality and high coverage. They can still meet international SPHERE standards for coverage of more than 50% with enhanced access and decentralization.

Key words: coverage, complex emergencies, nutrition.

PO1337

2012 "DON'T GET DEHYDRATED" HEALTH CAMPAIGN

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Background and objectives: From July to September 2012 the 'Don't Get Dehydrated' health campaign was conducted in order to educate the populace about the importance of preventing dehydration to enjoy an enhanced quality of life and better health.

Methods: During the carrying-out of this campaign pharmacists throughout Spain offered pharmacy patrons personalized guidance with regards to hydration. To this end they employed a technical consensus document and a brochure for customers featuring '10 Dehydration Prevention Tips' to get their message across. These materials were distributed to pharmacies through the General Council of Spanish Pharmacists. Member pharmacists were also able to consult and download materials at www.portalfarma.com.

Results: The health campaign 'Don't Get Dehydrated 2012' featured participation by a total of 47 Spanish provinces, from whose pharmacies a total of 961, 850 brochures were distributed amongst the general population, offering them '10 Dehydration Prevention Tips.'

Conclusions: - Pharmacists play an essential role by informing and counseling the public about healthy lifestyle habits. - The widespread participation in this educational campaign led to preventive and awareness-raising efforts keys to an essential educational drive carried out by Spanish pharmacists. - There is a need for educational Health Campaigns making it possible to establish preventive and informative programs at all levels. These programs should encourage the adoption of healthier habits, based on our traditional diet, regular and moderate exercise, and shifts to healthier habits by the population.

Key words: Hydration, mineral salts, water.

PO1338

POST SUPPLEMENTARY AND THERAPEUTIC FOOD DISTRIBUTION AND UTILIZATION MONITORING SURVEY IN WUROR COUNTY, SOUTH SUDAN

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Background and objectives: The post distribution follow-up was conducted to investigate the utilization of emergency relief commodities provided with the aim of establishing how much of the rations were actually consumed by the malnourished child. The data collection was conducted by the nutrition staff as part of the routine home visits among beneficiaries. The target was families of children still registered in the humanitarian programme.

Methods: Primary caregivers of malnourished children under five year's children admitted in the supplementary or therapeutic programme. 90 randomly selected from 3 centres. Home visits done three to seven days after the distribution. Structured questions administered to families of beneficiaries. Physical examination of rations done to assess use and storage.

Results: Of the 90 families which had received the rations, only 20 (22%) had some of the 14 day-ration.65 (72%) of the mothers were able to produce the expected number of sachets 71 (78%) of the caregivers visited could not account for the entire Plumpy nut ration on the visit day. 13(14%) had more RUTF than was required. 69 carers (76%) of the mothers correctly described how to prepare porridge and only 43(47%) followed the method. Hygiene during preparation and serving was observed to be minimal. In distant villages, the mothers obtained water from the open pools, filtered it before using it for cooking.

Conclusions: Household practices on the utilization of emergency nutrition rations for treatment are poor.Intensification of post distribution home visits and follow-ups to ensure that the child under rehabilitation is crucial.

Key words: supplementary, Therapeutic, food distribution.

PO1339

RESPONSE EXECUTION/INHIBITION TRAINING WITH FOOD IMAGES ALTERS ON SUBSEQUENT EATING BEHAVIOUR

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Background and objectives: Some previous studies suggested that training to inhibit food-related responses may be effective to decrease food intake. In the present study, therefore, we examined whether response execution/inhibition training with images of three confectionaries (chocolate, manju (Japanese steamed bun stuffed with red bean paste), and sio-senbei (rice cracker flavored with salt)) affected subsequent their intakes.

Methods: For the training, we used a go/no-go task that involved repeatedly respond to a go signal or not to respond it to a no-go signal, both of which simultaneously presented with one of the images of three confectionaries or empty plate. A total of 80 Japanese university students, 40 male and 40 female, were divided into two conditions: go signal consistently presented with chocolate image (chocolate-go condition) or no-go signal consistently presented with chocolate image (chocolate-no-go condition). In both conditions, manju and senbei images were presented evenly with go and no-go signal. We measured amount of consumption of each confectionery in a sham taste test following the go/no-go training.

Results: Female participants ate 13.3 ± 9.4g (go condition) and 21.0 ±12.1g (no-go condition) of chocolate while male participants ate 26.8 ± 12.7g (go condition) and 17.5 ± 12.7g (no-go condition) of chocolate. Two-way ANOVAs on chocolate consumption did not reveal significant main effects of condition and gender, but revealed significant interaction of them ($F[1,76] = 10.378$, $p = 0.02$). On the other hand, two-way ANOVAs on manju and senbei consumptions reveal no significant main effect or interaction.

Conclusions: These findings demonstrate that,after the response execution/inhibition training with food images,eating behaviour only in the food whose image is used in the training might be altered differently between male and female. We suggest that such training might be effective for the control of eating behaviour.

Key words: eating behaviour, go/no-go training, food image

PO1340

DIFFERENCES IN BEVERAGE CONSUMPTION STRUCTURE FOR ADULTS IN RELATION TO AGE

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Beverage consumption may have a significant influence on a variety of health related elements, such as excess weight and obesity, diabetes therapy or the development of certain types of cancer. They are an important part of everyday diet. Aim: Comparison of beverage consumption between adults aged 18 – 24 and adults aged 55 – 64.

Method and material: 209 persons aged 18 – 24 and 199 persons aged 56 – 64 took part in the study. The average age was 21 and 60 years correspondingly. The consumption was assessed using a 7 day consumption log.

Results: The average beverage consumption in the younger group was at a level of 1,85l/day and 1,55l/day for the older. Water consumption was similar for both groups and was measured at 560 ml which made up for 33% of all liquids consumed. The senior group consumed a higher amount of warm liquids (782ml vs 648ml, 46 vs 38%) while the younger group drank more coloured soft drinks (140ml vs 40ml, 8 vs 2%). Additionally persons aged 18 – 24 drink more milk and fruit beverages. Alcohol consumption is identical and was measured to be 85ml on average making up for 5% of all the liquids consumed. Energy drinks are drank by younger persons but on average it's only 55ml – 3% of all liquids consumed.

Conclusions: Younger persons consume more liquids. Furthermore they drink more coloured soft drinks and fruit drinks. Older persons prefer warm beverages like tea and coffee. The results show the need for further education.

Key words: beverages, consumption, relation to age

PO1341

EPILEPSY: ANALYSIS OF NUTRITIONAL STATUS AND SERUM VITAMIN D LEVEL (VIT D).

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Background and objectives: In France, the number of people with epilepsy (PWE) is estimated to 500000. Their nutritional status is poorly studied. Impaired nutritional status might play a role in the response to treatment. Vit D might be involved in some forms of epilepsy.The main purpose of this study was to describe the nutritional status of patients with epilepsy and analyze their serum vit D level.

Methods: After consent, a nutritional assessment was performed in 46 PWE with or without drug resistance. Weight, height, body mass index (BMI), waist circumference, triceps skinfold (TS), biceps, supra-iliac, subscapular skinfolds, arm circumference, fat mass (FM) and fat-free mass (FFM) by bioimpedance were measured. The serum vit D dosage was realized before supplementation (deficiency <30 ng/mL). Statistical analysis used Student's t test, chi2 and ANOVA.

Results: The mean age was 44.5 ± 14.3 years, with a sex ratio M/F at 1.3. 60.9% were drug-resistant. BMI was 28.7 ± 7.0 kg/m^2, with 2.2% of malnourished and 30.4% obese. Vit D concentration was 15.3 ± 9.9 ng/mL with 87% of deficient patients, and 40% with severe deficiency (<10 ng/mL). The TS was higher in the drug-resistant group (p=0.03). Drug resistance was not linked with nutritional status, other skin fold measures, FM, FFM and vit D level.

Conclusions: The number of PWE was low, but the study shows that they are rarely malnourished. However, studies focused primarily on clinical cases or African populations. Obesity is common in PWE, possibly iatrogenic and should be deeply studied. Vit D deficiency is very common, often severe, but as nutritional status, seems not playing on the drug-sensitivity of patients studied.

Key words: Epilepsy, drug resistance, nutritional status, vitamin D.

PO1342

NUTRITIONAL VULNERABILITY OF UNDER-5 CHILDREN IN URBAN POOR SETTELEMENTS OF DELHI, INDIA: NEED FOR ALIGNING POLICY TO FOOD CONSUMPTION PATTERN

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Background and objectives: One in every three malnourished children in the world lives in India. Millions of children living in urban poverty confront daily violations of rights and fare poorer than rural counterparts in terms of undernutrition and under-5 mortality. Objective: To assess nutritional status of children residing in urban poor settlements of Delhi and identify factors that may affect their dietary consumption pattern.

Methods: A cross sectional study on random sample of 202 under-5 children from population of 30, 000 in 3 urban poor settlements of North-East district of Delhi. Nutritional status was assessed using standard anthropometric techniques, 2 days dietary recall along with food frequency questionnaire. Key socio-demographic characteristics, IYCF practices and dietary intake pattern were assessed.

Results: High prevalence of undernutrition with underweight (WAZ<-2SD) as 34.9 %, stunting (HAZ<-2SD) as 61.3% and wasting (WHZ<-2SD) as 10.2% was observed. Mean calorie and protein intake was higher than RDA for age. Mean intake for iron, zinc, thiamine, riboflavin, niacin, vitamin C was poor when compared to age specific RDAs. Mean consumption of vegetables (4 gm/day), fruits (32gm/day) and pulses(16gm/day) was sub-optimal. About 90% reported a daily consumption of packaged snack foods like chips, chocolates, local crisps, sweets, aerated beverages(known sources of saturated fat, trans fat, energy, refined carbohydrates and salt).

Conclusions: In spite of an adequate consumption of calories, habitual diet had poor nutritional quality. Targeted marketing, food policy especially pricing policy and easy access to unhealthy foods may have bearing on food behaviour of a vulnerable community. While addressing nutrition gap, it is essential to have a multidimensional approach and apart from creating awareness and access to community based nutrition services, there is need to create an enabling environment with nutrition sensitive policies that make healthier options more accessible and affordable to community.

Key words: Urban poor children nutritional status.

PO1343

BIOAVAILABILITY OF VITAMIN D2 AND D3 IN HEALTHY VOLUNTEERS – A RANDOMIZED TRIAL

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Background and objectives: Vitamin D exits as ergocalciferol (vitamin D2) and cholecalciferol (vitamin D3). It was the aim of the study to investigate whether both forms are bioequivalent.

Methods: We tested the effect of supplementation of either 50 µg/d vitamin D2, D3 or a placebo for a period of 8 weeks on 25(OH)D2, 25(OH)D3, total 25(OH)D serum levels, and parathyroid hormone in healthy volunteers. Blood samples were collected at baseline, after 4 and 8 weeks of supplementation.

Results: 25(OH)D3 decreased in the placebo group from 39.4 ± 14.2 nmol/L to 31.1 ± 12.4 nmol/L after 8 weeks ($p < 0.01$). In the vitamin D3 group, concentrations of 25(OH)D3 increased from 41.5 ± 22.8 nmol/L at baseline to 88.0 ± 22.1 nmol/L after 8 weeks ($p < 0.01$). In the group receiving vitamin D2, 25(OH)D2 concentrations increased from 1.3 ± 1.9 nmol/L at baseline to 51.2 ± 18.5 nmol/L after 8 weeks. The 25(OH)D3 concentration decreased from 36.4 ± 13.3 nmol/L at baseline to 16.6 ± 6.3 nmol/L after 8 weeks ($p < 0.01$). Total 25(OH)D was not different among the groups at baseline, but was significantly different among the 3 groups after 4 and 8 weeks (by ANOVA, $p < 0.001$).

Conclusions: Vitamin D3 is more effective than vitamin D2 which was demonstrated by the increase of the total 25(OH)D concentration. Vitamin D2 supplementation was associated with a decrease in 25(OH)D3 which can explain the different effect on total 25(OH)D.

Key Words: ergocalciferol, cholecalciferol, bioavailabilty.

PO1344

WHICH NUTRIENTS LIMIT CHANGES TO MORE SUSTAINABLE DIETS?

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Background and objectives: Improving the environmental sustainability of human diets is clearly desirable but changes to achieve this need to take into account nutritional requirements and recommendations. Recommendatios of some nutrients are harder to meet than others if animal foods are reduced, and it is important to be able to identify these.

Methods: Reducing greenhouse gas emissions (GHGE) was used as an indicator of improving sustainability. Linear programming was used to create diets that minimised GHGE while still meeting dietary requirements for health. These include requirements which are lower limits (energy, protein, vitamins and many minerals and micronutrients) and upper limits (fat, sodium). In the diets generated, some nutrient requirements tend to be at their limit and prevent further reduction of GHGE.

Results: In the diets generated, it became apparent that requirements for sodium (maximum) and calcium (minimum) were often at their limit. This meant that satisfying them prevented greater selection of lower GHGE food items. In the case of sodium, it was then possible to investigate the effect of reducing the amount in e.g. bread and breakfast cereals, as it tends to be added in processing rather than naturally present. In the case of calcium, fortification of wheat based foods allowed more of these to be selected instead of higher GHGE items which contained natural calcium. Reducing fat in foods also led to GHGE reduction, though this was less effective because fat reduction also reduces energy content, the primary requirement.

Conclusions: Some dietary requirements limit the ability to construct more sustainable diets. Policies such as reducing added sodium or considering further fortification of certain foods may have a role to play in improving diet sustainability.

Key words: sustainable diets, healthy, greenhouse gas emissions, food, nutrients.

PO1345

DIFFERENT HEALTH RELATED BEHAVIORS CONDUCTED BEFORE SCHOOL HOURS IN SEVEN EUROPEAN COUNTRIES – THE ENERGY PROJECT

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Background and objectives: Children in Europe have different habits before they start their schooldays. The purpose of this study was to create a score on "a good start of the school day" assessing different health related behaviors conducted before school hours in seven European countries, as well as assessing potential inequalities regarding gender, ethnicity and parental education in the score.

Methods: The study sample included 5595 children and one of their parents/caretakers from the ENERGY cross sectional study with data on health related behaviors. A score was created by four frequency items from the child questionnaire concerning breakfast and active commuting to school. Further, one item from the parent questionnaire about children's sleep hours, was added in the score. Each unit got one point per healthy behavior. Descriptive frequency analyzes, analyzes of variance (ANOVA) and Post Hoc test were used to assess the differences in socioeconomic status, ethnicity and gender.

Results: The children in Norway, The Netherlands, Belgium and Spain had a higher score than Greece Slovenia and Hungary. Children with highly educated parents had significantly more healthy morning habits ($p<0.001$) than children with low educated parents. Non-native children had a lower score, than natives ($p<0.001$). No such disparities were observed for gender differences.

Conclusions: In families with at least one highly educated parent, the children made more favorable choices before they began the school day. Being non-native was associated with a lower score. Gender was not associated with differences in how children start their school day.

Key words: Morning habits, socioeconomic status, children.

PO1346

ASSESSMENT OF THE POTENTIAL IMPACT OF THE NUTRITIONAL COMMITMENTS OF FOOD OPERATORS ON FRENCH NUTRIENT INTAKES

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Background and objectives: In accordance with French health authorities, food operators have signed voluntary commitment charters to improve the nutritional quality of their foodstuffs. The purpose of this study is to assess the potential cumulative impact of these reformulations on French consumers' nutrient intakes.

Methods: Initial nutrient intakes were computed by combining the data from the French individual consumption survey (INCA 2) and the CIQUAL food composition database. Potential new nutrient intakes were simulated by integrating improved nutrient contents to foodstuffs concerned by reformulations. These new contents were matched with the corresponding consumption data, according to the real market shares of these improved foodstuffs. New nutrient intakes were simulated for 1918 adults and 1544 children and compared to the initial intakes.

Results: Potential improved nutrient intakes differed significantly from the initial ones for all the nutrients studied (sugars, dietary fibers, lipids, saturated fatty acids, trans fatty acids, sodium, calcium, vitamin D). For instance for men, sodium and lipids intakes decreased (-1.1% and -0.4%) mainly due to reductions in delicatessen meats and sugar intakes decreased (-0.4%) mainly due to reformulations of dairy products and soft drinks. All socio-economic groups were significantly impacted by the reformulation agreements proposed and for all the nutrients studied (except for calcium).

Conclusions: This study represents an interesting tool to assess French nutritional policies. This impact assessment of reformulations proposed by food operators doesn't take into account all reformulations but only those defined in the agreements. This study highlights the limited potential impact of these reformulations on French nutrient intakes. Now, the magnitude of the impact depends on the number of food operators involved and on their market shares. That's why new commitments are needed to enhance the impact.

Key words: nutrition policies assessment, food composition, nutritional improvements, nutrient intakes, socio-economic groups.

PO1347

ADHERENCE TO THE DUTCH DIETARY GUIDELINES AND 20-YEAR MORTALITY: THE ROTTERDAM STUDY

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Background and objectives: The Dutch Healthy Diet index (DHD-index) assesses adherence to the Dutch dietary guidelines for a healthy diet of 2006. These dietary guidelines were mainly developed for preventing chronic diseases. Consequently, adherence to these guidelines as assessed by the DHD-index, should hypothetically lower the risk of chronic diseases as coronary heart diseases (CHD). However, this has not been examined yet. Therefore, we aimed to examine the association of the DHD-index with all-cause mortality and CHD mortality in the Netherlands.

Methods: We studied 4, 829 men and women aged 55 years and older from baseline (1990-1993) measurements of the Rotterdam Study. Maximum follow-up was 20 years. Coronary heart diseases and mortality cases were determined from general practitioners databases, hospital databases, and follow-up examinations. Diet was assessed at baseline with a 170-item food frequency questionnaire. Based on these dietary data the DHD-index score was calculated excluding the component on consumption occasions of acidic drinks and foods. This results in a range of scores between 0-90, where higher scores indicate better adherence to the dietary guidelines. Cox proportional hazards models were used to estimate hazard ratios (HR) and 95% confidence intervals (95% CI) adjusted for age, sex, total energy intake, smoking and educational level.

Results: Out of 4, 829 participants, 2, 394 (49.6%) participants died. In 3, 770 participants free of CHD, in 554 participants occurred fatal CHD event. A ten-unit increment in DHD-index score was inversely associated with all-cause mortality (HR: 0.92; 95% CI: 0.88-0.96), and CHD mortality (HR: 0.88, 95% CI: 0.81-0.96).

Conclusions: Better adherence to the Dutch dietary guidelines for a healthy diet was associated with a significant lower risk of all-cause mortality and CHD mortality

Key words: DHD-index, dietary guidelines, mortality, cohort.

PO1348

NEW MEANINGS OF EATING OUT FOR A GROUP OF ELDERLY IN BRASIL

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Background and objectives: To make meals out of home in major centers in Brazil is a habit that has becamed part of the daily life of a good portion of the population in recent decades, this is due to the accelerated pace of life, convenience, low cost, wide range of restaurants and industrial products and greater sociability. The home kitchen has no longer a central role in the preparation of meals and eating out has become a common practice in the lives of seniors. To understand this habit is a way to improve Public Health Programs. The objective of this study is to analyze the meanings of food habits of eating out in a group of elderly population.

Methods: Our study followed an Extension Program Promoting health and quality of life of elderly, developed at the Federal University of the State of Rio de Janeiro for 17 years, and, based on ethnography analyze the transition social phenomena of eating out considering the meaning that social actors attribute to their actions (Geertz, 1989).

Results: We realize that biological, psychological and social factors as retirement, widowhood and children leaving home are related to changes in food habits of elderly men living alone, beyond disinterest in preparing meals and a search for new environments more propitious to social relations. Eating outside became a way of socialization, besides being a form of inclusion in the globalized world.

Conclusions: frequenting food plazas eventually, especially when someone is alone, proved most interesting for the elderly than spending time in the kitchen to prepare a meal that will not always be shared. We observed that eating out as well as buy food outside and bring it back home promotes new kinds of relationships in this age range of the population

Key words: eating out, elderly, life style.

PO1349

LIFESTYLES AND RISK FACTORS ASSOCIATED WITH BASELINE ADHERENCE TO THE MEDITERRANEAN DIET IN THE PREDIMED TRIAL

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Background and objectives: The traditional Mediterranean dietary pattern (MedDiet) has shown a beneficial relationship with longevity and several chronic conditions such as with cardiovascular disease (CVD), obesity, and cancer. However, scarce information on who is more likely to follow this food pattern is available. We aimed to evaluate which factors are associated with lower MedDiet adherence in elderly Spanish subjects.

Methods: We included 7305 participants (men aged 55-80 y, women 60-80 y) at high CVD risk from the PREDIMED trial (ISRCTN35739639). Lifestyle, anthropometric and socioeconomic characteristics and CVD risk factors were collected. MedDiet adherence at baseline was evaluated with a validated 14-item questionnaire. Multivariate logistic regression models were used to estimate odds ratios (OR) and their 95% confidence intervals for lower adherence to the MedDiet (<9 points out of 14) and ascertain which factors were independently associated with adherence to the MedDiet.

Results: Former smoking (OR=0.87; 95% CI, 0.78-0.98), physical activity (OR for the 3rd vs. the 1sttertile: 0.69; 0.62-0.78), and higher educational level (OR for university vs. less than primary school: 0.54; 0.38-0.77) were associated with higher MedDiet adherence. Conversely, having a larger waist-to-height ratio (OR for 0.1 units, 1.35; 1.22-1.49), being diabetic (OR=1.13; 1.03-1.24), being single (OR=1.27; 1.01-1.61) or divorced or separated (OR=1.44; 1.09-1.89), and current smoking (OR=1.28; 1.11-1.47) were associated with lower adherence.

Conclusions: Participants with little education, a larger waist-to-height ratio, or diabetes and those who were less physically active, single, divorced, or separated, or smokers were less likely to adhere to the MedDiet, an ideal model for food choices. Stronger efforts of health promotion are needed in these groups to foster adoption of the MedDiet.

Key words: Mediterranean diet, lifestyle factors, PREDIMED trial.

PO1350

INCREASE IN BODY MASS INDEX IS ASSOCIATED WITH A WORST LUNG FUNCTION IN SPANISH MEDITERRANEAN SMOKERS WITHOUT RESPIRATORY DISEASE

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Background and objectives: Trends of overweight and obesity have increased dramatically in Spain. The aim of this study was to determine the association between body mass index (BMI) and the lung volumes in a smoking population without history of respiratory disease.

Methods: Cross-sectional study. Setting: 12 Spanish primary care centers. The period of study was between June 2008 and June 2010. Subjects: smokers of 10 or more packs/year, 35 to 70 years, of both sexes and no history of lung disease who consented to undergo spirometry with bronchodilator test. Study variables: demographic data, smoking habit, medical history, anthropometric measures and spirometric values. We performed multivariate analysis unconditional logistic regression, using SPSS for Windows v15.

Results: Sample comprised of 738 patients (53% male) with a mean age of 53.7 years old (SD: 8.3), BMI of 27.2 kg/m^2 (SD 4.8). With regard to smoking, consumption was 34.6 packs /year (SD: 21.8). Spirometric values were: FVC 93.3% (SD 16.5) and FEV1 94.7% (SD 18.1). In multivariate analy-

sis, after adjusting for all variables studied, were independent determinants for altering FEV1, age (OR:1, 05 ; IC95%:1, 03-1, 07), male gender (OR:2, 70 ; IC95%:1, 72-4, 25), smoking (packs/year) (OR:1, 01 ; IC95%:1, 00-1, 02) and BMI (OR:1, 05 ; IC95%:1, 02-1, 11), and FVC were age (OR:1, 05 ; IC95%:1, 03-1, 08), male gender (OR:3, 27 ; IC95%:2, 03-5, 26), smoking (packs/year) (OR:1, 02 ; IC95%:1, 01-1, 03) and BMI (OR:1, 11 ; IC95%:1, 06-1, 15).

Conclusions: BMI, as well as age, gender and accumulated consumption of tobacco is an independent determinant of lung function in Spanish Mediterranean smokers without a known respiratory disease.

Key words: Body Mass Index, Lung function, Smoking

PO1351

IRON STORES AND ANAEMIA PREVALENCE AMONG SCHOOL CHILDREN FED COWPEA-BASED FOOD PLUS FISHMEAL WITH VITAMINC-RICH DRINK

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Background and objectives: Iron deficiency anaemia affects growth, development and academic performance of school children. This study investigated the effect of cowpea-based food fortified with fishmeal consumed with vitamin C-rich drink on the iron status and anaemia prevalence among school children.

Methods: The study consisted of a cross-sectional baseline and a six month's nutrition intervention phase. The participants were 143 school children (78 males and 65 females), aged 6 to 12 years, randomly assigned into 3 groups: group I (cowpea + fishmeal + vitaminC), Group II (cowpea + vitaminC) and a control group (cowpea only). Socio-demographic data were collected using questionnaires at baseline. The following data were collected at baseline and end-line: height and weight by standard procedures, dietary data by 24-hour recall and food frequency questionnaires, haemoglobin concentrations by Haemocue Haemoglobinometer and serum ferritin by Enzyme Linked Immunosorbent Assay (ELISA). Malaria parasites and soil-helminthes were examined throughout the study.

Results: Mean ferritin concentrations at baseline were 23.21±12.64ng/ml, 24.96±18.67ng/ml, 23.53±13.81ng/ml; at end-line 32.71±21.45ng/ml, 27.62±16.29ng/ml and 26.83±17.06ng/ml for intervention group I, II and control group respectively. The mean haemoglobin concentration increased significantly in intervention I, intervention II and control group from 120.08 ± 9.8 g/L, 119.09 ± 12.4 g/L and 119.16 ± 10.4 g/L at baseline to 128.41 ± 7.2, 126.37 ± 8.9 g/L and 123.12 ± 6.6 g/L respectively at end-line. Prevalence of anaemia reduced largely in group I (23.5% to 3.9%), followed by group II (34.9% -9.3%) and control group (30.6% -18.4%).

Conclusions: Cowpea-based food plus fishmeal and vitamin C-rich drink consumption improved ferritin and haemoglobin concentrations significantly and reduced anaemia prevalence in school children. The meal promises to be an important dietary strategy for improving ferritin, haemoglobin concentration and controlling anaemia among school children.

Key words: Fishmeal, cowpea, anaemia, children, vitaminC.

PO1352

STABILITY IN WEIGHT STATUS DESPITE INCREASED SEDENTARY BEHAVIOR AFTER TWO YEAR FOLLOW-UP IN SWEDISH SCHOOLCHILDREN

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Background and objectives: Sedentary behavior and physical activity are factors influencing children's weight status. We aim to observe longitudinal changes in weight status and some lifestyle factors in schoolchildren in Western Sweden.

Methods: Anthropometric data from 1182 schoolchildren (7-9 y) in the county of Västra Götaland, Sweden were collected in 2008, following a standardized methodological protocol. A follow-up was conducted in 2010 including 1055 children (9-11 y). Included in this study were 810 children (69%) that were measured both years. Prevalence of pre-obesity and obesity were classified using International Obesity Task Force cut-offs. Parents filled in lifestyle questionnaires containing questions about physical activity and sedentary behavior. 555 children (69%) returned the questionnaire.

Results: Prevalence of pre-obesity was 13.0% in 2008 and 13.6% in 2010 (p=0.53), corresponding numbers for obesity

was 2.8% and 2.5% (p=0.44). Most children, 92%, remained in the same weight category both years, 4% increased one category, 4% decreased one category. One child moved two categories from normal weight to obese. 30% of children spent more time on sedentary activities in 2010, while 60% spent the same amount and 10% spent less time. At the same time, 33% of children increased the number of days they participated in sports over the 2 year follow-up, while 56% reported the same level.

Conclusions: Most children did not change weight category after two years of follow up. We observed an increase in sports participation as the children grew older but sedentary behavior also increased. It may be possible to identify positive and negative lifestyle changes in children after a relatively short period of time, which can be of importance when planning public health interventions.

Key words: child, obesity, lifestyle, longitudinal Acknowledgements Funded by the Swedish Research Council, The Swedish Council for Working Life and Social Research and Västra Götaland region.

PO1353

PERCEPTIONS, ATTITUDES AND PRACTICES OF UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF THE FREE STATE REGARDING DIETARY SUPPLEMENTS AND ALTERNATIVE DRINKS

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Background and objectives: The sales of dietary supplements and alternative drinks (including so-called energy drinks) run into billion figures worldwide, yet evidence to support the benefits of these products are often lacking. This study aimed to determine the perceptions, attitudes and practices regarding dietary supplements and alternative drinks of young South African adults.

Methods: A cross sectional descriptive study was conducted via a self-reported electronic questionnaire made available to all students. The questionnaire included assessment of perceptions and attitude of students regarding the use of dietary supplements and alternative drinks; and practices related to dietary supplement use, alternative drinks and food intake.

Results: The respondents (N=1311; 21±3yrs), were mostly female (54%); black (61%) or white (31%) ethnicity. The 63% who reported consuming supplements, indicated that they use vitamin (56%), mineral (31%), herbal (11%), sport (11%) and homeopathic (2%) supplements. In contrast less than 30% reported daily intakes of fruit and vegetables. Most users obtained information regarding supplements from the internet (35%) and magazines (34%), and supplements were mostly recommended to users by their families (45%), and friends (42%), with parents paying for supplements in 40% of cases. Eighteen persent of users reported having experienced side-effects. "Energy drinks" like Bioplus® (30%) and Red Bull® (28%) were popular mainly for the taste and to provide energy. Various misperceptions regarding supplements were also identified.

Conclusions: The use of dietary supplements and alternative drinks and misperceptions regarding these products were common among these students. Most relied on information and recommendations from unreliable sources and unqualified people. Interventions to educate students on the safe and efficient use of the products, and adequate fruits and vegetables consumption are required.

Key words: students, dietary supplements, perceptions, attitudes, practices.

PO1354

DOUBLE BURDEN OF MALNUTRITION IN AFRICA

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Background and objectives: Various studies have reported that despite increases in income in low-to-middle income countries, the problem of undernutrition is persisting, whereas it does generate new disease burdens related to overnutrition, with overweight and obesity as early signs. In the present study, we have analyzed associations between income and various indicators of over- and undernutrition for low-to-middle income countries in Africa.

Methods: Country statistics were obtained from the World Bank and from the WHO Nutrition Landscape Information System, and countries were classified into low, low-to-middle and upper middle income categories. Double burden of malnutrition was defined as a prevalence of stunting >30% and a prevalence of overweight >15% in children (aged< 5y), or a prevalence of BMI>25 >50% in adults within a country.

Results: Prevalence of stunting correlated negatively with income indicators (r=-0.63 to -0.70, P<0.001), whereas the prevalence of overweight in both men and women was positively correlated with income indicators (r=0.50 to 0.70, P<0.001). Large heterogeneity in the prevalence of both forms of malnutrition existed among African countries with a gross national income (GNI) per capita < 2, 000 US$. Seven out of 43 countries could be classified as experiencing the double burden of

malnutrition, namely Botswana, Comoros, Guinea-Bissau, Lesotho, South Africa, Swaziland, and Zimbabwe. Strikingly, three of these countries are low income countries and two are low-to-middle income countries.

Conclusions: The double burden of malnutrition is not confined to upper middle income countries, but is also present in low and low-to-middle income countries in Africa. Identification of the etiology of the double burden of malnutrition in low and low-to-middle income countries is urgently required in order to define integrative approaches to reduce stunting and to prevent overweight simultaneously.

Key words: Stunting; Overweight; Income; Double burden of malnutrition; Africa.

PO1355

DIETARY PATTERNS AND ASSOCIATED HEALTH-RELATED LIFESTYLE FACTORS IN DENMARK

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Background and objectives: Poor diet has been associated with increased risk of lifestyle-related diseases. Despite having had food-based dietary guidelines in Denmark since 1970'ties, the compliance is still low. Identification of major dietary patterns in the population may facilitate Health authorities in more targeted nutrition education towards potentially vulnerable groups in the population. The objective was to identify dietary patterns in the Danish population, and to describe associations with lifestyle factors.

Methods: Data derive from the Danish National Survey of Diet and Physical Activity, an ongoing, nation-wide cross-sectional survey. Food intake was assessed by means of a 7-days food diary in a sample of the adult Danish population (n=3354), recruited 2003-2008. Foods and drinks were combined into 53 overall food groups, and Principal Component Analysis (PCA) was applied to identify underlying dietary patterns. Multiple regression analysis was applied to determine associations between dietary patterns and gender, age and health-related lifestyle factors (smoking, physical activity and BMI).

Results: Three dietary patterns were detected: A Traditional pattern characterized by high correlation with rye bread, topping on bread, meat, potatoes and gravy; a Health Conscious pattern, highly correlated with fruit and vegetables, nuts, coarse bread, water and tea, and a Fast food pattern, correlated with pizza, hamburger, soft drinks, sweets and crisps. The traditional pattern was positively associated with being male and physically active, while the health conscious pattern was associated with age, and being female, non-smoker, physically active, and negatively associated with body mass index. The fast food pattern was negatively associated with age and being physically active.

Conclusions: Three dietary patterns were identified, and associations with health-related lifestyle factors were assessed. Identification of dietary patterns can be useful in future nutrition education to increase the proportion in the population complying with dietary guidelines.

Key words: Dietary patterns, PCA, lifestyle factors, Denmark.

PO1356

MODELLING OF USUAL NUTRIENT INTAKES: POTENTIAL IMPACT OF THE CHOICES PROGRAMME ON NUTRIENT INTAKES IN YOUNG DUTCH ADULTS

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Background and objectives: The Choices Programme is an internationally applicable nutrient profiling system with criteria for trans fatty acids (TFA), saturated fatty acids (SAFA), sodium, added sugar and for some product groups energy and fibre. These criteria determine whether foods are eligible to carry a "healthier option" stamp. The objective of this study was to evaluate these criteria by investigating the potential effect on nutrient intakes using an nutrient intake modelling method.

Methods: Data were combined from the 2003 Dutch food consumption survey in young adults (aged 19-30) and the Dutch food composition table into the Monte Carlo Risk Assessment (MCRA) model. Three scenarios were calculated: the "actual intakes" (scenario 1) were compared to scenario 2, where all foods that did not comply were replaced by similar foods that did comply with the Choices criteria. Scenario 3 was the same as scenario 2 adjusted for the difference in energy density between the original and replacement food. Additional scenarios were calculated when snacks were not or partially replaced.

Results: Calculated intake distributions showed that median energy intake was reduced by 16% by replacing normally consumed foods with Choices compliant foods. Intakes of nutrients with a maximal intake limit were also reduced (ranging

from -23% for sodium and -62% for TFA). Effects on intakes of beneficial nutrients varied from an unintentional reduction in fat soluble vitamin intakes (-15 to -28%) to an increase of 28% for fibre and 17% calcium.

Conclusions: This intake modelling method showed that with the consumption of Choices compliant foods, nutrient intakes shift towards population intake goals for the nutrients for which nutrition criteria were defined, while effects on beneficial nutrients were diverse.

Key words: nutrient intake modelling, nutrient profiling, reformulation.

PO1357

THE EPIC-GRANADA-GIPUZKOA PROJECT ON DIETARY PATTERNS, ANTIOXIDANTS AND BIOMARKERS OF OXIDANT-ANTIOXIDANT STATUS (EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION)

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Background and objectives: The role of antioxidant nutrients on the relationship between intake of antioxidant-rich foods and the prevention of chronic diseases remains unknown. Total Antioxidant Capacity (TAC) and dietary patterns are both a measure of overall exposure to antioxidants and to the diet, respectively. The project´s aims are to identify dietary patterns associated with TAC, and to examine whether biomarkers of oxidative stress are associated with TAC.

Methods: Cross-sectional study including 7, 879 and 8, 417 participants from Southern (EPIC-Granada) and Northern Spain (EPIC-Gipuzkoa), respectively, recruited during 1992-1996. TAC of the diet will be assessed through published TAC data (ORAC, TRAP, FRAP, DPPH, ABTS) in food. TAC in plasma will be analyzed in a subsample. Dietary patterns will be derived through a priori and a posteriori approaches, also considering different definitions of the Mediterranean Diet (MD), geographic variations (South-North Spain), Quality Diet Indexes and Dietary Guidelines. Statistical analysis: Regression analysis between TAC and the adherence to dietary patterns, and between TAC and antioxidant-oxidant and inflammation biomarkers, considering potential confounding variables and effect modifiers (smoking habits, and other lifestyle factors), will be performed.

Results: A dietary pattern characterized by a combination of food groups of high antioxidants content, such as the MD, is expected to be associated with a higher TAC. Variants of the MD might be more antioxidants rich, leading to higher concentrations of TAC and antioxidant status (carotene, vitamin C, vitamin E), and to lower levels of biomarkers (IL-6, IL-8, ...). This effect might be more prominent in subjects with healthier lifestyle habits.

Conclusions: This project will contribute to expand the knowledge on dietary patterns associated with a higher TAC and antioxidant status. The ultimate goal is to understand the role of dietary antioxidants in the aetiology of cancer and chronic diseases related to oxidative stress.

Key words: dietary patterns, antioxidants, biomarkers.

PO1358

PREVALENC OF UNDERNUTRITION IN HOSPITALIZED INFANTS IN TABRIZ, IRAN COMPARED TO GLASGOW UK

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Background and objectives: Hospitalized children are thought to be at high risk of undernutrition in developed, as well as developing countries, but little is known about undernutrition risk in children under one year. The apparent prevalence is likely to depend on the back ground prevalence of undernutrition, but also varies with the thresholds and measures used. We thus surveyed hospitalized infants in two countries to compare the prevalence of •Risk of undernutrition using the Paediatric Subjective Global Nutritional Assessment (SGNA) tool •Malnutrition using Triceps and subscapular skinfolds z score Subjects and

Methods: Infants were studied at admission to two tertiary children's hospitals, 210 in Glasgow UK and 187 infants in Tabriz, Iran, between September 2011 and 2012.

Results: Participants were aged mean (SD) 5.42 (2.97) months in Iran and 4.65 (3.43) months in UK. Their mean

lengths z-scores were similar (Iran -0.58 (1.53) UK -0.06(1.33)) but the Iranian children had much lower BMI (Iran -1.65(1.39) UK -0.45(1.23)). More Iranian than UK infants had high SGNA risk (Iran 59, 31.6%; UK 14, 6.7%; p=0.0001) and acute malnutrition, defined as skinfolds z score <-2 (Iran 54, 42.9%; UK 6, 5.4%; p=0.0001) but there were similar rates of medium risk (Iran 47, 25.1%; UK 63, 30.3%). Within each SGNA category UK children had markedly higher skinfolds than Iranian children. While in Iran 80%(33) of high risk and 45%(18) of medium SGNA risk children had SF z score<-2SD, in the UK only 17%(1) and 10%(3) respectively had SF z score<-2SD.

Conclusions: Higher rates of both undernutrition risk and acute undernutrition were seen in Iran than in the UK. Few of the UK children with raised undernutrition risk actually had objective evidence of undernutrition, but these were closely related in Iran.

Key words: undernutrition, skinfold, SGNA.

PO1359

ASSOCIATIONS BETWEEN DIETARY FATTY ACIDS AND BLOOD LIPIDS IN HEALTHY SOUTH AFRICAN ADULTS: THE PURE STUDY

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Background and objectives: Results from baseline Prospective Urban and Rural Epidemiology (PURE) study in South Africa, found higher prevalence of unfavorable blood lipid levels than previously documented in South African populations. We investigated associations between dietary fat and individual fatty acid (FA) intake and blood lipids of subjects from the PURE study.

Methods: Cross-sectional data analysis within the PURE baseline study of healthy subjects (n=2000, 35–70years) from rural and urban areas. Dietary data was collected and blood lipid analysis performed. Hierarchical multiple linear regression models were used to determine associations between blood lipids and dietary fat and FA intake, gender and urbanization.

Results: Dietary fat intake was significantly higher in urban (males=27%E, females=25%E) than rural areas (males=18%E, females=20%E), the same was true for specific FAs. However, essential FAs and long chain PUFA intake was below recommendations in all groups. Total cholesterol (TC) and LDL were higher in females than males, with no differences between rural and urban areas. Intake of ALA (C18:3n-3) was significantly associated with higher LDL (r=0.152, p=0.016) and triglycerides (r=0.241, p<0.001) in males, adjusting for age, urbanization, energy intake, BMI and physical activity. In females ARA (C20:4n-6) and EPA (C20:5n-3) were associated with higher TC (ARA: r=0.107, p=0.020 and EPA: r=0.283, p=0.014) and LDL (ARA: r=0.091, p=0.045 and EPA: r=0.252, p=0.027), while DHA (C22:6n-3) predicted lower levels of TC (r=-0.2, p=0.022) and LDL (r=-0.255, p=0.028).

Conclusions: Blood lipid profiles were more unfavorable in females than males. Though higher in urban areas, mean dietary fat intake was within recommendations. The low essential and long-chain PUFA intake in all groups is concerning, considering the inverse association of DHA with TC and LDL found in females. However, the positive association between ALA and TC, LDL and triglycerides in males was unexpected at such low levels.

Key words: blood lipids, dietary fatty acids, urbanization.

PO1360

EFFECTS OF VITAMIN D3 AND BETA-CAROTENE ON RISK OF ESOPHAGEAL SQUAMOUS CELL CARCINOMA-A CASE-CONTROL STUDY IN CHINA

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Background and objectives: Beta-carotene (BC) and vitamin D3 (VD3) may be protect factors for cancer risk, while the results are inconsistent, and few reports are about the effects of BC and VD3 on esophageal cancer in human epidemiologic studies. Our aim is to evaluate the etiological roles of BC and VD3 in the development of esophageal squamous cell carcinoma (ESCC) based on a case–control study in Huaian, China. Methods A population based case-control study was conducted in 100 new ESCC diagnosed cases from 2007 to 2008 and 200 residency- age-, and sex-matched healthy controls were recruited from Huaian, a high esophageal cancer incidence region of China. Food frequency questionnaire (FFQ) and reversed phase high-performance liquid chromatography (RP-HPLC were used to measure the beta-carotene intake and concentrations of beta-carotene and vitamin D3 in serum. We calculated the odds ratios (OR) and 95% confidence intervals (CI) by using the conditional logistic regression models. Results The dietary intake of beta-carotene was 3322.92 μg in case group and 3626.83 μg in control group per capita per day and

their quartile ranges (QR) were 3701.84 μg and 3866.05 μg. There was no significant difference on BC intakes between case and control groups by Wilcoxon test p>0.05. The OR values of highest quartile and the lowest quartile of vitamin D3 and beta-carotene are both 0.127.

Conclusion: The circulating vitamin D3 and beta-carotene in serum were associated with a reduced risk of ESCC in this China population. But no evidence was found between dietary beta-carotene intake and ESCC risk.

PO1361

IMPROVED BEHAVIOR IN CHILDREN AGED 3 TO 5 AFTER ONE YEAR OF A SCHOOL-BASED INTERVENTION FOR HEALTHY LIVING

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Background and objectives: The onset of inadequate lifestyle-related behaviors is known to occur early in life. An effective program for health promotion should focus on children, and include strategies capable of establishing life-long habits. We aimed to evaluate the efficacy of a behavioral intervention to introduce healthy lifestyle habits into children, their parents and teachers, through the school environment.

Methods: We carried out a cluster-randomized controlled intervention in schools from Madrid targeting 3-5 year old children. A total of 24 schools were assigned to the usual scholar curriculum or to engage in an additional multi-domain (Program SI!) intervention organized for a total duration of three years. Primary outcome are 1-year, and 3-year changes from baseline in knowledge, attitudes, and habits (KAH scores) of children, parents and teachers in regards to health-related (diet, physical activity, human body, and emotion's management) behaviors.

Results: There were 12 intervention schools and 12 control schools including a total of 2062 children, 1949 parents, and 150 teachers. Children in the intervention group showed a significantly larger increase (4.3%) in all overall KAH score. By class level, 3 year old-children benefited the most, with an increment 5.8% higher than the controls. By domain, the largest difference was found in the KAH-physical activity score (6.4% more on intervention). No effect for the emotion domain was found. There was a significant interaction with children's age (p=0.046), as well as children's baseline score (p=0.051), and parental socioeconomic characteristics (p=0.008), and higher economic status (p=0.011).

Conclusions: Interim results after 1-year intervention with the Program SI! can be consider as a proof of an effective, and feasible preventive strategy at improving knowledge, attitudes and habits related to a healthy lifestyle in very young children.

Key words: Comprehensive health; Behavior; Lifestyle; Cluster-randomized controlled intervention

PO1362

OPEN (OBESITY PREVENTION THROUGH EUROPEAN NETWORK), STRENGTHENING AND UP SCALING THE IMPLEMENTATION OF COMMUNITY-BASED PROGRAMMES AT EUROPEAN LEVEL

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Background and objectives: Building on the EPODE European Network (EEN) project (2008-2011) and according to the needs of the Community-based Programmes (CBPs) OPEN is a project supported by the European Commission (DG SANCO), aims to scale-up a minimum of 12 European Community-Based Programmes/Initiatives (CBPs/Is) that involve communities, in terms of quality and amount of actions developed and in term of increased diversity of the target groups reached. This, in order to reduce overweight and obesity among children and adolescents, including socially deprived groups.

Methods: During 3 years, OPEN will base its childhood obesity prevention approach on the EEN recommendations and recent EU-funded researches (ENERGY, SPOTLIGHT, TEMPEST, IDEFICS). The CBPs progress will be measured according to the WHO Good Practice Appraisal tool. An OPEN Coordination team will assess the needs of 12 CBPs from 17 European countries willing to strengthen their methodology and improve their interventions. A scientific committee will gather, disseminate and facilitate practical application on the field of evidence and practice-based findings.

Results: A network of 7 universities and scientific partners interested in the issue of 9 Community/School-Based Programmes and 2 European health promotion boards to develop coordinated research plans in health-related diet and physical activity behaviours in the future was created with the support of DG Sanco.

Conclusions: OPEN will focus on increasing amount and efficiency of local actions developed among various target groups and facilitate implementation of innovative actions and dissemination through a best practice database to support the development and the efficiency of CBPs.

Key words: Community-Based Programmes, Prevention, obesity, healthy lifestyle.

PO1363

STRENGTHS AND WEAKNESSES OF COMMUNITY-BASED PROGRAMMES FOR OBESITY PREVENTION

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Background and objectives: The EPODE International Network (EIN) is a non-governmental organisation which has been created to support Community-Based Programmes (CBPs) aimed at preventing obesity. Today, 25 CBPs are member of this network (9 in Europe, 11 in America and 5 in Asia-Pacific region). The objective of this study was to identify the strengths and weaknesses and the needs of these programmes in terms of scientific and strategic expertise, evaluation processes, political and institutional commitment, Public-Private Partnerships (PPP), programme visibility and communication strategy.

Methods: The programme managers were interviewed around three topics: Network Functioning, Strengths and weaknesses, experience sharing. The aim of the first part was to identify the four main expectations of the CBPs towards the three network supporting platforms (Scientific, PPP and Political). The second part was dedicated to explore the strengths and weaknesses of the CBPs (self-reported) and the last one to identify their global needs.

Results: In total, 19 out of 25 CBPs members of the EIN answered the questionnaire (76% response). The main expectations reported by the CBPs are the need of a methodological support within their monitoring and evaluation process, a sustainable funding and a guidance for building and managing PPP. The strengths and weaknesses will be presented during ECO. One of the aspects that emerge is the need of a greater link between the field and the scientific community. **Conclusions:** Based on this study the EIN will suggest a pragmatic methodology to improve the functioning and sustainability of the CBPs aimed at preventing obesity.

Key words: Community-Based Programmes, prevention, obesity, evaluation, coordination.

PO1364

CHILDHOOD OBESITY PREVENTION : A SIGNIFICANT DECREASE OF OVERWEIGHT PREVALENCE IN TWO PILOT TOWNS OF THE VIASANO PROGRAMME AFTER 2 YEARS OF INTERVENTION.

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Background and objectives:VIASANO is a Community Based Programme in Belgium adapted from the EPODE methodology. It is a coordinated, capacity-building approach for communities to implement effective and sustainable strategies to prevent childhood obesity. This methodology enables the entire community to be empowered and contribute to create a healthier environment facilitating social norm changes and healthier behaviours.

Methods: The interventions involved the whole population of these pilot towns (families and children) in whole-of-community actions targeting physical activity and nutrition. The national coordination team using social marketing and organizational techniques trained and coached a local project manager nominated by the local authorities. The project manager was provided tools to mobilize local stakeholders through a steering committee and local network. The BMI of the children was assessed in 2008 and then 2 years later (in 2010) in the two pilot towns and in the French Community as comparator.

Results: Over 1300 Children aged 3-6 were assessed in VIASANO towns in 2008 and 2010. There was a significant 22% reduction in the prevalence of overweight in these pilot towns between 2008 and 2010 ($p<0, 04$) and between these pilot towns and comparison towns of the French Community.

Conclusions: The results of this whole community programme are supporting the encouraging results of EPODE methodology which show that the involvement of the whole community is necessary to reduce the prevalence of childhood obesity.

Key Words: Prevention, obesity, decrease, evaluation.

PO1365

EPHE (EPODE FOR THE PROMOTION OF HEALTH EQUITY), A 3 YEARS EUROPEAN PROJECT TO PROMOTE HEALTHIER LIFESTYLES AND REDUCE OBESITY-RELATED HEALTH INEQUALITIES

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Background and objectives: Background and objectives:"Overweight and obesity most affect people in lower socioeconomic groups, and this in turn contributes to a widening of health and other inequalities". EPHE is a European project designed to evaluate how Community-Based Programmes (CBPs) can reduce health inequalities linked to diet and physical activity.

Methods: This 3 year project will conduct a pilot-life testing in 7 communities around Europe implementing the EPODE methodology with CBPs (Belgium, Bulgaria, France, Greece, Portugal, Romania, The Netherlands). They will implement 2 years whole of population interventions enhancing the deprived population around 4 themes: improve fruits and vegetables consumption, sleep duration and water consumption and decrease sedentary lifestyle. The evaluation will be conducted on each of these 4 themes and a quartile analysis of income will be done to compare results from the highest and lowest quartiles within and in-between communities. Each CBPs will evaluate 150 families through questionnaire. The questionnaire will be anonymous and will be made up of three parts, so as to appropriately analyse the aforementioned measurements: • Assessment of SES, in terms of education, profession and social status • Assessment of the behaviour of the four themes and their determinants •Parents' perception of a healthy body

Results: 7 Communities-Based Programmes together with 8 European Universities are involved in this project and the results of the first survey will be presented during the IUNS.

Conclusions: This project will lead to produce concrete guidelines and best-practices for policy makers, health promotion services to implement sustainable and focused strategies among communities to reduce health inequalities linked to diet and physical activity.

Key words: health inequalities, prevention, reduction, community.

PO1366

DIETARY INTAKE OF PHYLLOQUINONE IS RELATED TO A REDUCED RISK OF ALL-CAUSE MORTALITY: THE PREDIMED STUDY.

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Background and objectives: Vitamin K has been associated with a reduced risk of CHD and fatal cancer. Dietary menaquinones intake has been associated with cancer mortality. However, the association between the dietary intake of vitamin K and all-cause mortality has not been evaluated in a Mediterranean population at high cardiovascular risk.

Methods: A prospective analysis was conducted in 7216 participants in the framework of the PREDIMED cohort (median follow-up: 4.8y). Energy and nutrient intakes were evaluated using a previously validated 137-item food frequency questionnaire. Dietary phylloquinone and menaquinone intake was calculated using the USDA database and previous published

data, respectively. All-cause mortality was verified by medical records and consultation of National Death Index. Cox proportional hazard models were fitted to assess the relative risk of all-cause mortality.

Results: At baseline, energy-adjusted dietary phylloquinone intake was associated with a significantly reduced risk of all-cause mortality after controlling for potential confounders (HR: 0.64; 95% CI: 0.43, 0.96). No significant associations were found between quartiles of energy adjusted dietary menaquinones intake and risk of all-cause mortality. In a longitudinal manner, subjects who increase their consumption of vitamin K, phylloquinone or menaquinone, had a lower risk of all-cause mortality (HR: 0.58; 95% CI: 0.45, 0.74 and HR: 0.59; 95% CI: 0.45, 0.78, respectively) compared with subjects who decrease their consumption.

Conclusions: The results showed that an increase of dietary intake of vitamin K is related with a reduced risk of all-cause mortality in a Mediterranean population at high cardiovascular risk.

Key words: Vitamin K, Mortality, Phylloquinone, Menaquinone.

PO1367

ANTHROPOMETRY AND BLOOD PRESSURE IN 3-5 YEAR OLD CHILDREN OF MADRID: PROGRAM SI! STUDY

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Background and objectives: The Program SI! for comprehensive health is a multi-level school-based intervention working on four key domains (diet, physical activity, human body and management of emotions) for the promotion of a healthy lifestyle. The intervention has been initiated at preschool (3-5 years) level, and its efficacy to modify children's behavior is currently evaluated. As part of this evaluation, anthropometry and blood pressure measurements have been collected at baseline to assess the long-term impact of the intervention.

Methods: The design of the study was a cluster-randomized controlled intervention trial including 24 public schools of Madrid (Spain). Weight, height, skinfolds thickness (triceps and subscapular), waist circumference and blood pressure were assessed in 2011 children (1009 boys and 1002 girls). Body fat was calculated according to Slaughter. Obesity and overweight were defined in relation to BMI international references proposed by the IOTF.

Results: Percentage of body fat in boys and girls was 14.5±3.6 and 15.8±3.5 respectively, waist circumference was 52.2±4.0 for boys and 51.6±4.1 for girls, and systolic / diastolic blood pressure was 99.6±8.2 / 60.0±7.2 for boys, and 98.5±8.4 / 61.2±7.4 for girls ($p<0.01$, for all). The prevalence of overweight children was 10% for boys (n= 101), and 14.9% for girls (n= 149) ($p<0.01$), and for obese children was 4% for boys (n=40), and 4.6% for girls (n= 46) ($p<0.01$) using BMI categories.

Conclusions: Obesity is less prevalent in these children in comparison to other studies in Spain with the same age range. Significant changes in anthropometric and clinical parameters of children in the intervention group will determine the long-term efficacy of the intervention.

Key words: Obesity, body composition, blood pressure, health promotion, children.

PO1368

MEDITERRANEAN DIETARY PATTERNS IN 3-5 YEAR OLD CHILDREN AND THEIR PARENTS: THE PROGRAM SI! STUDY

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Background and objectives: Dietary habits are developed early in life. It is therefore important to understand the determinants of this development in order to design effective strategies for health promotion. Parental dietary patterns may be one of the most important determinants of children's dietary choices. Our aim is to evaluate the parental adherence to a MD and its impact to the MD quality of their children.

Methods: 24 schools from Madrid, including 2, 062 children aged 3-5, were recruited to carry out a cluster-randomized controlled trial: The Program SI! for Comprehensive Health. A total of 1, 949 parents completed a questionnaire about their children's MD quality by means of a validated questionnaire (KIDMED score). In addition, we evaluated the parents MD with the PREDIMED score (0-14 points). Information on fruit,

vegetables, fish, olive oil, and nuts consumption is provided by both questionnaires.

Results: The KIDMED score was 7.5±1.9. The MD quality distribution was classified as Poor in 2.4%, Average in 47.1%, and Good in 50.5% of the children. As for their parents, the average PREDIMED score was 6.3±2.4. Parents' adherence to MD was significantly associated with that of children (r=0.326; p<0.001). Furthermore, both parents and children follow a similar pattern for fruits, vegetables, fish and olive oil consumption (p<0.001), but differed in the consumption of nuts (p=0.424). In addition, a higher percentage of Good MD quality was observed in children from parents with upper educational level (67.9%) compared with middle (19.2%) and lower education (12.8%) (p<0.001).

Conclusions: In this particular Spanish population from Madrid, the parents' adherence to MD positively affects their children's dietary habits. The parents' educational status seems to play a mediating role in the beneficial effect of children's MD quality.

Key words: Mediterranean diet, preschoolers, parental education.

PO1369

ASSESSING THE CONTINUUM OF THE DELIVERY PROCESS OF AN INFANT AND YOUNG CHILD FEEDING PROGRAM IN ETHIOPIA

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Background and objectives: Process evaluation that is guided by program impact pathways (PIP) can shed light on critical challenges to delivery of interventions. Our study analyzed the PIP of a behavior change communications intervention implemented as part of Alive & Thrive, an initiative to improve infant and young child feeding (IYCF). The intervention is integrated into the Health Extension Program in Ethiopia through a cascade of training. The study aim was to determine linkages and gaps across levels of the delivery process.

Methods: Semi-structured interviews were conducted with supervisors (n=8), health extension workers (HEW) (n=16), community volunteers (n=48), mothers (n=80) and fathers (n=32) in two regions. Data were coded using NVivo and analyzed based on a mapping of the PIP developed with stakeholders. We triangulated responses on four topics: (1) training received, (2) use of program tools, (3) work performance context, and (4) exposure to program messages, across four levels: woreda (district), kebele (ward), gote (village/town) to households.

Results: Program-specific IYCF training reached all supervisors and HEWs in one region, but appeared variable in the other. The cascade of training was least effective at reaching volunteers, who are in most frequent contact with communities. There were competing sources of training from other programs at various levels. Patterns on the use of program tools were similar to those of training. Factors influencing work performance differed between health workers and volunteers. Volunteers had flexibility in dealing with workload, unlike the more constrained health workers. Overall, exposure and knowledge of program messages among beneficiaries were still weak.

Conclusions: Using the PIP analysis enabled us to identify patterns of linkages, gaps and the drivers along the continuum of the delivery process, leading to a cohesive understanding of the overall program process.

Key words: process evaluation, program impact pathway, infant and young child feeding, Ethiopia.

PO1370

TRANS FATTY ACIDS IN EUROPEAN DIETS

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Background and objectives: Consumption of trans fatty acids (TFAs) has been linked to adverse health effects. Efforts to reduce exposure to TFAs are on-going in different countries and regions. We aimed to collect the most recent data on the presence of TFAs in foods and their intake by the European population

Methods: A structured search of scientific articles in the English language, conducted in Europe from 2004 to 2012, was undertaken. In addition, the EuroFIR AISBL was used to extract data from national food composition datasets on TFA levels in foods.

Results: We will present the data obtained. A preliminary analysis shows that there is limited information on the consumption of TFAs in Europe over the last decade. Nevertheless, we identified eight studies on TFA intakes, four of which report separately the intake of industrial, ruminant and total TFA. We also identified twenty-eight articles evaluating the presence of TFAs in foods in Europe; eight of these, also distinguished between industrial and ruminant TFA present in foods. Twenty-six national food composition databases provide information on TFA.

Conclusions: The limited information on TFA intake in Europe is of concern. Specific population groups may be at risk of

consuming more than the recommended 1% of energy from TFAs and therefore various stakeholders from food industry to public health authorities should address this gap.

Key words: public health, trans fatty acids, European region, policy.

PO1371

THE MEDITERRANEAN LIFESTYLE INDEX: A MEASUREMENT INSTRUMENT

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Background and objectives: Scientific evidence indicates that adherence to the Mediterranean diet (MD) is associated with decreased cardiovascular risk. However, it is well accepted that this association may be also influenced by other characteristics of the Mediterranean lifestyle. Our aim was to create an overall lifestyle index (MEDLIFE) that includes traditional Mediterranean-related patterns besides food consumption, and to assess its concordance with previously reported diet-quality scores.

Methods: MEDLIFE was created based on the current Spanish Mediterranean Food Guide pyramid. MEDLIFE, as well as other known diet-quality scores (alternative Healthy Eating Index (aHEI), alternative Mediterranean Diet Index (aMED), Mediterranean Diet Adherence Screener (MEDAS)) were calculated by using a FFQ that was administered to 988 participants of the Aragon workers' health study (AWHS). The MEDLIFE is a 28 item- derived index consisting of questions about frequency of food consumption (15), Mediterranean food habits (7), physical activity, as well as social habits (6).

Results: Participants presented an average MEDLIFE score of 11.3±2.6. Only a 6.1% met 1-point criteria for processed meat < serving/week) and white meat (2 servings/week). Less than a 50% achieved 1-point for fruit (18%, 3-6 servings/day), nuts (19.7%, 1-2 servings/day), olive oil (28.1%, >3 servings/day) and legumes (31.1%, >;2servings/ week) consumption. However, 90.2% and 80% consumed fish/seafood and vegetables > servings/ week respectively. Only a 15.7 % consumed 1-2 servings/ day of wine, and 69.1% reported no nibbling habits. Concerning social habits, 40.9% take a nap, 81.2% sleep between 6-8 hour/day, and 54.5% socialize with friends>2hour/ weekend. Finally, the MEDLIFE score was significantly associated with various diet quality-scores (aHEI, aMED, MEDAS) ($p<0.001$) (CI range: 0.44-0.62).

Conclusions: MEDLIFE is the first quality index including overall lifestyle habits. It is expected to be a valid instrument to measure adherence to Mediterranean lifestyle in epidemiological studies.

Key words: diet quality, Mediterranean diet, diet score.

PO1372

CONSTRUCT VALIDITY ASSESSMENT OF AN ADAPTED VERSION OF THE SAIN, LIM NUTRIENT PROFILING SYSTEM

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Background and objectives: Nutrient profiling allows ranking or classifying foods according to their nutrient composition. Existing systems are usually based on public health issues from developed countries. As part of a project aimed to develop an operational tool to be used both in developed and lower-income countries, the objective of this study was to assess the construct validity of an adapted version of the SAIN, LIM nutrient profiling system in a French adult population.

Methods: The adaptation of the SAIN, LIM system consisted in using international references for nutrients to limit (i.e. free sugars, SFA and sodium) and local recommendations for nutrients of concern (i.e. protein, fiber, vitamin C, iron, calcium and as optional vitamin D). The algorithm and classification of foods were also adapted, using 3 classes: rebalancing foods (Class A), neutral foods (Class B) and unbalancing foods (Class C). Construct validity was assessed, using linear programming, with dietary data and food database derived from the INCA French dietary survey (n=598 foods). Different hypotheses were tested to assess how the three food classes can contribute to a 2000kcal balanced diet (e.g. is it possible to have a balanced diet without class A foods?).

Results: Foods from class A were mandatory to design balanced diets, while unable alone to design unbalanced diets. It

was unfeasible to achieve balanced or unbalanced diets with class B foods only. Class C foods allowed designing unbalanced diets but not balanced diets, even combined with class B foods. The combination of foods from classes A, B and C could result in both balanced and unbalanced diets.

Conclusions: This adapted version of the SAIN, LIM is considered as valid in this French adult population. Other local contexts (India, Indonesia, USA) are currently under investigation.

Key words: Nutrient profiling system, construct validity, linear programming, diet modeling.

PO1373

MEDITERRANEAN DIET AND COGNITIVE FUNCTION: THE SUN PROJECT

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Background and objectives: The Mediterranean diet (MD) has been hypothesised to have a neuroprotective effect on cognitive function. The aim of this study was to evaluate the association between MD and cognitive function in a subsample of 823 participants (62 ± 6 years at baseline) of the SUN Project.

Methods: A validated 136-item food frequency questionnaire was used to assess the adherence to the MD at baseline, according to a nine-point score, presented in three categories (low, medium and high). The cognitive function was evaluated with the Telephone Interview of Cognitive Status-modified (TICS-m) for first time at 2008-2009 and for second time two years later. The association between MD adherence and cognitive function was assessed with linear regression models after adjusting for potential confounding variables.

Results: In the first evaluation of the cognitive function no significant association was detected between MD adherence and TICS-m score. In the second evaluation, participants with a medium adherence to MD presented a significantly lower TICS-m score compared with those with high adherence (b = -0.63, 95 CI%= -1.07 to -0.18). Also, a higher loss of cognitive function (score at second evaluation minus score at first evaluation) was observed among participants with low and medium adherence to MD in comparison to those participants with a high adherence (b = -0.51, 95 %CI= -0.98 to -0.03 and b = -0.68, 95 %CI= -1.13 to -0.24, respectively) **C**

onclusions: A high MD adherence might be associated with a better cognitive function. However, further studies are needed to confirm this finding.

Key words: Cognitive function, Mediterranean diet, SUN study Acknowledgements: The SUN Study received funding from the Spanish Government (Grants PI01/0619, PI030678, PI040233, PI042241, PI050976, PI070240, PI070312, PI081943, PI080819, PI1002658, PI1002293, RD06/0045, G03/140, 87/2010), and the Navarra Regional Government (36/2001, 43/2002, 41/2005, 36/2008, 45/2011).

PO1374

INSTAPA: IDENTIFYING INNOVATIVE STAPLE FOOD BASED STRATEGIES TO ALLEVIATE MICRONUTRIENT DEFICIENCIES FOR HEALTH AND DEVELOPMENT OF WOMEN AND CHILDREN IN AFRICA

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Background and objectives: Micronutrient deficiencies are a leading cause of mortality and morbidity in young children and women. Food-based approaches involving commonly consumed staple foods such as sorghum, millet, cassava and maize, can sustainably increase micronutrient intake. INSTAPA aims at identifying innovative staple food based strategies to alleviate iron, zinc and vitamin A (VA) deficiencies in Africa.

Methods: Research was organized in 5 workpackages: (1) biofortification of sorghum (Fe) and cassava (VA); (2) optimization and (3) fortification of traditional sorghum and millet based diets; (4) safety of Fe fortification combined with supplementation in pregnant women in malarious areas; (5) long-term effect of micronutrient powders (MNP) on child development. Study approaches included acceptability studies, dietary intake assessment, randomized controlled trials and iron absorption studies conducted in Kenya, Mali, Benin and Burkina Faso. **Results:** Yellow cassava (7-12 ppm beta-carotene) was acceptable for consumption and doubled VA intake by children. Conventional breeding did not increase Fe and Zn levels in sorghum sufficiently. However, accompanying sauces based on Roselle and amaranth leaves were formulated with sufficient bioavailable Fe, Zn and VA. NaFeEDTA and Zn sulphate are the preferred fortificants for sorghum and millet based foods. However, asymptomatic malaria may blunt effect of iron fortification in malaria endemic areas. Flour fortification at posho mills increased percentage of children and women meeting their iron requirements. After 6 months, MNP supplemented children improved eye-hand coordination compared to unsupplemented children. Findings were incorporated in a training module for stakeholders.

Conclusions: Food-based approaches are promising in improving micronutrient intake. Opportunities for adding nutrient value in the supply chain differ per staple food and per micronutrient. Interaction between infections and micronutrients in food-based approaches should be further studied. Acknowledgements The project was realized in the EU-FP7 framework [FP7/2007-2013, 211484].

Key words: Staple foods, food based approaches, malaria, micronutrients, cognitive development.

PO1375

IDENTIFYING BARRIERS PREVENTING LATINA WOMEN FROM ACCESSING WIC ONLINE NUTRITION INFORMATION

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Background and objectives: The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) is a program for low-income women and children under age five. The purpose of this study was to identify barriers to accessing online WIC resources among Latina WIC clients.

Methods: Five focus groups were conducted with Spanish-speaking participants recruited from a single WIC clinic.

Results: Two key themes emerged relating to barriers in accessing WIC's online resources. The first theme, access issues, included three subthemes: lack of computer/Internet resources; family barriers to computer use; and computer literacy. The second theme, perceived value of the website, included three subthemes: limited time savings; preference for on-site education; and knowledge about the website.

Conclusions: This is the first study to evaluate barriers to accessing online resources among Latina women in the WIC program. WIC sites attempting to increase utilization of online resources may be more successful if they serve clients with easy access to a computer with Internet access. They may also consider strategies to increase the value of the online resources, as compared to their current services offered to clients in a face-to-face setting.

Key words: WIC, Latinos, focus groups, computers, Internet.

PO1376

PHYSICAL ACTIVITY, OBESITY, AND ALL-CAUSE MORTALITY IN THE EPIC STUDY

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Background and objectives: The risk of premature death due to excess adiposity may be attenuated by physical activity. **Methods:** Physical activity (PA), assessed by the 4-category Cambridge index, was examined in relation to mortality risk among 338, 215 participants with measured height, weight, and waist circumference (WC) in the multicentre EPIC cohort study. The association of PA on mortality risk was estimated by meta-analysis of centre-specific hazard ratios (HR), adjusted for sex, education, smoking, alcohol intake, BMI, and WC. Cross-classified groups of PA by BMI [<18.5 kg/m2 (underweight), 18.5-24.9 kg/m2 (normal weight), 25-29 kg/m2 (overweight), 30-34.9 kg/m2 (obese I), >35 kg/m2 (obese II)] and WC quintiles were examined in relation to mortality risk

with Cox proportional hazard models, adjusted for education, smoking, and alcohol intake, and stratified by centre, sex, and age of recruitment.

Results: During a mean follow-up time of 12.4 years, there were 21, 738 deaths (11, 183 men and 10, 555 women). The risk of mortality was 10% lower per one category increase in PA (HR 0.90, 95% CI 0.89-0.92). In the combined association analysis, the risk of mortality was significantly lower across increasing levels of PA within all strata of BMI and WC. Relative to the active/normal weight group, mortality risk was higher among the active/obese I group (HR1.34, 95% CI 1.21 - 1.49) and among the inactive/ normal weight group (HR 1.53, 95% CI (1.42 - 1.66), whereas no association was detected in the active/ overweight group. Similar results were obtained in the combined WC quintiles/PA analysis.

Conclusions: The greatest reduction in premature mortality risk is likely to be achieved by a combination of lower general and abdominal obesity and increased physical activity, however, higher levels of PA are associated with lower risk of mortality at all levels of adiposity.

Key words: Physical activity, BMI, waist circumference, mortality.

PO1377

DOES NUTRITION LABELING HELPS CONSUMERS MAKE HEALTHIER FOOD CHOICES?

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Background and objectives: Nutrition labeling is a means of informing consumers about the nutrient content and messages about food and health that appear on the labels of commercial foods. Such labeling would help consumers choose healthier foods. Several studies conclude that at European consumers show interest the nutritional information on the packaging, but it is unknown understood that information. To assess whether nutrition labelling influences consumers when choosing a product.

Methods: Literature review of studies evaluating the influence of nutrition labeling when buying a product. We did a search in Medline (PubMed) and the Cochrane Library. Key words established as descriptors (Mesch): food labeling, nutrition labeling, consumer behavior. Were established as inclusion criteria to evaluate all those studies consumer behavior when choosing a product, taking into account the information of nutrition labeling.

Results: There were a total of 39 articles, 9 of which met the inclusion criteria. The results show that consumers are able to use the nutrition information, but the choice is not based on the product is healthier, not on qualities such as taste and price. The choice is determined by consumer motivation and product design.

Conclusions: To ensure that consumers better understand the nutritional labeling and use them to choose healthier foods, you should design programs and education policies to ensure food labeling compression, besides establishing a standardized format: simple, clear and legible.

Key Words: food labeling, nutrition labeling, consumer behavior.

PO1378

TECHNOLOGY FOR HEALTH: A QUALITATIVE STUDY ON BARRIERS TO USING THE IPAD FOR DIET CHANGE

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Background and objectives: Emergence of tablet computers has led to interest in their use to impact health-related behaviors of users. However, little is known regarding which devices are most effective for changing these behaviors, and whether or not these devices or accompanying applications (apps) are feasible or desires vehicles for behavior change.

Methods: Four focus groups were conducted with students from a Midwestern university who were given iPads to download diet-related apps. Participants were asked questions about preferences regarding iPad functionality, app functionality, and the likelihood of using apps and iPads for facilitating diet-related behavior change in the future.

Results: Two key themes emerged from focus group discussions on diet-related apps for iPads and their usefulness to facilitate behavior change. The first theme, lack of iPad practicality, contained three subthemes: inconvenient mid-way technology, internet access barriers, and smartphone preference. The second theme that emerged was attitudes towards apps in general. Three subthemes were identified under the second theme: too intensive; positive functions not specific to iPads; and lack of reliable/trustworthy information.

Conclusions: This study is the first to report the use of qualitative methods to study the practicality of using apps and iPads in changing diet-related behaviors. Early generations

of iPads may not be effective devices for facilitating behavior change among college students; and diet-related apps seem to have poor functionality that lead to cessation of use.

Key words: IPads; diet-related behavior change; qualitative methods; technology and health; behavior change.

PO1379

SODIUM REDUCTION POLICIES IN ARGENTINA: AN ANALYSIS OF THE "LESS SALT MORE LIFE" INITIATIVE

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Background and objectives: In 2011, the Ministry of Health and the Ministry of Agriculture of Argentina launched a voluntary agreement (Less Salt More Life) with the food industry to reduce sodium content in processed foods. The expected reduction is between 5% and 18% on the maximum sodium levels over a period of two years. Our objectives are to describe the context in which the current policy has been created, to analyze similarities and differences with other countries, and to explore the strategies of the different stakeholders to comply with the reformulation of food composition policy in Argentina.

Methods: We performed a stakeholder analysis to map all actors involved in the voluntary agreement both from the private and public sectors and then conducted in-depths interviews with the most relevant actors. We used a purposive sample. Data obtained at the in-depth interviews was coded using qualitative data analysis. We also conducted a literature review to learn about similar experiences in other countries.

Results: The Argentinean voluntary agreement to reduce sodium content in processed foods shows relevant differences as compared with other countries. The main differences include the selected targets and the lack of other comprehensive measures such as food labeling and education campaigns. The stakeholder analysis showed that the food industry and the food associations played a crucial role in the design of the voluntary agreement and in the selection of the reduction targets. The main obstacles identified by the participants relate to the monitoring of the agreement.

Conclusions: Although the Argentinean initiative is a significant progress regarding sodium reduction in the region, further analysis of the content of the agreement should be considered, including reduction target selection and the inclusion of other comprehensive measures.

Key words: public health– processed foods –non-communicable chronic diseases – sodium.

PO1380

THE INFORMAS FRAMEWORK FOR MONITORING FOODS IN PUBLIC SECTOR SETTINGS

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Background and objectives: The International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) is setting benchmarks for creating healthy food environments. This study provides a step-based framework for monitoring the foods provided or sold in publically funded institutions (the focus is on school foods, but the framework can easily be applied to foods provided in other publically funded institutions).

Methods: The framework was designed by conducting a review of previous monitoring activities of school food and considering the key lessons learned. We also consulted experts in the field.

Results: The monitoring framework includes protocols for data collection and evaluation that can be applied in two phases: Phase I: which describes steps and data to compile information on existing nutrition policies and standards across jurisdictions and the principles that have been applied in developing such standards. Currently, standards vary widely globally and a comprehensive review of such standards will facilitate institutional learnings for those jurisdictions that have not yet established such policies or standards, or are undergoing review of existing ones. Phase II: consists of steps to follow in order to evaluate the quality of foods relative to the nutrition policy/guideline/program; or if no standards exists this may be an assessment of the nutritional quality of foods relative to the standards of a similar jurisdiction or other authoritative body or other appropriate standards used for defining 'healthy'. We also propose examples of measurement indicators (based on minimal, expanded and optimal measurement indicators for both food-based and nutrient based standards) that can be used to assess success or progress over time in meeting the policy objectives.

Conclusions: The monitoring framework has been developed to be pilot tested in a number of countries with varying resource capacities.

Key words: monitoring framework, public sector, nutritional quality, nutrition standards, school foods.

PO1381

STUDY OF THE EFFECTIVENESS OF AN EDUCATIONAL MODEL TO PREVENT AND CONTROL CHILDHOOD OBESITY

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Background and objectives: As a health policy response to the high prevalence of childhood obesity in Uruguay there is a need to emphasize activities promoting healthy lifestyles, specifically eating habits and physical activity during formal education. The objective of this study was to evaluate the impact of an educational intervention in nutrition and physical activity on nutritional status, eating habits and fitness of children attending kindergarten.

Methods: Community intervention with longitudinal monitoring, applying an educational model for 5 months, in 160 children (intervention group-IG). The results were compared with those of 103 children who continued usual curricular activities (control group-CG). Measurements before and after the intervention were: BMI/age, % Fat Mass- FM (validated equation for uruguayan preschool children), fitness (distance walked in 6 minutes) and food consumption (self-administered survey to parents).

Results: Mean z BMI/age declined significantly in IG for both genders ($p<0.02$) while increased in CG. Obesity prevalence declined significantly only in IG from 14, 1 to 10.3%($p=0.04$). Mean % FM had a slight not significant decline in IG while increased in CG ($p=0.00$, both genders). Fitness post-intervention significantly increased for both sexes in IG ($p=0.00$) while in CG did not change. The increase in daily fruit intake was higher in IG compared to the CG ($p=0.00$). The proportion of children who did not consume vegetables daily declined more in IG (14, 4% to 6.3%) than in CG (11.7% to 9.7%). In school collation, the intake of healthy foods increased only in IG while in CG there was a slight increase in intake of non-recommended foods.

Conclusions: The strategy was effective at achieving beneficial changes in the prevalence of obese children, fitness, intake of fruits and vegetables, and type of school collation.

Key words: educational intervention, childhood obesity, eating habits, physical activity.

PO1382

FACILITATING DECENTRALIZED PROCUREMENT MECHANISM OF GOVERNMENT ENSURING UNINTERRUPTED SUPPLY FOR FULL COVERAGE OF VITAMIN A IN UTTAR PRADESH, INDIA

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Background and objectives: Since 2006, Uttar Pradesh adopted fixed months (June and December) biannual Vitamin A supplementation strategy. These months were denoted as Bal Swastha Poshan Mah (BSPM). Micronutrient Initiative (MI) is supporting biannual VAS rounds since 2010 in 38 districts of UP with other partners UNICEF and Woman and Child Development department. A major barrier identified was untimely procurement and interrupted supply of Vitamin A marked as missed BSPM rounds or low coverage. 2010-11 was counted as zero year for full coverage due to missed round in December. In 2011-12 coverage decreased from 50% to 36%. Focus was therefore on to systematically work with government systems to establish decentralized procurement mechanism (DPM) in the state. Objective: Incorporating Vitamin A into State Drug List and establish DPM for Vitamin A

Methods: MI provided specification of vitamin A syrup for procurement to government to facilitate incorporation of vitamin A in the state drug list. Systematic plans for procurement based on targets and distribution of vitamin A were prepared for all 75 districts and shared at all levels.

Results: For the first time state published the rate contract of vitamin A syrup bottles and finalized agencies for providing Vitamin A on fixed rates to all 75 districts. This facilitated district level procurement for the first time in all districts and improved availability of Vitamin A Syrup for BSPM rounds in December 2012-13. Results were measured with improved availability of supply from 0 to 54% and expecting to benefit 11, 731, 937 children in absolute numbers.

Conclusions: Timely procurement achieved by establishing decentralized procurement mechanism within the government system for uninterrupted supply and increase coverage. Accu-

rate demand generation based on targets and distribution plan ensured distribution at all levels with proper monitoring and reporting.

Key words: BSPM, Decentralize Planning Mechanism, Full coverage of Vitamin A.

PO1383

FOLLOW-UP OF A GROUP OF POPULATION WHO IS PRESENT AT THE GYMNASIUM. EFFECT OF THE PHYSICAL EXERCISE AND THE DIET

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Background and objectives: The developed work tries to determine the results obtained in a group of practicing subjects of a physical activity controlled during a period of time and submitted to control and nutritional supervision. An individualized plan of diet and exercise produced a significant loss of weight and improves the imc. the general aim is to determine the effect that an individualized plan of diet and exercise has on the loss of weight and improvement in the imc.

Methods: A study was done observacional, descriptively and comparatively of a series of cases realized in a gymnasium and with a sample of 34sujetos, of which 16 were men and 18 women. For the accomplishment of the analysis I use the version 20.0 of the program SPSS.

Results: There takes place is produced a decrease of the weight($p<0.001$) and the IMC($p<0.001$) in three measurements of linear form, increase of the lean mass, increase of the basal metabolism, increase of the corporal water and of the muscular skeletal mass.

Conclusions: The dietetic plan and of physical exercise(fiscal year) he has proved to be an effective being since: variable weight has diminished in three measurements with approximate values of between(among) 3-4 kg, the variable IMC has diminished also in three measurements and there are improved the percentages of fat and muscular mass. The decrease of the weight is more accentuated in men that in women and IMC's decrease more accentuated in women that in men. The Weight and IMC diminish more in major subjects of 33 years.

Key words: Physical exercise, diet, nutrition, weight, imc.

PO1384

ALCOHOLIC BEVERAGE CONSUMPTION, NUTRIENT INTAKE, BODY WEIGHT AND PHYSICAL ACTIVITY AMONG GHANAIAN ADULT ALCOHOLICS

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Background and objectives: The effect of alcohol on nutritional status is not well understood. Although many studies have examined nutritional aspects of excessive alcohol consumption there is scarcity of data in Ghana. The present study analyzed for differences in nutrient intakes based on the amounts of alcohol consumed, and relationships among alcohol consumption, energy intake, body weight and physical activity.

Methods: This was a cross-sectional study involving 107 adult men and women screened as alcoholics using a modified Concern/Cut-down, Anger, Guilt, and Eye-opener (CAGE) and Alcohol Use Disorders Identification Test (AUDIT) questionnaire. Study participants were interviewed on their sociodemographic and lifestyle characteristics using a pretested questionnaire. The 24-hour recall method was used to obtain information on dietary intakes and consumption of alcoholic beverages. Additionally, weight and height measurements were taken. Participants were categorized by tertiles of daily alcohol consumption; <;34.5 g/day, 34.6 to 65.6 g/day and >65.7 g/day. ANOVA and correlation analyses were used to test for differences and association among variables.

Results: There was a positive correlation between total alcohol consumed and total energy intake of participants ($r= 0.234$; $P=0.015$). The participants with higher ethanol intake had higher weight although not significant ($r= 0.114$: $P= 0.243$). There was no significant relationship between ethanol consumption and levels of physical activity among participants. Energy and macronutrient intake did not differ by tertiles of alcohol consumption.

Conclusions: The mechanism for the positive correlation between alcohol consumption and body weight in this population needs further exploration.

Key words: Alcohol, weight, nutrient, physical activity

PO1385

THE EFFECT OF TTM MODEL ON BREAKFAST EATING PLAN OF NURSES IN THE CENTRAL HOSPITAL OF IRANIAN OIL INDUSTRY

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Background and objectives: Some evidence claim that 10 to 30% people do not eat enough breakfast in developed and developing countries. Missing breakfast has long term negative effects such as stress, depressive symptoms, obesity and chronic diseases. Some studies emphasize that breakfast eating habit can be associated with physical and mental achievement in children and adults. Therefore, the purpose of study is to improve breakfast eating habits among of nurses in the central hospital of Iranian oil industry by preparing the suitable educational plans for encouraging nurses to consume suitable breakfast meal.

Methods: The participants of study were the nurses who worked in the central hospital of Iranian oil industry in autumn 2012. The sampling method was purpose sampling and the collection data was completing questionnaires by the participants. The Trans Theoretical Model of change as an effective model was selected to improve breakfast eating habit among participants.

Results: The findings of study show that the majority of participants paid attention to prepare and consume breakfast. Furthermore, there was a normal distribution between TTM stages and breakfast consumption in this study. Some reasons such as no appetite in morning, sleepy feelings and no time for eating breakfast before going to work were the common reasons for no breakfast consumption in this study.

Conclusions: Despite the findings of study show that the most of participants consumed breakfast and liked to eat breakfast, but they did not eat suitable breakfast meal. In fact, according to similar studies, the best breakfast meal should include at least three or four food groups; moreover, this breakfast must have high dietary fiber and low glycemic index until it can reduce obesity prevalence. Moreover, it should be considered some sensitive factors such as taste, color and shape.

Key words: Breakfast eating plan, TTM Model, Nurses.

PO1386

QUALITY OF DISPENSING FOLIC ACID SUPPLEMENTS TO PREGNANT MOTHERS AT FIELD ANTENATAL CLINICS IN A SRI LANKAN SETTING

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Background and objectives: Folic acid supplementation programme to pregnant mothers is implemented through Public Health Midwives (PHMM) in Sri Lanka, to prevent neural tube defects of foetuses and anaemia of pregnant mothers. Folic acid tablets are distributed to pregnant mothers free of charge at the field antenatal clinics held by the government. Objective of this study was to describe the quality of dispensing folic acid tablets to pregnant mothers in field antenatal clinics.

Methods: A descriptive cross-sectional study was carried out in a health unit in Sri Lanka in 2011. All the twelve field antenatal clinics of the health unit were directly observed on random two sessions for dispensing folic acid, using Lot Quality Assurance Sampling technique, using an observational check list. Equal or less than 50% of 'good practices' was considered as 'Highest Risk' and equal or more than 80% of 'good practices' was considered as 'Lowest Risk'; and Decision Rule of 24:8 was applied considering a Provider risk of 3.6% and Consumer risk of 7.6% where the lowest total classification error (0.112) would occur.

Results: General cleanliness and tidiness of the dispensing counter was 'acceptable' (Defective Observations (DO) =7). Both the quality (DO=1) and storage (DO=0) of folic acid were 'acceptable'. In providing knowledge on folic acid; introducing the tablet by name (DO=18), educating the usefulness (DO=24), instructing the dose to be taken (DO=20), and instructions on storage (DO=17), all the components were 'substandard'. Inquire about the compliance (DO=20) and wrapping folic acid tablets at the counter (DO=23) were also 'substandard'.

Conclusions: Though the cleanliness, tidiness, quality and storage of folic acid tablets in the clinics were satisfactory, aspects such as providing knowledge on folic acid, inquiring about compliance and wrapping the tablets need to be improved.

Key words: Folic acid, Lot Quality Assurance Sampling (LQAS), Sri Lanka.

PO1387

EFFECT OF INFORMATION ABOUT THE CALORIC CONTENT ON FOOD CHOICE IN TWO RESTAURANTS IN JALISCO, MEXICO

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Background and objectives: The overweight and obesity have been linked to excessive consumption of high-caloric foods and the growing trend of eating out. Thus, humans make decisions about food many times per day, affected by several factors, such as the information about the content of food. The purpose of this study was to analyze the effect of caloric information on food choices in two restaurants in Jalisco, Mexico.

Methods: We conducted a quasi-experimental study involving 200 adults between 18 and 65 years old in each restaurant, who were randomly divided into two groups (control and experimental). The experimental group received information about the caloric content in the dishes offered by the restaurant. Two questionnaires were used in order to identify the information considered for food choices.

Results and conclusions: The results showed that caloric information affects the decision; however it was not the only important factor that contribute for food choices.

Key words: caloric information about food, making decision, food choices.

PO1390

OVERWEIGHT, GENERAL AND CENTRAL OBESITY AND THEIR ASSOCIATION WITH ETHNICITY, DEMOGRAPHICS AND SOCIOECONOMIC STATUS IN IRANIAN WOMEN

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Background and objectives: Iran, as a country experiencing an accelerated nutrition transition, encounters an increasing prevalence of overweight and obesity. This study aimed to determine the association between overweight and obesity ethnicity, demographic and socioeconomic status (SES) among women living in Tehran.

Methods: In this cross-sectional study, 460 women aged 20-50 years were selected by stratified random sampling in Tehran metropolitan. Demographics, ethnicity and SES were asked by a questionnaire through face to face interview. Weight, height and waist circumfrance (WC) were measured and BMI was calculated. Multivariate logistic regression was used for analysis.

Results: Distribution of main ethnic groups among the study population were as follows: Fars 66.7%, Turks 14.3%, Northern (Tabari & Gilaki) 9.3%, Kurds 5.2% and others 4.5%. The highest prevalence of overweight was observed among Turks (65.1%) and Northerners (56.1%); while general and central obesity were more prevalent in Northerners (28.7% and 48%, respectively). However, the differences were not significant. Higher risk of overweight and obesity was associated with age (OR: 1.32, 95% CI:034.-0.69) and duration of residence in Tehran (OR: 1.23, 95% CI:1.15.-1.49), whereas being employed (OR: 0.79, 95% CI:0.45-0.96), having university degree (OR:0.41, 95% CI:0.20-0.85), owning a house (OR: 0.62, 95% CI:034.-0.69), number of rooms(OR: 0.62, 95% CI:0.34.-0.69) were associated with lower chance of being overweight and obese. With regards to central obesity, being married (OR: 2.60, 95% CI:1.23-5.40) and total household income (OR:1.02, 95% CI:1.0-1.05) were related to higher risk and having university degree (OR:0.39, 95% CI:0.23-0.68) with lower risk. No significant relationship was found between obesity and central obesity with ethnicity after adjusting for age, energy intake, physical activity and SES.

Conclusions: Considering SES in overweight and obesity programs and further investigation on its role in different ethnic groups in the country is warranted.

Key words: Overweight, obesity, socioeconomic status, ethnicity, Iran.

PO1391

HOUSEHOLD FOOD SECURITY, DIETARY DIVERSITY, ANEMIA, AND ANTHROPOMETRIC STATUS OF POOR WOMEN FARMERS IN PREY VENG, CAMBODIA: A CROSS-SECTIONAL STUDY

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Background and objectives: Cambodia has been food secure for nearly a decade based on having sufficient rice for its population. However, national surveys indicate that nutritional status remains poor among women and children, particularly in rural farming households. Little is known about household level food security and how it relates to indicators of nutritional status such as dietary diversity, anthropometrics, and hemoglobin in these households. Our objectives were to determine levels of food security and explore the association between food security and indicators of nutritional status in rural farming households in Prey Veng province.

Methods: A cross-sectional study of food security, dietary diversity, and anthropometric status, and anemia was conducted among 900 poor rural women farmers in Prey Veng Province. Validated instruments were used, including the Household Food Insecurity Access Scale (HFIAS) and the Household Dietary Diversity Scale (HDDS). Hemoglobin was measured by Hemocue and weight and height measured by standardized techniques.

Results: Only18% of households were classified as food secure and almost 12% were severely food insecure according to the HFIAS. Mean BMI (SD) was 21 (2.7) kg/m2 with over 13% of women classified as underweight (<18.5 kg/m2). Mean hemoglobin was 122 (12) g/L, and 33% were anemic (<120 g/L). There was a weak association between HFIAS score and HDDS scores (r=-0.23; P<0.001) and hemoglobin (r=-0.12; P=0.01) but no association with women's BMI (r = -0.02; P=0.48).

Conclusions: There were high levels of food insecurity among poor farming households. Poorer HFIAS scores were associated with lower dietary diversity and hemoglobin but not BMI. Strategies to improve household food security may increase dietary diversity and improve hemoglobin concentration however because the associations were weak and there was no association with BMI, other strategies will be needed to improve nutritional status of rural Cambodian women.

Key Words: Undernutrition, food security, women.

PO1392

NUTRITION KNOWLEDGE, ATTITUDES AND CULTURAL PRACTICES OF RURAL WOMEN FARMERS IN PREY VENG PROVINCE, CAMBODIA.

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Background and objectives: Cambodia is food secure at the national level; however, the nutritional status of women and children has not improved since 2005. Food availability data indicate an adequate supply of energy yet over 20% of women have a low BMI and 40% of children are chronically undernourished. Where the food supply is sufficient, knowledge and cultural practices may limit progress towards improved nutrition status. The objectives of this study were to: 1. Understand women's knowledge of nutrition and feeding recommendations. 2. Identify cultural practices and attitudes that may be risk factors for malnutrition.

Methods: A mixed methods approach was used to evaluate nutrition knowledge and practices. Initially, 900 randomly selected women completed a household survey. Findings from the survey guided key informant interviews and focus groups, which provided additional information on practices and attitudes that could impact nutritional status.

Results: Nutrition practices and knowledge were poor. For example, almost half the women reported they did not consume 3 meals the previous day and most were unable to identify the correct number of meals pregnant women should consume. Sixty-two percent had heard of anemia and 67% said they could identify foods high in iron, yet almost all identified green leafy vegetables. The results were similar for vitamin A. The majority did not have access to a latrine and only 73% reported using soap for hand-washing and less than half after defecation.

Conclusions: Women lack relevant nutrition knowledge. Poor sanitation and hygiene practices likely contribute to undernutrition as few households have access to adequate sanitary facilities and hand-washing with soap was irregular. Improving nutritional status will require more than food-based interventions. Our results point to a lack of knowledge regarding nutrition and care practices that if improved, could positively impact nutrition and health.

Key words: Undernutrition, nutrition knowledge and practices.

PO1393

IT TAKES A VILLAGE: DEVELOPING KEY COMMUNITY-LEVEL MESSAGES TO ADDRESS THE RISE IN STUNTING IN RURAL EGYPT

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Background and objectives: The United States Agency for International Development (USAID)-funded Maternal and Child Health Integrated Program (MCHIP) is implementing a project (Smart) in Upper and Lower Egypt that focuses on improving newborn health and the nutritional status of children less than two years of age. A doubling in stunting prevalence in Lower Egypt between the 2005 and 2008 Egypt Demographic and Health Surveys served as the impetus for a focus on prevention of stunting in the Smart project and the conduction of a research study examining factors associated with stunting in Smart project areas.

Methods: In-depth interviews (IDIs) were conducted with pregnant (N=40), lactating (N=40), and non-lactating women (N=40), as well as with key influencers in decision-making for infant and young child feeding including husbands (N=40), health workers (N=40) and grandmothers (N=40). IDIs were conducted in two Smart project areas: Qaliobia, Lower Egypt, where the rise in stunting occurred and Sohag, Upper Egypt, where stunting decreased slightly. Qualitative IDI were recorded, transcribed, and coded by theme and provided an in-depth examination of attitudes, behaviors, and perceptions of child growth of key family and community members in the context of poor infant and young child feeding practices and an avian flu outbreak in Lower Egypt.

Results: A counselling guide was developed, based on messages from formative research, on motivations well as economic and cultural barriers. Targeted messages were aimed at reducing junk food consumption, increasing quality and quantity of food intake, using local foods and recipes, and addressing misperceptions of mothers, family members, and health workers regarding healthy food for the child and family.

Conclusions: Counselling guides will be further tested in Smart project areas to improve infant and young child feeding in the prevention of stunting.

Key words: stunting, counselling messages, Egypt, family.

PO1394

ADEQUATE IODINE INTAKE IN PREGNANT WOMEN COINCIDES WITH MORE-THAN ADEQUATE IODINE INTAKE IN THEIR SCHOOL-AGED CHILDREN IN SOUTHERN INDIA

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Background and objectives: Universal salt iodization (USI) is a mass fortification approach to cover the iodine requirements of the population, including the sharply higher iodine requirement of pregnant women. However, WHO/UNICEF/ICCIDD recommended cut-offs leave only a narrow range for median urinary iodine concentrations (UIC) that will both meet the needs of pregnant women and not lead to excessive intake for other groups, such as children.

Methods: In a cross- sectional study, we recruited healthy pairs (n=194) of pregnant women and their 6-15 years old children in Bangalore, India. We measured UIC, household salt iodine concentration, anthropometrics and maternal thyroid volume (ultrasound), and administered a questionnaire on demographic characteristics and salt usage patterns.

Results: The iodized salt program was providing adequate iodine during pregnancy: a) the overall median (range) UIC in women was 172 (5-1024) µg/L, b) the median UIC was >150 µg/L in all trimesters and c) thyroid size did not significantly change across trimesters. At the same time, the median (range) UIC in their children was 220 µg/L (10-782), significantly higher than in mothers (p=0.008) and indicating more than adequate iodine intake at this age.

Conclusions: Our data indicate that in this region of southern India salt iodization ensures adequate iodine intake in pregnant women but at the expense of 'more-than-adequate' iodine intake in their school age children. RBecause recent studiesdata suggest iodine intake in the range of 'more-than-adequate' for children have no adverse effects on thyroid function. These findings, if confirmed in other countries, suggest the current WHO/UNICEF/ICCIDD cut-off for median UIC in children indicating 'more-than-average' intake should be reconsidered.

Key words: Iodized salt; Urinary iodine concentration; Pregnant women; School children; India.

PO1395

OPERATIONS RESEARCH: TRIANGULATION OF DATA COLLECTION METHODS AND ANALYSES TO EXAMINE THE RISE IN STUNTING IN LOWER VERSUS UPPER EGYPT

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Background and objectives: The United States Agency for International Development (USAID)-funded Maternal and Child Health Integrated Program (MCHIP) is implementing a project (Smart) that focuses on improving newborn health and the nutritional status of children less than two years of age. A doubling in stunting prevalence in Lower Egypt between the 2005 and 2008 Egypt Demographic and Health Surveys in comparison to Upper Egypt, served as the impetus for a focus on prevention of stunting in the Smart project and the conduction of a research study examining factors associated with stunting in Smart project areas in Lower and Upper Egypt.

Methods: Qualitative data collection consisted of in-depth interviews with pregnant, lactating, and non-lactating woman, as well as key influencers in infant and young child feeding including husbands, health workers, and grandmothers. Quantitative 24-hour recall and food frequency provided dietary data (N=120), which were analysed using Egyptian food consumption tables. Qualitative direct observations and in-depth interviews with mothers on infant and young child feeding (IYCF) practices through Trials for Improved Practices (N=150), were collected, along with anthropometric measurements of weight and length for children less than 2 years of age. Data was triangulated and interpreted.

Results: In Lower Egypt, where the rise in stunting occurred, poor IYCF practices consisted of high consumption of nutrient-poor foods (chips; high fat and high sugar cakes and cookies), low frequency and quality of dietary intake (deficient in iron, zinc), and misperceptions regarding optimal feeding practices from mothers, family members and health workers. In Upper Egypt, the consumption of better quality foods was reflected in the lower level of stunting.

Conclusions: Both quantitative and qualitative data are required to provide an in-depth examination of factors associated with stunting.

Key words: stunting, mixed methods, quantitative, qualitative.

PO1396

IMPACT OF PHYSICAL ACTIVITY ON ADIPOSITY, ADIPOCYTOKINES AND METABOLIC PARAMETERS IN MEXICAN ADULTS

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Background and objectives: Sedentary style life is a risk factor for developing obesity and its comorbidities. The objective of study was to determine the relationship between activity and inactivity with adiposity, adipocitokines and metabolic parameters in Mexican adults.

Methods: Participants were 221 adults. Activity was assessed with International Physical Activity Questionnaire (IPAQ) long last 7 days format. Inactivity was determined with the time spend sitting on weekdays and weekend included in the IPAQ. Adiposity was evaluated with body mass index (BMI), waist circumference (WC), percentage of total body fat (%BF) and intra-abdominal adipose tissue (IAAT). %BF and IAAT were estimated by Inbody 720 analyzer. Adiponectin and TNF-á were measured by luminometry method. Metabolic parameters were plasma concentrations of glucose, insulin, lipids, HOMA index, and systolic and diastolic blood pressures (SBP and DBP, respectively).

Results: Score of physical activity (PA) was 4662.9 MET-minutes per week. Men were more active than women (5577.3 vs 3706.2 MET-minutes per week, $p<0.02$). There were significant negative correlations between IAAT and moderate-vigorous intensity PA, between %BP and vigorous intensity PA and between HDL and walking. Adipoenctin also had a negative correlation with walking and moderate-vigorous intensity PA. Inactivity on weekday positively related with IAAT, %BF, BMI, concentration of cholesterol total, HDL, LDL, TNF-á and adiponectin. Inactivity on weekend only had positive correlation with IAAT and WC.

Conclusions: The results show that inactivity mainly on weekday could have an effect on the adiposity and alters the concentration of lipids and adipocytokines. Moderate and vigorous intensity PA are associated with less amount of abdominal and total adiposity. However, in this sample of Mexican adults there were associations that are inconsistent with those reported in the literature: a negative relationship of PA with adiponectin; and positive relationship between HDL and inactivity.

Key words: Physical activity level, metabolic parameters, adiposity, adipocytokines.

PO1397

PLASMA LEVELS OF IRON, COPPER, ZINC AND THE ANTHROPOMETRIC NUTRITIONAL STATUS IN AÑU ETHNIC CHILDREN FROM THE SINAMAICA LAGOON, VENEZUELA

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Background and objectives: Malnutrition in childhood increases the risk of death in the adult people, affecting their healthy status. Minerals such as iron (Fe), copper (Cu) and zinc (Zn) are essential trace elements for adequate nutrition, participating in the growth and anthropometric development of the children. The aim of the study was to correlate the plasma levels of iron, copper and zinc and the anthropometrical study in preschool children of ethnic Añu from Sinamaica Lagoon, Venezuela.

Methods: Peripheral blood was collected in a sample of 43 preschool children. The anthropometric nutritional assessment was performed by combining the indicators weight/age, weight/height and height/age. The concentrations of Fe, Cu and Zn were determined by flame atomic absorption spectrometry (FAAS).

Results: Plasma levels of minerals (mg/ml) in preschool Añú were: Fe 0.45 ± 0.29, Cu 0.94 ± 0.33, Zn 0.35 ± 0.15 without differences between genders or nutritional groups. The 60.47% of children had values indicating iron deficiency, the 32.55% of children had values indicating deficiency of Cu and 97.67% of children had values indicating severe Zn deficiency. The 74.4% of children showed a normal nutritional status, followed by excess in 20.9%. There was a significant inverse correlation between serum levels of Cu and Zn with size, as well as an inverse correlation between Cu and weight ($p<0.05$).

Conclusions: We conclude that Añu children evaluated in the present study are deficient in some of the essential trace elements analyzed, which might reveal a high prevalence of hidden hunger in this population.

Key words: Añu ethnic, children, minerals, trace elements, nutritional status.

PO1398

EVALUATION OF LIFESTYLE OF PEOPLE SELF-PERCEIVED OVERWEIGHT

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Background and objectives: Numerous studies have suggested the importance of the alteration of the perception of body image as an early symptom to detect eating disorders. Usually we proceed to the comparison of objective parameters, e.g. weight and height measured by the researcher, with self-reported values for the study subjects, there may be errors in weight and self-reported height; frequently, it is observed underestimation of weight and overvaluation of height, causing increased risk of obesity, so the aim of this study was to evaluate the lifestyle of people who self-perceive with overweight to determine whether this influences their feeding habits.

Methods: A survey of self-perception of body weight was applied and selected those who self-perceived with overweight, later were measured height, weight and body fat percentage and were applied surveys for lifestyle and eating habits. The statistical analysis of the data were performed using the R-sigma-Babel software.

Results: Sample consisted of 74 people, with a mean age of 41.34±10.67 years, and although they were self-identified with a 'little extra weight', the average BMI was 32.84±4.88, and body fat 38.82±5.7%. The waist circumference of 78% of the population was of cardiovascular risk. With regard to diet, 15% had made at least three different diets over the past year and 36.5% has ever dieted in his life, despite this, 33.78% considered to have healthy eating habits and 27% have two meals a day (breakfast and dinner). 17% are smokers and 63.51% had a family history of diabetes.

Conclusions: Although a person is self-perceive with a little extra weight, they feel healthy, this is crucial in their lifestyle which impacts the acceptance of health problems such as hypertension, obesity and disorders in lipid profile. People who are mistakenly perceived have a potential hazard to their health.

Key words: Self-perception, overweight, lifestyle.

PO1399

WHAT DO WE KNOW ABOUT THE FEED-THE-FUTURE INITIATIVE'S PROGRESS TOWARD NUTRITION GOALS? RESULTS OF A GLOBAL LANDSCAPE ANALYSIS

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Background and objectives: The U.S. Government's Feed the Future (FTF) initiative is a $3.5 billion pledge for agricultural development and food security. The Bureau for Food Security of USAID has requested the Strengthening Partnerships, Results and Innovations in Nutrition Globally (SPRING) project to conduct a landscape analysis to review current programming that links agriculture and nutrition in all 19 FTF focus countries in Africa, Asia and Latin America and Caribbean.

Methods: IFPRI and FAO agriculture-nutrition pathways and principles were used to analyze country FTF multi-year strategies and key project documents provided by the USAID Missions. Supplementary key informant interviews were conducted with FTF points of contact in each country.

Results: Most countries selected child stunting and minimal acceptable diet and maternal anemia as key nutrition indicators, but predominantly rely on general nutrition education as the intervention. The design of most FTF projects adopted a "value chain" approach, and assumed that increases in agricultural production and income would lead to either greater consumption or purchase of nutrient-dense foods and improved nutritional outcomes. Staple foods were the most commonly selected value chain items, while animal-sourced foods, legume/nuts, and horticulture were selected by half of the focus countries. Women's time, labor burden, and control of income were infrequently addressed.

Conclusions: FTF projects invest in improving production and strengthening markets for value chain crops; more diverse, nutrient-dense food items need to be incorporated in these efforts, in order to impact selected nutrition indicators. Furthermore, FTF projects need to better assess the contextual factors that affect the target beneficiaries' production, purchase, and consumption decisions and practices. Projects should develop a comprehensive behavior change communication strategy to address the agriculture-nutrition continuum with a special focus on improving women's influences in household decisions that affect maternal and child nutrition.

Key words: Feed the Future, agriculture, nutrition.

PO1400

A RAPID, INITIAL ASSESSMENT OF THE DISTRIBUTION AND CONSUMPTION OF IRON-FOLIC ACID TABLETS THROUGH ANTENATAL CARE: A COMPARATIVE ANALYSIS

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Background and objectives: Supplementation of iron-folic acid (IFA) during antenatal care (ANC) visits has existed for decades but often has low national coverage and few women consume the World Health Organization (WHO) recommended 180 tablets. USAID's SPRING Project has developed a Rapid Assessment method that, through analysis of Demographic and Health Survey (DHS) data, illustrates pregnant women's access to and consumption of IFA tablets through ANC visits.

Methods: This tool assesses performance at four falter points (ANC attendance, IFA received, any IFA taken, and compliance with WHO standards), illustrated as flowchart, to understand how well ANC functions as an IFA supplementation platform. This assessment allows policy-makers to identify and rank bottlenecks to scaling-up IFA supplementation through ANC. SPRING performed this analysis on 23 countries, highlighting performance patterns for improved program planning.

Results: When indicators are averaged across all 23 countries, 85% of women attended at least one ANC, 80% of these women received IFA, of which 93% consumed at least one tablet, but only 13% of these women take all 180 tablets. Further analysis reveals patterns, with some countries having high ANC coverage but low IFA provision during ANC (DRC and Haiti), others having high ANC coverage and IFA provision but few women taking any tablets (Nigeria and Liberia), and countries that perform well in ANC, supplies, and initial consumption, but very few women consume the recommended 180 tablets (Liberia, Malawi, Cambodia).

Conclusions: Each performance pattern requires a different approach to improving IFA supplementation through ANC. Usually improvements will depend on identifying and addressing shortcomings in access to ANC, IFA supply management, health workers' practices, and compliance of pregnant women. This assessment tool allows for identifying and prioritizing problem areas, a practical first step in improving IFA coverage and reducing anemia.

Key words: supplementation, iron folic-acid, antenatal care, policy.

PO1401

MANAGING THE ZAMBIAN FORTIFICATION PROGRAM PORTFOLIO

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Background and Objectives: Zambia was a world pioneer when it began vitamin A-fortification of sugar 15 years ago. However micronutrient deficiencies continue to plague it. Are there other fortification options for Zambians? We analyzed Zambia's fortification program portfolio and discuss the optimal mix based on costs, coverage, impact and cost-effectiveness.

Methods: We used household consumption and acquisition data from the 2006 Living Conditions Monitoring Survey with a Zambian food composition table to estimate usual intakes of calories, vitamin A, iron, and zinc, and estimated the prevalence of inadequate intake. Using purchases of fortified sugar and three other fortifiable staples, we modeled the additional intake of nutrients due to each vehicle (all combinations), and estimated the change in the prevalence of inadequate intake. Using estimates from the global comparative risk assessments on the incidence of each micronutrient's deficiency-related health outcomes, we calculated the disability-adjusted life years (DALYs) at baseline and total DALYs saved. We then juxtaposed the costs, coverage, impact and cost-effectiveness using Zambia's official fortification regulations with results based on World Health Organization's 2009 recommendations for wheat flour and maize meal.

Results: The greatest coverage is provided by sugar and oil (60% and 59%), followed by wheat flour (45%) and maize meal (23%). Oil fortification produced the greatest reduction in the prevalence of inadequate vitamin A intake (16%). Maize flour produced modest reductions in the prevalence of inadequate intake for iron (2.8%) and zinc (4.4%) as did wheat flour for iron (2.7%). Greater reductions were observed by applying WHO guidelines and impacts based on DALYs saved paralleled these results.

Conclusions: In order to produce the greatest impacts, a combination of Zambia's regulations and WHO guidelines should be adopted. While combining interventions produced greater impacts, all vehicles were not necessary for producing the most cost-effective package.

Key words: Zambia, Fortification, DALYs, cost-effectiveness.

PO1402

ASSESSMENT OF THE EFFECTIVENESS OF NUTRIBUTTER® DISTRIBUTION ON ANAEMIA AND STUNTING IN REFUGEE POPULATIONS IN DJIBOUTI AND KENYA

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Background and objectives: Stunting and micronutrient malnutrition are persistent public health problems in refugee populations. One of the approaches adopted by UNHCR and partners, is blanket supplementary feeding programmes (BSFP) using Nutributter®, a low-quantity lipid-based nutrient supplement. However, the evidence base for the efficacy and effectiveness of Nutributter® is limited. This secondary analysis aimed to assess the effectiveness of blanket Nutributter distribution on anaemia and stunting in children 6-23 months and to assess trends in children 6-59 months, in Dadaab, Kakuma, and Ali Addeh refugee camps.

Methods: A plausibility design using routine pre and post-intervention cross-sectional nutrition survey data was conducted. Trends in total anaemia (Hb<11g/dl), anaemia categories (mild, moderate and severe), and stunting (HAZ<2) from 2008-2011 were explored and interpreted using available contextual, and Nutributter® programme monitoring data. Data was cleaned and analysed using Emergency Nutrition Assessment for SMART software (July 2012), and Epi Info (v3.5.4).

Results: In all camps anaemia prevalence was reduced by at least 20% in children 6-59 (UNHCR short-term target) ($p<0.05$), however there was variation between camps in how quickly this was achieved, and total anaemia remained of high public health significance (>40%). A reducing trend in the prevalence of anaemia in children 6-23 months was seen. Improvements in anaemia were largely due to reductions in moderate

and severe anaemia; mild anaemia (10<Hb<11g/dl) remained relatively unchanged in all years, for all camps. Trends in stunting varied by camp.

Conclusions: The replicability of findings suggest that Nutributter® distribution is associated with a reduction in anaemia, especially in its most severe forms, in the Horn of Africa. These results need to be interpreted in consideration of the other anaemia reduction activities implemented in the camps alongside the Nutributter® intervention between 2008-2011. Further investigation is required in children 6-23.

Key words: Nutributter®, micronutrient deficiencies, malnutrition, anaemia, stunting.

PO1403

MANAGING THE MICRONUTRIENT PORTFOLIO: A CASE STUDY OF ZAMBIA

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Background and objectives: There has been increasing discourse about the optimal mix of nutrition programs. However, few empirical studies examine this important issue. The objective was to examine Zambia's micronutrient program portfolio and discuss the optimal mix based on costs, coverage, impact and cost-effectiveness.

Methods: We used household consumption and acquisition data from the 2006 Living Conditions Monitoring Survey with a Zambian food composition table to estimate usual intakes of calories and key micronutrients and estimated the prevalence of inadequate intake. Using purchases of fortified sugar and three other potentially fortifiable staples, we modeled the additional intake of nutrients due to each vehicle. We also modeled biofortification of a high pro-vitamin A maize and empirically identified the key characteristics of the maize market. Finally we analyzed vitamin A supplementation through Child Health Week. For each intervention independently and all combinations, we analyzed the cost, coverage and impact including the change in the prevalence of inadequate intake and the total number of disability-adjust life years (DALYs) saved. e used IFPRI's IMPACT Model to predict changes in food production and consumption patterns through 2042 and used alternative objective criteria to optimize the micronutrient program portfolio mix over 30 years.

Results: Oil and sugar offer the greatest coverage (67%-69%) while biofortification can reach greater than 50%. Supplementation and sugar and oil fortification produce the greatest impacts. The most cost-effective 1, 2, and 3-package interventions were oil fortification alone; oil plus biofortification; and oil plus biofortification and supplementation. The sequencing of combinations affected these results.

Conclusions: Each intervention plays a significant role in combating micronutrient deficiency in Zambia. However, the choice of vehicles and the order of implementation sequencing of the interventions is crucial to optimizing overall impact and cost-effectiveness.

Key words: Biofortification, fortification, supplementation, impact, cost-effectiveness.

PO1404

NEIGHBORHOOD SOCIOECONOMIC DISPARITIES IN THE AVAILABILITY OF HEALTHY FOODS IN SAO PAULO, BRAZIL

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Background and objectives: Differential access to healthy foods has been hypothesized to contribute to health disparities. Evidence from high-income countries shows that healthy foods are less likely to be found at poor neighborhoods, however, findings from low- and middle-income countries are scarce. This study examines whether the access of healthy foods varies across different types of stores and neighborhoods of different socioeconomic statuses in Sao Paulo city, Brazil.

Methods: Cross-sectional study conducted in 2010-2011 across 52 census tracts selected according to socioeconomic characteristics. Healthy food access was measured by two comprehensive micro-level food environment tools. They assessed in-store measures in (1) retail food stores and fruit and vegetable (FV) specialized stores/markets; and (2) different types of restaurants. Healthy food access was measured as the availability, variety, and promotion of healthy and unhealthy foods and was summarized into two indexes developed for retail food stores and restaurants. Multilevel models were used to examine associations of store type and neighborhood characteristics with food access indexes.

Results: Tools were tested for test-retest and inter-rater reliability. They were reliable and able to discriminate across store types. Fast-food restaurants, bars and corners stores were more likely to be located in low income neighborhoods, though supermarkets and FV specialized markets/stores were more likely to be located in neighborhoods in the 2nd tertile of income. Multilevel analyses showed that supermarkets and full-service restaurants carried more healthy items independent of local and surrounding income levels. Stores with better food access, regardless of the type, were more likely to be found at high income neighborhoods.

Conclusions: We found differences in the access of healthy foods in Sao Paulo favoring middle and high income neighborhoods. Policies and interventions aimed at reducing disparities in food access should focus low income settings.

Key words: food environment, disparities, food stores, socioeconomic factors, neighborhoods.

PO1405

OUT-OF-POCKET HEALTHCARE EXPENDITURE ASSOCIATED TO OBESITY IN BRAZIL: AN EVALUATION BASED ON HOUSEHOLD BUDGET SURVEY 2008-2009

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Background and objectives: The prevalence of obesity is increasing in Brazil and is an important risk factor for chronic diseases and may result in higher health costs. The objective of this study was to analyze the association between obesity and out-of-pocket healthcare expenditure of Brazilian families.

Methods: Data are from the Brazilian Household Budget Survey (POF/IBGE) conducted in 2008/2009 on a probabilistic sample of 55, 970 households, with the household as the unit of study. Data analyzed were the nutritional status of individuals over 20 years and out-of-pocket healthcare expenditure. The body mass index (BMI) of the household was calculated based on the average BMI of adults and classified according to WHO (1995) categories. The out-of-pocket healthcare expenditure was calculated based on the annual per capita expenditure and included medicines, healthcare services and private insurers. We conducted a descriptive analysis and multiple linear regression models were used to evaluate the influence of BMI categories of household on the out-of-pocket healthcare expenditure (outcome), controlling for potential confounders (socio-demographic variables, such as income, proportion of children, adolescents and elderly in household, area and region).

Results: The households with BMI classified as normal (until 24.99 kg/m2) and pre-obese (25 to 29.99 kg/m2) spent R$186.09 and R$216.37 respectively, while households with BMI between 30.00 kg/m2 and 34.99 kg/m2 and over 35.00 kg/m2 had per capita out-of-pocket expenditure of R$271.72 and R$319.48 respectively. The difference was statistically significant ($p<0.000$). In the linear regression, adjusted to confounders, households with obesity class I or more (II or III), increased the out-of-pocket expenditure in 52% and 65%, respectively, in relation to a normal BMI household.

Conclusions: Obesity impacts on household budgets, increasing the out-of-pocket expenditure healthcare.

Key words: Obesity; Out-of-pocket; Household Budget Survey. Acknowledgements: FAPESP (São Paulo Research Foundation).

PO1406

EXPLORING WHERE PEOPLE LOOK FOR INFORMATION ABOUT NUTRITION, WESTERN AUSTRALIA 2009 AND 2012

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Background and objectives: In Western Australia (WA) guidelines around healthy eating are regularly promoted. As surveys regularly report relatively low adherence to these it is important to know what do people know about the guidelines and where do they get their information. The aim of the study is to identify what WA people perceive as problems related to nutrition and where they usually get their information.

Methods: The 2009 and 2012 Nutrition Monitoring Surveys conducted a total of 2832 randomly sampled adults aged 18 to 64 in WA. The surveys, which had ethics approval, asked about perceptions of the major problems with the average Australian

diet as well as sources of nutrition information. All data were self-reported.

Results: Data were weighted for probability of selection and adjusted to the 2009 age, sex and area of residence distribution of the population. Pearson Chi Square, Adjusted WALD tests, logistic and poisson regressions were used to determine statistically significant asociations. Females mentioned significantly more problems with the Australian diet (2.0) compared with males (1.6). Information sources and major problems mentioned differed by sex and year of survey. Different problems were associated with different sources of information about nutrition for example: Sugar, salt or fat as the major problems were associated with newspapers (OR 1.78); books (OR 1.44); credible health sources (OR 1.38) or the internet (OR 1.29) as nutrition information sources.

Conclusions: Sex and year of survey are associated with both perceived problems with the Australian diet and nutrition information sources. Further investigation of the sources of information could be helpful in decisions about how to promote nutrition guidelines.

Acknowledgements: The Department of Health funded the survey which is part of a Healthway funded project based in Curtin University to assist the translation of research into practice.

PO1407

NUTRITION EDUCATION OF PRE-SCHOOL AND SCHOOL-AGE CHILDREN, FAMILIES AND TEACHERS UTILISING SOCIAL PARTICIPATION WITH INFORMATION AND COMMUNICATION TECHNOLOGIES SALINAS J, CORREA F, GONZALEZ CG, HUENCHUPAN C, MONTENEGRO E, VIO F INSTITUTE OF NUTRITION AN

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Background and objectives: A three year nutrition education applied research project is presented. The objective is to design, apply and evaluate the impact of educational materials on food and nutrition, aimed to change eating habits in children from nursery and primary school, parents and teachers to prevent infant obesity in Chile.

Methods: The methodology is the articulation of the conceptual and regulatory framework and public policy with the school, family and individual context. The methodologies and materials for schools and families are specifically based on social participation and the use of information technology and communication including photovoice, healthy cook workshops, videos and utilization of web 2.0.

Results: A nutrition education methodology was designed and an intervention model was implemented for 50 teachers through 8 workshops to transfer healthy food knowledge and practices to pre-school and school-age children. In addition, a participative training program for families was designed based on the previous two years (2011-2012) findings of the research project. The complete model is been applied in a quasi-experimental intervention to 300 pre-school and school-age children and 300 controls during 2013.

Conclusions: The nutrition education model and the baseline results of the intervention are presented. Results of this project are crucial to determine public nutrition education policies in Chile. Acknowledgements: This study was funded by FONDECYT project Nº 1110044.

Key words: nutrition education, information technology and communication (ICT), participatory methodologies.

PO1408

PROCESSED AND ULTRA-PROCESSED FOOD PRODUCTS AND OBESITY IN BRAZILIAN HOUSEHOLDS (2008-2009)

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Background and objectives: The consumption of industrially processed foods and drink products has risen in parallel with the global epidemic of obesity and related chronic non-communicable diseases. The objective of this study was to analyze the relationship between household availability of processed and ultra-processed products and obesity in Brazil.

Methods: The study was based on data from the 2008-2009 Household Budget Survey involving a probabilistic sample of 55, 970 Brazilian households. The units of study were household aggregates (strata), geographically and socioeconomically homogeneous. Multiple linear regression models were used to assess the relationship between the availability of processed and ultra-processed products, and the average body mass index (BMI) and percentage of obese people in the strata. The

study controlled for potential confounders (socio-demographic characteristics; percentage of expenditure on eating out of home; dietary energy other than that from processed and ultra-processed products). Predictive values for prevalence of obesity were estimated according to quartiles of the household availability of dietary energy from processed and ultra-processed products.

Results: The mean contribution of processed and ultra-processed products to total dietary energy availability ranged from 15.4% (lower quartile) to 39.4% (upper quartile). Adjusted linear regression coefficients indicated that greater household availability of these products was correlated with higher prevalence of obesity. For example, people in the quartile who consumed most processed and ultra-processed products were 36% more likely to be obese, compared with people in the quartile who consumed least of these products.

Conclusions: Greater household availability of processed and ultra-processed food products in Brazil was positively and independently associated with higher risk of obesity in all age groups.

Key words: Obesity; Food Processing; Household Budget Survey. Acknowledgement: CNPq (National Council for Scientific and Technological Development).

PO1409

DIETARY PSYCHOLOGICAL, DIETARY ATTITUDES AND DIETARY BEHAVIOR AMONG ADULT FEMALE IN DIFFERENT REGIONS EXPOSED TO WENCHUAN EARTHQUAKE, CHINA

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Background and objectives: It is known that Wenchuan earthquake in 2008 and strong aftershocks have caused terrible casualties and damage in China. Although many investigations have been conducted on the influence of the disaster to health, few researches have examined nutritional behavior affected. The objective is to evaluate the influence of the disaster to dietary psychological, dietary attitudes and dietary behavior of the adult women in different regions of China and to provide the essential data for nutritional interventions to disaster victims.

Methods: The investigation was conducted just after the May 12th, 2008 (from July to September), and a total of 736 adult women (18-55 years) were selected randomly in earthquake region (Sichuan, China), shaking region (Chongqing, Ningxia and Shanxi China) and non-seismic region (Liaoning, China), where the amount of the participants were 206, 326 and 204, irrespectively. The questionnaire was designed by the researchers.

Results: The women in earthquake region were more vulnerable to generated negative feelings including hallucinations, anxiety and worries than that in the other regions Furthermore, the women in earthquake region became pay more attention to nutrition value and acceptability of the food than those who lived in other places. There is no significance difference among people in different region on the amount of the food consumed. The women in earthquake region have increased the consumption and reserve of basic food and snack food compared to the other females.

Conclusions: The earthquake drove the influence to women in earthquake region on diet psychology, eating attitude and dietary behavior. However there was a positive factor ingredient, which is the opportunity to carry out nutrition health education in the earthquake region to improve their diet psychology to diminish the hazard of the earthquake and benefit the post-disaster reconstruction.

Key words: Wenchuan earthquake, dietary psychological, dietary attitudes, dietary behavior. Acknowledgements: This project was funded by the Higher Education Reform Project in Chongqing, China [NO.1203131].

PO1410

DIETARY AND LIFE-STYLE FACTORS THAT INFLUENCE THE CHEWING CONSCIOUSNESS IN PRIMARY SCHOOLCHILDREN IN JAPAN

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Background and objectives: The decline of ability of chewing in the child is a major problem. The objective of this study is to clarify dietary and life-style factors that improve chewing consciousness.

Methods: A questionnaire (55 items, 1-4 points) on diet and life-style was administered to primary schoolchildren aged 11-12 years old (n=592, 50% boys) from four schools in Kansai area in Japan. Factor analysis by the least-square method was conducted and six factors were extracted. We analyzed dietary and life-style factors that affected chewing consciousness by using covariance structure analysis.

Results: "Interest in cooking" had the strongest effects (path coefficient=0.43) directly and indirectly on improvement of "chewing consciousness". "Interest in cooking" also had significant effects on "intake frequency of vegetables and fruit" and on "enjoying eating". "Intake frequency of vegetables and fruit", "enjoying eating" and "no irritation" directly influenced improvement of "chewing consciousness". "Chewing consciousness" was influenced indirectly from "enjoying sports", "refrainment from eating between meals and eating out" and "frequency of eating together at dinner". "Chewing consciousness", "intake frequency of vegetables and fruit", "refrainment from eating between meals and eating out" and "no irritation" had significant effects directly on improvement of "learning motivation and learning attitude". The overall fit of this model was judged to be statistically satisfactory (GFI=0.986, AGFI=0.976, CFI=0.986, RMSEA=0.023).

Conclusions: Covariance structure analysis suggested that the chewing consciousness was significantly associated with multiple dietary and life-style habits in primary schoolchildren. Interest in cooking and intake frequency of vegetables and fruit were important for improved chewing consciousness. It was also shown that improved chewing consciousness was positively associated with learning motivation and learning attitude.

Key words: chewing consciousness, learning motivation and learning attitude, interest in cooking, primary schoolchildren.

PO1411

RELATIONSHIP BETWEEN MASTICATORY ABILITY AND DIETARY BEHAVIORS IN UNIVERSITY STUDENTS IN JAPAN

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Background and objectives: The aim of this study was to investigate the relationship between the masticatory ability and dietary behaviors in university students.

Methods: This is a cross-sectional study with 323 university students (54 males and 269 females) in Japan. To investigate the masticatory ability, we used color-changeable chewing gum (Masticatory Performance Evaluating Gum: XYLITOL with the LOTTE Co., LTD., Tokyo, Japan). The participants chewed gum for two minutes. The numbers of chews were counted and the color changes of the gum were checked. The L*a*b* values of a color were generated by measuring the color with a spectrophotometer SE-2000 (Nippon Densyoku). Dietary behaviors and consciousness of mastication were measured using

self-administered questionnaires. Data were collected from May to July 2010.

Results: The average numbers of chews for two minutes were 161 and 145 times in male and female students, respectively. The a* value of chewing-gum was significantly higher in male students than that of female students. Among female students, a* value which reflects the redness of chewed gum was significantly higher in a group who does not dislike eating hard-food than a group who dislikes eating hard-food. And dietary behaviors were significantly correlated with the masticatory ability. Students with healthy dietary style had higher frequency of vegetable and bean intake, chewed food better, preferred Japanese food, savored a meal, had higher level of consciousness of mastication, and ate a low sodium diet.

Conclusions: These findings suggest that promoting healthy dietary behaviors will help to enhance the masticatory ability in female university students. Especially, education to increase masticatory ability should target students who dislike eating hard-food. Addressing a conscious effort to exercise the masticatory muscles is important.

Key words: Masticatory ability, Masticatory consciousness, Dietary behavior.

PO1412

INFLUENCE OF EATING HABITS ON THE NUTRITIONAL STATUS OF HEALTHCARE PERSONNEL AT THE UNIVERSITY OF ANTIOQUIA- COLOMBIA: LATINMETS STUDY.

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Background and objectives: Social, cultural and economic factors influence food preferences; knowledge of healthy eating does not necessarily translate into actual healthy eating. This study aims to establish the relationship between eating habits and nutritional status in students and professors from the health area's faculties at the University of Antioquia, Colombia.

Methods: Cross-sectional study, carried out from 2010 to 2011. Sociodemographic, anthropometric, dietary intake and eating behavioral data were collected. A descriptive and analytical study was performed by using chi-square2 tests and logistic regression models in order to classify the variables associated with overweight measured by BMI and abdominal obesity (AO) P = 0.05. SPSS v.19.

Results: A total of 285 volunteers (42.8% professors, 57.2% students), aged between 20 and 61 participated in the study. In professors, the consumption of energy-dense foods such as sweet cakes and sugar, was directly related to overweight and AO respectively (p<0.05). As for the students, overweight and AO were related to Colombian stuffed potatoes consumption, and overweight to chocolate drinks consumption (p<0.05). Logistic regression showed a positive gradient with age as well as association with overeating perception (p<0.05) in professors, in both overweight and AO. In students, an association between overweight and AO with overeating perception more than three times per week (p<0.05) was found. The same association was found for overweight with the menu components: soup/salad, main course, beverage (OR = 0.310, 95% CI 0.097; 0.993).

Conclusions: The nutritional status is influenced by eating habits like the consumption of energy-dense foods. The perception of overeating in professors and students, and the menu components in students, represent relevant variables when relating them to nutritional status both by BMI and waist circumference.

Key words: Eating habits, nutritional status, healthcare professionals, overeating, obesogenic environment.

PO1413

TRENDS IN NUTRITIONAL STATUS OF CHILDREN UNDER 5 YEARS OLD FROM 2000-2010 IN HO CHI MINH CITY, VIETNAM

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Background and objectives: This study aims to examine the trends of under- and over-nutrition as well growth acceleration of children under-5-years of age over a 10 year period from 2000-2010 in HCMC.

Methods: Data from 10 epidemiological cross-sectional surveys in children under-5-years old from 2000-2010 were collected. The sample size ranged from 1497 subjects in 2008 to 3105 in 2000. The proportion of boys and girls were similar in each survey. Weight-for-age <-2SD and height-for-age <-2SD were classified as underweight and stunting, respectively. Weight-for-height >+2SD was determined as overweight. Mean of height and weight of subjects in each year was analyzed separately by sex and for each 6 months of age.

Results: The prevalence of underweight and stunting of children under 5 years old between 2000-2010 declined from 9.0% (95% CI, 8.1-10.1) to 6.7% (95% CI, 5.5-8.0), p<0.01 and from 14.3% (95% CI, 13.1-15.6) to 7.8% (95% CI, 6.5-9.2), p<0.001, respectively; while overweight increased three-fold from 3.7% (95% CI, 3.1-4.4) to 10.7% (95% CI, 9.2-12.3). Boys were significantly more overweight than girls. Mean height of boys and

girls under 18 months did not change. From 18-months of age children demonstrated increased height rates of 1.5cm-3.2cm for boys and 1.3cm-3.8cm for girls. Mean weight gain for children over 18 months was 1.1-3.2kg for boys and 0.9-2.5kg for girls.

Conclusions: The prevalence of underweight and stunting in children under the age of 5 has gradually decreased and has been accompanied by a rapid increase in the prevalence of overweight. Overweight children are now more prevalent than underweight children due largely to rapid economic change. We conclude that there is a secular trend in growth (both in height and weight) in children under-5-years of age with children in 2010 are taller and heavier than those in 2000.

Key words: malnutrition, children under-5-years, HCMC.

PO1414

CHANGES IN PHYSICAL STATUS OF CHILDREN IN JAPAN AND STRATEGIES TO ADDRESS CHILDHOOD OBESITY AND UNDERWEIGHT

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Background and objectives: In Japanese school-aged children aged 6-17 years, average height according to age has plateaued since 2000, whereas average weight has gradually declined. We therefore reviewed changes in physical status of Japanese children from 1980 to 2011.

Methods: A cohort study was undertaken to assess the percentage of overweight* as an indicator of physical status in children aged 6-17 years based on data from the Annual Report of School Health Statistics (hereinafter, the 'Report') from 1980 to 2011. We reviewed these data and used them to evaluate the prevalence of obesity and underweight. *Sugiura R and Murata M: Problems with body mass index as an index to evaluate physical status of children in puberty, Pediatrics International (2011) 53, 634-642.

Results: Although the prevalence of obesity increased from 1980 to 2000 in boys and girls aged 6-17 years, the prevalence of obesity tended to decrease in boys and girls aged 6-10 years after 2000. In addition, after 2002-2006, the prevalence decreased in boys and girls aged 11-17 years. The prevalence of mild and moderate obesity decreased after 2002-2004 and that of severe obesity began to decline after 2006-2008.

Conclusions: These data indicate that the physical status of Japanese children has changed in recent years such that the prevalence of obesity decreased in both boys and girls, and has been replaced by an increased prevalence of underweight. Reasons for the change in physical status among Japanese children from 1980 to 2011 and necessities for future strategies to solve the problems of childhood obesity and underweight are discussed.

Key words: obesity, underweight, children.

PO1415

THE FEASIBILITY OF MULTISECTORAL POLICIES AIMED AT REDUCING TRANS FAT IN INDIA

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Background and objectives: Non-communicable diseases (NCDs) are the leading cause of death in India. There are several dietary risk factors for NCDs, including trans fat consumption. The World Health Organization recommends replacing trans fat with polyunsaturated oils to improve diets and reduce the risk of NCDs. The objective of this study was to examine the feasibility of multisectoral policy options to support trans fat reduction in India.

Methods: Semi-structured interviews were conducted with 18 stakeholders from multiple sectors including trade, agriculture, industry, health and finance. Interviewees were asked about the feasibility of nine core policy options derived from food supply chain analysis aimed at supporting trans fat reduction and its replacement with polyunsaturated oils, in addition to sector specific policies based on their area of expertise. Interviews were coded and analysed according to key themes.

Results: Overall, interviewees were most supportive of downstream policies such as mass media campaigns aimed at increasing awareness and improved labelling. Although there was support for policies aimed at improving inputs into agriculture and streamlining the supply chain, interviewees noted several difficulties related to the implementation and enforcement of those policies. Trade policies aimed at increasing the availability of healthier polyunsaturated oils were not deemed feasible given that the country relies heavily on imports of palm oil to meet consumer demand. Many interviewees noted the need to increase the role of the private sector, given the lack of capacity for implementation of government policies.

Conclusions: There was little support for upstream policies aimed at increasing the availability of healthier oils. Nevertheless, agriculture policies that improve the availability and decrease the price of polyunsaturated oils have the potential to strengthen supply chains and lead to greater uptake of their use by industry, thereby decreasing the risk of NCDs.

Key Words: non-communicable disease, trans fat, multisectoral policy.

PO1416

REFORMULATING PARTIALLY HYDROGENATED VEGETABLE OILS TO MAXIMISE HEALTH GAINS IN INDIA: AN INDUSTRY PERSPECTIVE

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Background and objectives: The consumption of partially hydrogenated vegetable oils (PHVOs) high in trans fat is associated with an increased risk of cardiovascular disease. In response to high intakes of PHVOs, the Indian government has proposed regulation to set limits on the amount of trans fat permissible in PHVOs. Global recommendations are to replace PHVOs with polyunsaturated fatty acids (PUFAs) in order to optimise health benefits. The purpose of this study was to examine the technical and economic feasibility of reducing trans fat in PHVOs and to assess the feasibility of their replacement with PUFAs in India.

Methods: Fourteen semi-structured interviews were conducted with manufacturers of PHVOs in India. Data were coded and organised according to key themes.

Results: Interviewees indicated that reformulating PHVOs was both economically and technically feasible provided that trans fat regulation takes account of the food technology challenges associated with product reformulation. The main challenge was deemed to be maintaining the physical properties that consumers prefer while reducing the trans fat in PHVOs. The availability of input oils was not seen to be a problem because of the low cost and high availability of imported palm oil. Most interviewees were not concerned about the potential increase in saturated fat associated with use of palm oil and were not planning to use PUFAs in product reformulation. Interviewees indicated that many smaller manufacturers would not have sufficient capacity to reformulate products to reduce trans fat.

Conclusions: Reformulating PHVOs to reduce trans fat in India is feasible; however, ensuring that product reformulation is done in a way that maximises health benefits will require shifts in knowledge and subsequent demand of products, decreased reliance on palm oil, investment in research and development and increased capacity for smaller manufacturers.

Key words: trans fat, product reformulation, regulation.

PO1417

STABILITY AND RETENTION OF MICRONUTRIENTS IN SIX DIFFERENT TYPES OF FORTIFIED RICE PREPARED USING FIVE DIFFERENT COOKING TECHNIQUES.

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Background and objectives: Fortifying staple foods such as rice hold great potential to bring essential micronutrients to a large part of the world population at risk for micronutrient deficiency. However, it is unknown what the retention is of micronutrients in fortified rice, prepared using different in cooking methods. Nor whether different methods for the production of rice premix affect the final amount of micronutrient consumed. The objective of the current study was to quantify the effect of different rice cooking techniques used throughout the world on the retention of micronutrients.

Methods: Retention of vitamin A, iron, zinc, vitamin B12 and folic acid was assessed in 6 different rice premixes, used to prepared fortified rice (by mixing normal rice with rice premix 1:100), cooked in 5 different way. Producers of rice premixes were provided with the same micronutrient premix.

Results: Retention of iron, zinc, vitamin B12 and folic acid was between 80% and 120%, and unaffected by cooking method. The retention of vitamin A was significantly affected by cooking method ($P<0.05$), with retention ranging from 80% - 0%, depending on cooking method and producer of rice premix. No systematic differences between the different production methods of making rice premix were observed

Conclusions: This study shows that preparation methods of rice used in different regions in the world do not lead to a loss of most micronutrients with the exception of vitamin A. Factors involved in protecting vitamin A against losses during cooking of the rice need to be identified

Key words: Fortified rice, retention, vitamins, minerals, cooking method.

PO1418

INFORMATION AND COMMUNICATION TECHNOLOGIES IN HEALTH PROMOTION EDUCATION FOR PRIMARY HEALTH CARE SALINAS J, MUÑOZ C, ALBAGLI A, VIO F. INSTITUTE OF NUTRITION AND FOOD TECHNOLOGY INTA UNIVERSITY OF CHILE, SANTIAGO, CHILE

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Background and objectives: INTA has a long experience in Health Promotion and Nutrition training programs, and in on-line education programs. The objective of this study is to evaluate an on-line Health Promotion training model for Primary Health Care professionals, based on a Diploma offering new teaching models utilizing Information and Communication Technologies for nutritionists, nurses, health education professionals, dentists, social workers and other health professionals.

Methods: A mixed quality and quantitative assessment is presented about the 8 months (248 hours) Diploma including 7 teachers, 12 monitors and 264 students from all the Regions of the country. The Diploma had 5 thematic terms, with individual and group exercises, participation in interactive blogs, tests and a final integral work.

Results: Evaluation showed that 90.15% of the students completed the Diploma successfully, which is a high rate of approval, with more than 90% satisfaction caused by the excellent interaction with teachers and monitors, the possibility of participation in blogs and exercises, the quality of the teaching process and the possibility to continue working in networks. The main barriers were the lack of time, overwork, problems with the access to internet, and inequality in the participation in work groups. The final works were done according to the real local situation of the students, with an excellent evaluation. After 8 months, a follow-up evaluation demonstrate very positive **results:** 48% of the students had implemented the final work as a project and 30% had applied part of the final work at the local level; Health Promotion interventions increased in 92% and 22% improved local work conditions.

Conclusions: With these results, it is possible to formulate an on-line model to apply in Health Promotion for Primary Health Care, utilizing Information and Communication Technologies.

Key words: Health Promotion, Primary Health Care, Communication and education.

PO1419

A MALAYSIAN RURAL STORY OF WHOLE GRAIN CONSUMPTION AND ITS EFFECTS ON WEIGHT AND BLOOD PRESSURE

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Background and objectives: The prevalence of obesity and hypertension have shown an increase in Malaysia, even in the rural community. However data on whole grain consumption of Malaysians are still scarce, even it is well recognized that whole grain intake can reduce risk of hypertension and obesity. This study was carried out to evaluate the whole grain consumption and determine its association with body weight and blood pressure.

Methods:117 subjects of Malay and Chinese ethnicity, consisting of equal number of men and women between 20 to 59 years old participated in this study. Anthropometric measurements such as body mass index, body fat percent and waist circumference were evaluated. Blood pressure was also measured. Whole grain consumption was determined using food frequency questionnaire and 2-days 24 hour recall.

Results: Mean whole grain intake of the subjects was 12.3g per day, and only 5% of the subjects achieved the Malaysian Dietary Recommendation for whole grain intake. Whole grains consumed by this community included wholegrain bread (27%), brown rice (23%) and oats (18%). Whole grain intake was significantly higher among women and the high income subjects. Majority of the subjects irrespective of sex and ethnicity were overweight or obese, had central obesity and high percent body fat as well as high blood pressure.

Conclusions: Although no significant correlation was found between whole grain consumption and body weight and blood pressure in this rural community, the intake of whole grains should be encouraged and promoted. A variety of interventions and efforts are necessary to educate Malaysians on whole grains and its benefits to health.

Key words: whole grain consumption, rural community, obesity, blood pressure, Malaysia.

PO1420

NUTRITION EDUCATION IN GERMAN AND AUSTRIAN KINDERGARTENS – QUALITATIVE SURVEY OF KINDERGARTEN TEACHERS

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Background and objectives: Early childhood nutrition is a major determinant of later health, especially for non-communicable diseases. Additionally, it influences nutrition habits and nutrition competences in adulthood. This underlines the importance of early childhood nutrition education in the kindergarten as the first institutional education place. To ensure good nutrition education skills kindergarten teachers must be trained appropriately or nutrition professionals assume responsible for nutrition education in kindergarten.

Methods: Within the framework of the Lifelong-Learning-project NUTGECS (A Nutrition Guide for Early Childhood Active Stakeholders) 27 qualitative interviews with kindergarten teachers concerning nutrition education were conducted in Vienna (Austria) and Fulda (Germany). These interviews were analysed by MAXQDA according to Mayring [2010].

Results: In both countries kindergarten teachers are aware about the importance of healthy nutrition as well as of early nutrition education and parents' participation in this process. Nutrition education is part of daily routine e.g. teachers communicate children nutrition information during consuming their meals. All participating kindergartens are lacking of money and time as well as scientific support and trained staff for good and sustainable nutrition education. Even though, in both countries a variety of good materials exists, these materials are mostly unknown to the pedagogues. These results are reflected in the kindergarten teachers' wishes concerning nutrition education: they want more nutrition training and information for themselves as well as they wish more expert-guests in kindergarten.

Conclusions: Austria and Germany faces similar challenges according to nutrition education in kindergarten. Especially limited resources seem to be a problem. Therefore, interested kindergarten teachers should be encouraged and supported in nutrition education through experts and scientific developed materials like the Nutrition Guide for Early Childhood Active Stakeholders (free download www.nutgecs.eu) in practical and theoretical aspects.

Key words: kindergarten teachers, nutrition education, qualitative interviews.

PO1421

COMMUNITY SOCIO-ECONOMIC STATUS INFLUENCES ON DIETARY INTAKE IN SOUTH AFRICAN ADOLESCENTS LIVING IN AN URBAN AREA

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Background and objectives: The influence of the community environment on adolescent dietary energy intakes has not yet been investigated in low- and middle-income countries (LMICs). This work investigates associations between community socio economic status (SES), gender, ethnicity and diet.

Methods: Analysis of data at 17-19 years from the 1990 born Johannesburg-Soweto Birth to Twenty (Bt20) cohort (n=489) were conducted. Descriptive statistics were performed on community indicators and dietary data (assessed using a locally developed Food Frequency Questionnaire). Associations between gender, ethnicity, community SES indices and dietary intake/food environment were examined using linear regression (diet) and logistic regression (food environment) whilst controlling for age, gender, ethnicity, and economic status. Ethnicity was self-identified as white, black, coloured, or South Asian. Community SES indices were created using principal components analysis applied to proxy indicators of the community environment.

Results: The mean energy intake was 4894 kcal/day for boys and 4212 kcal/day for girls (p=0.002). There was a significant relationship between gender and protein intake (142.4 g for boys vs. 122.5 g for girls, p=0.015), carbohydrates intake (611.9 g vs. 509.4g, p=0.004) and sugar intake (125.9g vs 103g, p=0.041). The association between ethnicity and protein intake was also significant (+57.2g/day for blacks vs. South Asians; p=0.048). Significant associations were shown between ethnicity and distance to fast food (p<0.01) and distance to restaurants (p<0.01). Black and coloured adolescents were less likely to be in proximity to fast food outlets compared to whites (OR=0.3 [0.1-0.5] and OR=0.4 [0.2-0.7] respectively). The same tendency was found for the distance to restaurants.

Conclusions: Factors such as gender and ethnicity seem to have a greater influence on dietary intake than environmental and SES factors at the community level. The conference presentation will also link these associations with risk for obesity.

Key words: Diet, economic status, neighbourhood, adolescents, obesity.

PO1422

THE GEOGRAPHIC CLUSTERING OF DISTRICTS ACCORDING TO PREVALENCE OF UNDERWEIGHT AMONG UNDER FIVE YEAR CHILDREN IN MADHYA PRADESH, INDIA

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Background and objectives: The type and magnitude of undernutrition may vary from district to district depending on the geographical and agro-climatic conditions and therefore, warrant region specific interventions. The objective of the present communication is to identify the geographical areas with a special reference to level of underweight and factors contributing to the same. For the purpose, cluster analysis was carried out to identify the clustering of districts with varying degree of underweight.

Methods: Information collected on children regarding age, gender, weight and corresponding WHO reference weights were utilized. Exploratory cluster analysis was carried out to identify cluster of districts with the same extent of underweight. Background characteristics of the households and the prevalence of underweight were compared between the clusters.

Results: A total of 22, 907 under 5year children (Boys: 12, 387) covered from 1000 villages in 50 districts of Madhya Pradesh. The prevalence of underweight was 52% (35%-67%). The prevalence of stunting was 49% (15.2%-66.7%), while wasting was 26% (15%-40.2%). The prevalence of underweight, stunting and wasting was significantly ($p<0.01$) higher among districts of Cluster 1 (60.8%, 57.5% and 29.9% respectively) as compared to the districts belong to cluster 3 (40.9%, 40.6% and 22%). Where the group of districts categorized as low prevalent, the mother and child care and infant and young child feeding practices were also low.

Conclusions: The cluster analysis identified the districts into 3 groups based on the extent of prevalence of underweight, which were, low, medium and high prevalent. This analysis would be useful for the administrators to utilize their limited resources in the priority cluster districts.

Key words: underweight, stunting, districts, Madhya Pradesh, Geographic-clustering.

PO1423

THE NUTRITION TRANSITION IN NEW GUNIEA HIGHLANDERS

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Background and objectives: The highland inhabitants of New Guinea island are known to be healthy and active, although they have traditionally subsisted mainly on potatoes. In a previous nutritional survey conducted during 1978—1980 in the Eastern Highlands of Papua New Guinea, the dietary proportions of protein (P), fat (F) and carbohydrate (C) were 4.0%, 4.0% and 92.0% respectively (Kajiwara et al, 1982). A cross-sectional survey of the nutritional and health status of the highland population in Papua, Indonesia was conducted among villagers who migrated from rural to urban areas (rural—urban migrants).

Methods: Studies were conducted in rural and urban villages in Papua province, Indonesia, during 2007-2010. The study comprised 454 males and 382 females who were aged 18—60 years. The anthropometric measurements, including weight, height, and waist circumference, were collected according to a standard protocol. A 24-h recall test was performed to estimate the total energy intake and the energy ratio of nutrients.

Results: The estimated nutrient intake determined by the 24-h recall test showed that the non-migrant (rural) group showed similar tendency to a previous study in 1981, i.e., P = 5%, F = 6% and C = 89%. The rural—urban migrant group had a better dietary composition than the rural group, i.e., P = 12%, F = 11% and C = 77%. However, the anthropometry measurement results showed that 34.7% of males and 50.0% of females in the rural—urban migrant group were categorized as 'overweight' based on WHO criteria, whereas among their rural counterparts only 3.1% of males and 11.0% of females were overweight.

Conclusions: The results showed that a drastic change in diet affected their obesity rate among rural—urban migrants. A detailed analysis may be required to prevent future health risks among the highlanders.

Key words: New Guinea highlanders, nutrition survey, rural urban migrant

PO1424

UNDERSTANDING AND USE OF THE GUIDELINE DAILY AMOUNTS (GDA) LABEL AMONG ETHNIC GERMAN RESETTLERS

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Background and objectives: The GDA label is a voluntarily nutritional labelling with the aim of empowering consumer to compose a balanced diet. Ethnic German resettlers, one of the largest migration groups in Germany with some nutritional problems, were so far neglected in research concerning GDA label. Consequently this study examines whether ethnic German resettlers understand and use the GDA label. The aim is to show which circumstances have influence on understanding and use and how they are linked.

Methods: Case studies with 10 ethnic German resettlers (age: 30-44 years; duration of stay in Germany: 8-17 years) were carried out by problem centered interviews according to Witzel. Understanding and use were tested in an experiment. Evaluation was carried out by using the qualitative summarizing content analysis according to Mayring and the software MAXQDA.

Results: Incomplete understanding and inadequate use of the GDA label is observed due to different reasons: On the one hand, it is the excessive demand with the sudden multifaceted range of food products in Germany and the complicated design of the GDA label and otherwise the resettlers´ attitude which prevent them from understanding and use. The issue nutrition and health do not rate high in their life and lack of knowledge about nutrition and prevention because of little motivation and interest to acquire the knowledge about the inter-relationships between nutrition and health is observed. Limited need to change one's own behaviour is a result of allowing them to keep their habits.

Conclusions: nder consideration of the ethnic German resettlers´ migration background, target group specific strategies have to be developed to enhance understanding and use. This involves both a substantial revision of the GDA label and a targeted nutrition communication where decision-making skills can be conveyed for understanding and use.

Key words: Ethnic German resettlers, GDA, case studies.

PO1426

ADDRESSING ACUTE AND CHRONIC MALNUTRITION IN ETHIOPIA: CHALLENGES TO FINDING THE POLICY BALANCE

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Background and objectives: The persistently high prevalence of wasting and stunting in Ethiopia is a major public health concern. Baseline interviews with stakeholders in 2010 showed that, donors, policy makers and implementers have been inclined to address wasting through recuperative approaches often ignoring stunting. Alive & Thrive focuses on infant and young child feeding (IYCF) to reduce stunting and engages in advocacy with various stakeholders. This study aims to understand whether the advocacy activities had led to any shifts in perceptions of stakeholders about wasting and stunting and the actions that were being taken to address these problems.

Methods: In-depth interviews using semi-structured guides were conducted with key policy stakeholders, including donors, implementing agencies, and the government. Transcribed interviews were analyzed using NVivo software.

Results: In 2012, interviewees emphasized on tackling both wasting and stunting and reported a shift in current strategy with an increased focus on stunting in recent years. However, greater resources for fighting wasting led to more programs focused on wasting. Implementers noted that treating wasting has an immediate visible effect, yet were frustrated by high rates of relapse. Majority stakeholders had a broad understanding about the need to reduce stunting given its long term implications. Food insecurity, lack of food-based interventions, poor promotion of complementary feeding, and lack of women's access to cash remained as challenges. Concerned sectors such as agricultural, women's affairs, and education were not involved in addressing nutrition.

Conclusions: Interviewees perceived a shift in policy to include both stunting and wasting. The relative simplicity of addressing wasting tilts the program activities towards wasting. Continued advocacy needed to ensure that stunting is kept high on agenda in a food insecure context like Ethiopia. Funded by the Bill & Melinda Gates Foundation, through Alive & Thrive, managed by FHI 360.

Key words: Ethiopia, stunting, policy.

PO1427

HOUSEHOLD FOOD INSECURITY IS ASSOCIATED WITH CHILD UNDERNUTRITION IN BANGLADESH, ETHIOPIA AND VIETNAM

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Background and objectives: Household food insecurity (HFI) is a potential determinant of child undernutrition in developing countries, but findings to date have been inconsistent. The association between HFI and child undernutrition was investigated in children 6-59 months of age in Bangladesh (BD), Ethiopia (ET) and Vietnam (VN) using baseline survey data collected as part of impact evaluation of the Alive & Thrive initiative (N= 2, 356, 3, 422, 3, 075 in BD, ET and VN, respectively).

Methods: Logistic regression models, adjusting for potential confounding factors, were used to determine the magnitude and significance of the association between HFI and child stunting, underweight and wasting.

Results: The prevalence of HFI was 66%, 40% and 32% in ET, VN and BD, respectively. The prevalence of stunting, underweight and wasting was higher in BD (47.1%, 43.7% and 19.1%, respectively) and ET (50.7%, 27.5% and 5.9 %, respectively) than in VN (20.7%, 15.8% and 5%). The odds of being stunted or underweight were significantly higher for children in severely food-insecure households in BD (stunting OR=1.88, 95% CI=1.47, 2.40; underweight OR=1.55, 95% CI=1.21, 1.97) and ET (stunting OR=1.39, 95% CI=1.01, 1.93; underweight OR=1.59, 95% CI=1.13, 2.24) and for children in moderately food-insecure households in VN (stunting OR=1.46, 95% CI=1.22, 1.75; underweight OR=1.66, 95% CI=1.22, 2.26) compared to children in food secure households. HFI was significantly associated with wasting only in BD where the prevalence was significantly higher than in ET and VN.

Conclusions: These results show that HFI is strongly associated with stunting and underweight in these geographically varied countries. Programs to improve HFI with other nutrition interventions may enable greater synergy and sustainable impacts in addressing childhood undernutrition than just nutrition interventions.

Key words: Food insecurity, undernutrition, Bangladesh, Ethiopia, Vietnam Funded by the Bill & Melinda Gates Foundation, through Alive & Thrive, managed by FHI 360.

PO1428

IMPROVEMENT IN STUNTING IN A COHORT OF CHILDREN 2 YEARS OLD ENROLLED IN A HEALTH PROGRAM WITH LNS IN MALI

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Background and objectives: Mali exhibits high rates of child mortality and malnutrition. In 2010 Médecins Sans Frontières, with the local health authorities, started offering comprehensive care to all children under the age of 2 years living in the sub-district of Kons`gu`la (pop.33.000), Koutiala district in southern Mali. Stunting prevalence (height-for-age Z score <-2) in the district and sub-district were 55.8% and 54.1%, respectively, among children 2 to 5 years of age in March 2010 when the project was initiated. The health package includes routine vaccination, distribution of mosquito nets, nutritional supplementation (250 Kcal/day lipid-based nutrient supplement from 6 to 24 months of age), early diagnosis and treatment of malaria, basic medical care and nutritional rehabilitation when needed. We report on HAZ and vaccine coverage for a cohort of 2 year old children who were enrolled in the program for at least 18 months.

Methods: Prospective descriptive cohort study

Results: As of July 31 2012, 1060 children aged 20-24 m had completed the program. The prevalence of HAZ <-2 for this group was 33, 9 % (mean ¨C 1, 59 Z). Comparatively, pooled data from 3 transversal surveys done for the rest of the district from 2010 to 2012 for the same age category show a prevalence of 52, 2 % (mean ¨C 2, 09) (p <0.0001). Since 2010, vaccine coverage for Pentavalent 3 among children <2 y in Kons`gu`la has increased to 84.1% from 47.8% and has remained at 50% for the rest of the district (P <0.001).

Conclusions: Provision of a comprehensive paediatric health services has resulted in an improvement of 0, 5 in HAZ and a 75 % increase in vaccine coverage over two years. Feasibility of scaling up similar interventions needs to be pursued.

Key words: stunting, chronic malnutrition, LNS.

PO1429

INCREASED HEIGHT AND COGNITION AFTER CONSUMPTION OF FORTIFIED MILK

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Background and objectives: The 2011 National Nutrition Survey data revealed that the prevalence of underweight among school-aged children is 32 % while under-height is 33.6 %. Supplementary feeding is a short-term intervention that involves the provision of food to vulnerable and at-risk groups. Milk drinking is unpopular in the Philippines. Mean one-day milk consumption of 6-12 years old children consisted of 15 grams of whole milk. Objective: This study determined the effects of consuming fortified milk on the nutritional status and cognition of schoolchildren.

Methods: 141 anemic 6-year old were randomly allocated into: Group 1: one glass of milk; Group 2: two glasses of milk; Group 3; Water. The milk was fortified with iron, zinc, Vit. A & Vit. C. Feeding was for 120 days: Monday to Friday under supervised regimen in the school and Saturday to Sunday as take home allocation. Anthropometric; food intake and cognitive measurements were collected at different time periods.

Results: There was a significant increase ($P<0.05$) in height in all groups, with 2 Glasses milk group having the highest increment (3.3 cm). Food intake and father's education were positively correlated to endline height and weight. The steady upward trends of slopes for all cognition domains (responsiveness, memory, comprehension, and tenacity) were associated with time with the milk groups consistent in having the higher slopes than the Water group. Macronutrients and mother's education were positively associated with responsiveness and focus.

Conclusions: Drinking 2 glasses of fortified milk might have increased height of schoolchildren. Increments in all cognition domains were observed in all groups but the milk groups have consistently showed higher slopes. The increases in weight, height and cognition in the Water group could be attributed to positive deviance or the ability of certain individuals to improve even on worse conditions.

Key words: height, cognition, fortified milk.

PO1430

CHRONOTYPE AND DIETARY HABITS IN JAPANESE UNIVERSITY STUDENTS

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Background and objectives: A disruption of circadian rhythm in nocturnal has been linked lifestyle-related diseases such as diabetes and obesity. However, few studies have reported the relationship between chronotype (Morningness-Eveningness) and dietary habits. The purpose of this study was to investigate the relationship between Morningness-Eveningness and dietary habits in Japanese university students.

Methods: This cross-sectional study evaluated 563 university students (192 males, 371 females). Chronotype was evaluated using the Horne and Östberg Morningness-Eveningness Questionnaire (MEQ) and categorized into three types: morning-types (M-types), neither-types (N-types), and evening-types (E-types). Dietary intake was assessed by a food frequency questionnaire. Health and lifestyle were similarly investigated by questionnaire.

Results: Dietary habits, health, and lifestyle differed according to sex. A significant association was noted between MEQ score and intake of certain nutrients. E-type males had a significantly lower intake of protein, minerals (potassium, calcium, magnesium, iron, and zinc), vitamins (A, C, D, K, riboflavin, B6, B12, and folic acid), dietary fiber, cereals (rice and noodles), vegetables, seaweed, beans, fruit, and sugar than M-type males. E-type females had a significantly lower intake of vitamins (alpha-carotene, beta-carotene, K, and folic acid), vegetables, seaweed, beans, fruit, and sugar and with a high intake of sweet beverages and snacks than M-type females. E-type skipped breakfast more frequently than other types.

Conclusions: These results suggest that evening-type students do not maintain a healthy lifestyle and have poor dietary habits such as low intake of protein, vitamins, and minerals. Taken together, it might be beneficial to assess and consider chronotype in educational settings to improve the unhealthy living attitudes and poor dietary habits of students.

Key words: Morningness-Eveningness questionnaire, food frequency questionnaire, skipping breakfast, circadian rhythm, nutrient intake.

PO1431

COMPARISON OF PREVALENCE OF OBESITY, DIABETES AND SMOKING IN CHILEAN WOMEN OF CHILDBEARING AGE BETWEEN 2003 AND 2009

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Background and objectives: health status of women of childbearing age (WCBA) before pregnancy is critical for newborn health in the long term. Objective: Analyzing whether there are changes in the prevalence of obesity, diabetes and smoking in WCBA in Chile during 2003 and 2009.

Methods: Cross-sectional study using information sources national health surveys databases (ENS2003- ENS2009). The study population included WCBA -17 through 45- in the country during 2003 and 2009. Sample: The samples were 827 in 2003 and 1507 in 2009. The following variables were compared: obesity (BMI>30), excess weight (BMI>25) overweight (BMI 25-29, 9), abdominal obesity (waist>88), morbid obesity (BMI>40), smoking (actual or occasional) and diabetes (glucose>126mg/dl or self-reported diagnosis). Statistics: Complex samples modul statistical programs SPSS were used. The prevalences of diseases were expressed as numbers of cases and percentage with confidence intervals (95%) and compared through OR; continuous variables (weight, BMI, blood glucose, waist circumference) compared through Wald F and the result was expressed as mean and standard deviation.

Results: Between 2003 and 2009 WCBA obesity increased from 21% in the year 2003 to 23, 6 % in the year 2009 (p>0, 05), excess weight raised from 51.3% to 55.6% (p>0, 05), overweight from 30, 8% to 32, 1% (p>0, 05), and abdominal obesity increased 33, 3 to 35, 7 (p>0, 05). Diabetes increased from 2, 2 to 3, 6% (P>0, 05). Morbid obesity remained in 2% and tobacco in approximately 45%. Between 2003 and 2009 increased averages weight, waist circumference and BMI, but not significantly. Prevalences and means were adjusted for education and socioeconomic status; only found a significant increase in waist circumference in 2009 compared to 2003.

Conclusions: The prevalence of obesity exceeds 20% and excess weight 50% in WCBA in both years. It´s important to invest in projects to reduce excess weight in WCBA.

Key Words: obesity, diabetes, women, childbearing Acknowledgements: Chilean health ministry by providing databases ENS2003-ENS2009

PO1432

PARASITE INFESTATION AND ANTHROPOMETRIC STATUS IN CAMBODIAN SCHOOL CHILDREN.

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Background and objectives: Although nutritional status in South-East Asia has improved over the last decade, the situation in Cambodia is still worrisome with >50% of preschool children being anemic. National data reported a consistent 40% of stunting among children <5yrs in 2005 and 2010. Data on nutritional status in schoolchildren in Cambodia is scarce. Through the Fortified Rice for Cambodian SchoolChildren (FORISCA) project, nutritional status and intestinal parasite infection in children attending primary schools was assessed.

Methods: Data on school children, aged 5-15 yrs (n=2229), from 20 schools on anthropometric and micronutrient status were collected. Parasite eggs in feces were counted using Kato-Katz method.

Results: Overall prevalence of stunting and thinness was 43% and 27% respectively. No overweight was found. Stunting prevalence in children >10 yrs was higher than in younger children (57% and 43% respectively, p<0.001). Parasite infestation was found in 18% of the children (mainly hookworm infection of light intensity). Anemia prevalence was 15% with only 3 children having severe anemia. Parasite infestation and anemia was significantly higher among children attending schools taking part in the WFP SchoolMeal program (SMP) than among children from control schools (p<0.01 for both). Hemoglobin concentrations were significantly lower, and prevalence of anemia was higher, in children with intestinal parasites (p<0.01 and p=0.05 respectively). HAZ tended to be lower in anemic children (p<0.10), with stunted children being more at risk for anemia.

Conclusions: Parasite infestation is an important risk factor for anemia in Cambodian schoolchildren. Persistent poor nutritional status within schools selected for WFP SMP warrants improvement in the nutritional quality of school meals. Progressive higher prevalence of stunting with age without evidence from national data for improvements in anthropometric status in children <5yrs suggests that growth faltering continues after 5 yrs of age in schoolchildren.

Key words: children, anthropometry, parasite infection.

PO1433

MEDITERRANEAN ALCOHOL-DRINKING PATTERN AND THE RISK OF CARDIOVASCULAR MORTALITY: THE SUN PROJECT

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Background and objectives: Moderate alcohol intake has been associated with lower rates of cardiovascular mortality. However, alcohol drinking involves more than only the quantity consumed. A specific pattern of alcohol consumption is the pattern observed in Mediterranean countries. We aimed to develop a score to assess the adherence to this Mediterranean Alcohol-Drinking Pattern (MADP) and test its relationship with cardiovascular mortality.

Methods: We included 18, 223 participants (mean age: 38 years; 39.5% men) from the SUN cohort. A baseline 136-item validated food frequency questionnaire was used to assess alcohol intake. Other aspects about alcohol drinking habits were also inquired at baseline. We developed an 8-point score accounting for moderate consumption (2-points), preference for wine (1-point), wine consumed with meals (1-point), avoidance of binge-drinking (1-point), non-concentrated consumption (2-points), and low consumption of spirits (1-point). Cox regression models were performed over 136, 361 person-years to ascertain the risk of cardiovascular mortality among categories of adherence to the MADP, and for a 2-point increment in the MADP. Causes of death were adjudicated, blinded to other participant's information, according to the International Classification of Diseases, 10th Revision.

Results: Participants with low adherence to the MADP (0-4 points) were at higher risk of cardiovascular mortality compared with participants with high adherence (5-8 points) [HR (95% CI): 2.41 (1.08-5.37)]. Abstainers seemed to also be at higher risk, however the association was not statistically significant [HR (95% CI): 2.39 (0.84-6.83)]. The 2-point increment in the MADP was associated with lower risk of cardiovascular mortality [HR (95% CI): 0.49 (0.31-0.79)].

Conclusions: Adherence to the Mediterranean Alcohol-Drinking Pattern was associated with lower rates of cardiovascular mortality compared with alcohol abstinence or departure from this drinking pattern.

Key words: Alcohol; Cardiovascular mortality; Mediterranean Alcohol Drinking Pattern. Funding sources: Spanish Government (PI1002658, PI1002293, RD06/0045, G03/140 and 87/2010), and the Navarra Regional Government (45/2011).

PO1434

LINKING NUTRITION, HUMAN RIGHTS AND GOVERNANCE FOR NUTRITION POLICY: COLLABORATIVE CAPACITY DEVELOPMENT IN UGANDA, SOUTH AFRICA AND NORWAY

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Background and objectives: Lack of democratic governance and respect for human rights contributes to persistent food insecurity and malnutrition in Africa, with limited attention to such aspects in forming tomorrow's leaders, educators and practitioners in food and nutrition policy. Capacity development in nutrition and related fields should include learning about norms, principles and practice of international, regional and national human rights' systems applied to programming towards freedom from hunger and enjoyment of the human right to adequate food for all.

Methods: An innovative model combining nutrition, human rights and governance was developed by academic institutions in Uganda, South Africa and Norway for two cohorts of nutrition master students registered at the respective institutions in 2011 and 2012. Financed by the Norwegian Go-

vernment, it included a four-month module shared between the three countries, on theory and practice linking nutrition to human rights and governance. Interactive learning involved human rights, nutrition policy and governance experts and actors, including civil society organizations, enabling students to explore the role of governance and human rights as both determinants and facilitators of food and nutrition security. Diversified field visits and study visits to relevant government institutions, national parliaments, human rights commissions and international agencies, offered rich opportunities to interact with policy actors and other stakeholders.

Results: The module has given the students a unique basis for research for their nutrition master theses with an explicit human rights and governance orientation. The three-way learning platform has potential for further collaboration between government institutions, academic staff and practitioners.

Conclusions: Experience from this model should stimulate other universities to form interdisciplinary partnerships and, where possible, similar international networks to strengthen capacity for dealing with food security and nutrition through a human rights-based approach to tertiary education in nutrition and related subjects.

Key words: Human rights, Governance, Nutrition Policy, Capacity Development.

PO1435

EFFECTIVENESS OF OFFERING KEYHOLE LABELLED MEALS IN IMPROVING THE NUTRITIONAL QUALITY OF LUNCH MEALS EATEN IN WORKSITE CANTEENS

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Background and objectives: In February 2012 the Danish Veterinary and Food Administration introduced the keyhole symbol to the restaurant and foodservice sector in Denmark. The keyhole labelling identifies the healthier options when eating out. The objective of this study was to evaluate the effectiveness of offering healthy keyhole labelled meals in improving the nutritional quality of lunch meals eaten in a Danish worksite canteen.

Methods: A pre-post quasi-experimental study design was used to evaluate the introduction of keyhole labelled meals in an intervention worksite canteen compared to a control worksite canteen. At baseline and end-point (six weeks from baseline) employees from both canteens were randomly selected to participate in the study during three consecutive days (n=180). Furthermore, a follow-up measure was obtained six months after end-point (n=90). A validated digital photographic method was used to estimate total intake and nutrient composition of the consumed lunch meals.

Results: Several significant positive nutritional effects were observed among the employees in the intervention canteen including a mean decrease in lunch intake of fat from 40 E% to 21 E% and an increase in mean fruit and vegetable content from 35 g/100 g to 45 g/100g. Also, mean energy intake decreased significantly from 2.5 MJ to 1.8 MJ per lunch meal eaten. Preliminary results of the follow-up measure suggest that the nutritional improvements of the lunch meals were sustained in the intervention worksite canteen a half year after end-point.

Conclusions: The present study provided insight into the effectiveness of a keyhole labelling in canteens. The study demonstrated that positive changes were achieved in the dietary lunch intake among customers at a worksite canteen by increasing the availability of healthy meals labelled with the keyhole symbol.

Key words: Worksite intervention, nutrition labelling, health promotion, canteen, lunch.

PO1436

STUNTING AND ANEMIA ARE PREVALENT IN CAMBODIAN SCHOOL CHILDREN AND AFFECT COGNITIVE PERFORMANCE

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Background and objectives: Micronutrient deficiencies remain a critical public health problem among children in developing countries. In Cambodia, more than half of children 6-59 months old were anemic and 40% were stunted in 2010. Many studies have assessed the prevalence or adverse outcomes of nutritional deficiencies among children <5yrs, but data on the impact of such deficiencies in school children on e.g. cogni-

tive development are scarce. The FORISCA project evaluates the effect of introducing fortified rice through the WFP school meal program on micronutrient status, health, and cognition among Cambodian school children. The present study investigated childhood anemia and anthropometric status, and their relation to cognitive performance.

Methods: The study sample consisted school children aged 5-15 yrs (N=2508) from 20 primary schools in Kampong Speu Province (KSP), Cambodia. Hemoglobin (Hb) concentrations were determined using HemoCue301+ system. Cognitive performance was assessed using Raven's Colored Progressive Matrices and two standardized tests from the Wechsler Intelligence Scale for Children (WISC): block design and picture completion. Anthropometric indices were calculated using the WHO 2006 standards.

Results: Anemia prevalence was 15.1%, with no significant differences between boys and girls or age. Anemia prevalence varied between 5% and 30% across the schools. Children with a Hb<115 g/L had lower scores on the Raven Test and Block design test (P<0.05 for both). The prevalence of stunting (HAZ<-2) was 42.5%, including 12.9% severe stunting (HAZ<-3).Stunting was a significant risk factor for lower cognition performance in Raven test (p<0.01), picture completion (p<0.01) and block design up to 12yrs (p<0.05).

Conclusions: Low hemoglobin concentration and stunting were significant risk factors for lower cognitive performance. Interventions to improve the nutritional status of Cambodian school children are urgently needed.

Key words: Anemia, stunting, cognition, schoolchildren, Cambodia.

PO1437

HOW DOES A SHIFT TOWARDS A MORE SUSTAINABLE FOOD CONSUMPTION PATTERN AFFECT NUTRIENT INTAKE OF DUTCH CHILDREN?

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Background and objectives: Food has a considerable environmental impact. Diets with less meat and dairy reduce the environmental impact, but may give nutritional challenges, especially in children. This modelling study investigates the impact of sustainable diets with less or no meat and dairy products on nutrient intakes.

Methods: Energy and nutrient intake, and environmental impact was assessed for observed consumption patterns (reference scenario) and two replacement scenarios. In the replacement scenarios, 30% or 100% of the dairy and meat consumptions were randomly replaced by plant-derived foods with similar use. Data of the Dutch National Food Consumption Survey Young Children (2005-2006) were used for the reference scenario. Food composition data were taken from the Dutch Food Composition Table 2011. For the evaluation of environmental impact, published data on global warming potential and land occupation were used.

Results: Full replacement of meat and dairy foods by plant-derived foods resulted in substantial lower environmental impact when compared to the reference. Saturated fatty acids intake was 26% lower and fiber intake 29% higher. After 100% meat and dairy replacement by plant foods, mean intakes of calcium, zinc and vitamin B1 decreased with 5-13%, and of vitamin B12 with 49%, while intake of iron was 10% higher. Calcium intake was below recommendations in all scenarios. In girls aged 4-6 y, 100% meat and dairy replacement resulted in 15 and 20% of children with inadequate intakes for zinc and vitamin B1.

Conclusions: Replacement of meat and dairy by plant-derived foods is beneficial for the environment and for children's health by lowering saturated fatty acids intake and by increasing the fibre contents of the child's diet. Alertness is needed for adequacy of zinc and vitamin B1 intakes of young girls.

Key words: consumption, children, sustainability, health, nutrient intake.

PO1438

PREVALENCE OF DISORDERED EATING AMONG MALAYSIAN ADOLESCENTS AGED 12 TO 19 YEARS OLD

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Background and objectives: Disordered eating is known to be a growing nutritional issue among adolescents, particularly girls. To date, there is no publicly available nationally representative evidence on this issue among Malaysian adolescent population. This study aims to determine the prevalence of disordered eating among Malaysian adolescents aged 12 to 19 years old.

Methods: Using the stratified multi-stage sampling, a total of 9748 adolescents (male: 43.2%; female: 56.8%) from 67 selected secondary schools in all states of Malaysia participated in this study. Adolescents were required to fill in their sociodemographic characteristics and the Eating Attitudes Test-26 (EAT-26) that assessed disordered eating.

Results: The overall prevalence of disordered eating of the Malaysian adolescents was 30.7%. The prevalence of disorde-

red eating was higher among males (33.4%; 95% CI: 32.5, 34.3) than females (28.7%; 95% CI: 27.8, 29.6) at ÷2 = 25.033, p < 0.001. About one-third of the adolescents aged 12 to 14 years old (34.9%; 95% CI: 34.0, 35.9) were having disordered eating, followed by 24.1% of adolescents aged 15 to 17 (95% CI: 23.3, 25.0) and 19.5% of adolescents aged 18 to 19 years old (95% CI: 18.7, 20.3; ÷2 = 130.289, p < 0.001). The prevalence of disordered eating was higher among adolescents lived in rural area (32.7%; 95% CI: 31.8, 33.6) than adolescents who lived in urban area (29.2%; 95% CI: 28.3, 30.1) at ÷2 = 13.929, p < 0.001.

Conclusions: The findings found that a high prevalence of disordered eating among Malaysian adolescents, particularly adolescents who were males, at younger age group and lived in rural area. Further studies are needed to determine factors associated with disordered eating in Malaysian adolescents.

Key words: Disordered eating, adolescents, Malaysia, eating disorders, secondary schools.

PO1440

RELATIONSHIP BETWEEN HABITUAL GRAINS CONSUMPTION AND THE PRESENCE OF NON-ALCOHOLIC FATTY LIVER DISEASE (NAFLD)

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Background and objectives: Long term dietary habits have been suggested to contribute to the development of NAFLD. The aim of this study was to investigate associations between habitual food groups' consumption and the presence of NAFLD in a case-control study.

Methods: Fifty-eight NAFLD patients (inclusion criteria: steatosis on liver ultrasound and/or biopsy, elevated ALT and/or GGT, exclusion of other causes of liver injury) and 58 controls, adjusted for age, sex and BMI participated in the study. Food groups' consumption was estimated through a semi-quantitative food frequency questionnaire, while daily energy intake was estimated through three non-consecutive 24hour dietary recalls. Medical history, anthropometric indices, body composition analysis, physical activity data, biochemical parameters and inflammatory markers were available for all participants.

Results: Among all the food groups only grains (62.2±31.9 vs. 49.2±23.6 servings/ week, p=0.028) and refined grains (55.4±32.1 vs. 40.8±23.3 servings/ week, p=0.022) differed significantly between patients and controls. Consumption of grains was associated with higher likelihood of having NAFLD (OR=1.021, 95%CI=1.001-1.041, p=0.045), after adjusting for age, sex, daily energy intake, visceral fat, insulin resistance and LDL levels. A similar trend was also observed for refined grains' intake (p=0.1). Those with weekly grains' intake > 61 servings/ week had 4.2 higher odds of having NAFLD (p=0.034), compared to those with lower intakes.

Conclusions: Among several food groups higher grains' intake was associated with higher likelihood of having NAFLD, after controlling for several potential confounders.

Key words: non-alcoholic fatty liver disease, dietary habits, grains, case-control

PO1441

CLASSROOM TRAINING OF SCHOOLCHILDREN IN OBESITY PREVENTION: IMPLEMENTATION AND MONITORING OF THE PESOEH PROJECT

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Background and objectives: It has been suggested that school-based interventions to prevent obesity may be more effective if introduced as part of the educational system. Our objective was to include in the 2011 curriculum of primary school children contents related to improvement of dietary and physical activity practices of school children from Hidalgo, Mexico (PESOEH project).

Methods: Childhood obesity was included as crosscutting topics of social relevance in official 2011curriculum. Blocks and topics on healthy foods and physical activity were included in the curriculum. We applied methodology of training projects (TPs) based on the socio-educational model. The TPs were planned by a multidisciplinary group and learning activities by teachers (n = 33). The tracking of TPs was performed by observation in the classroom and interviewing teachers by trained professionals.

Results: We performed 5 TPs of healthy food and physical activity. The TPs were implemented (2012-2013) in two public and one private schools (800 students). During the first visit (1st) we found that 60% of teachers implemented the TPs and

the second (2nd) 70%. In 87% (1st) and 95% (2nd) the teaching situations were addressed as programmed; 96% (1st) and 88% (2nd) of the teachers used suggested materials. In 88% (1st) and 91% (2nd) didactic materials were visible in the classroom (posters, collages, drawings, etc.). In general, students showed interest, involvement and concentration; 48% (1st) and 52% (2nd) of the teachers indicated that TPs are relevant to the curriculum, and 28% (1st) and 69% (2nd) that impact on adoption of healthy lifestyle.

Conclusions: Teachers and students have accepted the TPs gradually, perceiving that the TPs are processes of teaching and learning differently. For teachers it has been useful to complete the content of the curriculum and address the consequences of a poor diet in schoolchildren.

Key words: childhood obesity, prevention, curriculum.

PO1442

COST ANALYSIS FOR INTEGRATED MANAGEMENT OF ACUTE MALNUTRITION IN UGANDA: CASE STUDY FOR PAJULE HEALTH CENTER IV PADER DISTRICT

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Background and objectives: The Government of the Republic of Uganda is in the process of implementing integrated management of malnutrition. However, poor knowledge about costs of nutrition care services is perceived as a one of major obstacle towards effective and efficient nutrition service. The objectives for the study were: To establish cost of managing malnutrition in the different service points; To compare the cost of malnutrition services in the different cost centers for 2011 and To compare the cost of conventional approach to that of IMAM.

Methods: The study was exploratory in nature and covered financial year 2010– 2011. Data was collected through review of hospital record review and interviews using Questioners and extraction forms. Cost centres were identified according to the functional structure of the Nutrition unit and availability of reliable data.

Results: The study revealed that it costs $ 241 per child averagely, however it was much more costly to manage a child from Inpatient Therapeutic Care (ITC) compared to $ 78.8 of OTC for forty-eight days. The cost for managing a malnourished child with Vitamin A deficiency (VAD) was slightly higher ($162.5) regardless of child's age than when the child is not having VAD. Majority, 42.2% of the children had no VAD but had infections, and did not improve with in forty-eight hours. Averagely, the patients spent about half of the required ninety days on the program.

Conclusions: Feeds constitute the largest cost proportion, followed by personnel, laboratory, sundries, drugs and anthropometric equipment. The cost of management also varies widely from ITC to OTC but is generally highest in ITC regardless of the shorter length of stay compared to OTC. In addition, the cost in ITC could even be much higher depending on the presentation of the child's disease severity.

Key words: Average length of stay, Utilization.

PO1443

ALCOHOLIC BEVERAGE PREFERENCE AND DIET IN THE NETHERLANDS

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Background and objectives: The habitual consumption of a specific type of alcoholic beverage may be related to the overall dietary pattern. This cross-sectional study investigated associations between alcoholic beverage preference and diet in the Netherlands.

Methods: 2, 100 men and women from the Dutch National Food Consumption Survey 2007 – 2010 were studied. A general questionnaire assessed alcoholic beverage preference and two non-consecutive 24-hour dietary recalls assessed overall diet. Across categories of alcoholic beverage preference, mean nutrient and food group intakes, adherence to meal patterns and the Dutch Healthy Diet-Index, a measure of adherence to the 2006 Dutch Guidelines for a Healthy Diet, were calculated using generalized linear models. Adjustments were made for age, sex, education, smoking status, physical activity, energy intake, absolute alcohol consumption, and frequency of alcohol consumption.

Results: Although the majority of the population had no specific beverage preference (28%) or were non-consumers (30%), most contrasts were detected between persons who preferred wine (20%) and those who preferred beer (18%). Persons who preferred beer had higher absolute intakes of macro- and micronutrients, but also higher intakes of meat, margarine, deep frying fats, and snacks. Moreover, they displayed unhealthier meal patterns. Those who preferred wine had higher absolute intakes of vegetables, fruit, yogurt, and tea and adhered most to the Dutch Guidelines for a Healthy Diet.

Conclusions: Alcoholic beverage preference was associated with specific dietary habits in the Netherlands. As in other Northern-European countries, it was seen that persons with a

beer preference displayed less healthy dietary behaviour, especially compared to those who preferred wine.

Key words: Alcohol consumption, alcoholic beverage preference, dietary patterns, diet quality, Netherlands.

PO1444

WHAT AILS MICRONUTRIENT INTERVENTION PROGRAMMES IN KENYA?

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Background and objectives: Recent national nutrition surveys in Kenya indicate a worrying trend of stagnation or even deterioration in some of the key malnutrition indicators, particularly for micronutrients. This situation prevails despite the existence of nutrition intervention programmes to alleviate these conditions. The objective of this paper is to discuss some of the factors that contribute to this situation.

Methods: Secondary data was obtained from the recent Kenya Demographic and Health Surveys, and a survey of health facilities in Nairobi, the Kenyan capital in a cross sectional descriptive study.

Results: The aspect of effective monitoring and evaluation stands out as particularly weak in many of the national micronutrient intervention programmes. Routine record keeping of the activities in some of the programmes appears to be a problem. In the integrated programmes the staff involved in the implementation of most of the programmes are often not nutritionists, and are thus unable to offer the services appropriately. There also appears to be very limited adequate involvement of the recipients of the services in planning and implementation of the programmes.

Conclusions: Among the key factors adversely affecting the micronutrient intervention programmes in Kenya include limited monitoring and evaluation, lack of staff, and lack of involvement of the recipients of the services. There is need to strengthen effective monitoring and evaluation of such programmes with a view to enhancing the delivery of the desired services and improving nutrition and health outcomes of the target populations.

Key words: Micronutrients, Monitoring, Evaluation, Interventions.

PO1445

FOOD ENVIRONMENT CHARACTERISTICS AND HEALTH IMPLICATION AMONG CHINESE ADULTS

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Background and objectives: Obesity has been considered as a socioeconomic problem in worldwide. This study used data from wave2011 of a cohort study (China Health and Nutrition Study) to examine the possible risk factors of food environment characteristics to obesity among Chinese adults aged 18 to 65 years old at community level.

Methods: Local retail prices of 42 foods and beverages were obtained from supermarket and free market in 2011. Energy density of 16 food categories was calculated and energy cost was expressed as kcal/100g and ￡€/1, 000kcal. Communities were stratified by tertiles of BMI and differences in local food prices were analyzed using Kruskal-Wallis test. Disparities in average numbers of food businesses operated in communities (per 10, 000 persons) were examined between rural and urban area.

Results: Energy-dense foods, such as vegetable oil, rice, wheat, sugar, pork and wine, provided more energy at lower cost than those with low-energy-density, such as fruit, vegetable and milk. High BMI communities represented lowest prices in wheat, egg, oil, fruit, chicken, soybean curd, beer and cola, while highest price in mutton ($P<0.05$). Urban communities had more food businesses per 10, 000 persons in fast food restaurants, indoor restaurants, outdoor fixed food stalls, mobile food carts that sell cooked food, bakeries and vendors that sell fried, twisted bread or other breakfast foods and cafes ($P<0.05$).

Conclusions: Disparities in access to food businesses and differences in energy costs may help explain obesity related dietary behaviors and food choices among Chinese adults, and indicated that food environment characteristics should been taken into account when designing polices for tackling obesity in China.

Key words: food price; energy cost; food environment; Chinese; adults.

PO1447

ASSOCIATION BETWEEN ENERGY DENSITY AND DIET COST IN CHILDREN

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Background and objectives: Lower energy density diets are associated with higher diet quality, lower body weight and better health outcomes. However these type of diets are likely to cost more, which can be an obstacle to its consumption. To estimate the dietary energy density (DED) and to assess how the daily cost of diet is associated with DED in school children.

Methods: Children's data were obtained from a community-based survey selected from public elementary schools in Guimarães, Portugal. Of a total of 586 children attending these schools, 464 (51.5% girls), 6 to 12 years old, were studied. Dietary intake was assessed by a 24 hour recall between October 2007 and March 2008. DED (kcal/g) was calculated by three different ways: (1) with food and caloric/non-caloric beverages (DED1); (2) with food and caloric beverages (DED2); and (3) with food and no beverages (DED3). Energy adjusted diet cost (€/1000kcal) was calculated based on the collection of food prices available on a national leader supermarket website, and subjects were divided into tertiles according this variable. Anthropometric measures were taken and socio-demographic data was gathered from a questionnaire filled by parents. Logistic regression was used to estimate the association between diet cost and DED by sex, adjusting for age.

Results: Energy-adjusted diet cost was higher for children with the lowest DED. For boys, the energy-adjusted diet cost of the highest third of DED was lower, between 81% in the DED3 (p for trend <0.001) and 87% in the DED1 (p for trend <0.001), compared to the lowest third. Girls showed similar, but weaker associations between DED and diet cost.

Conclusions: Higher DED was associated with lower diet cost in children.

Key words: Energy-adjusted diet cost, dietary energy density and children.

PO1448

MICRONUTRIENT ADDED FOODS ANALYSIS IN COLOMBIA: VOLUNTARY FORTIFICATION CONTEXT

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Background and objectives: The aim of this research was to analyze, for the retail distribution channel in Colombia, the trend of the voluntarily micronutrient fortified foods, from the Euromonitor International database.

Methods: The data were gathered in three large stores directly from the nutritional, ingredients, and claims labels from 34 packaged food categories, all from the International Euromonitor database. The information was statistically processed and analyzed according to Resolution 333 and ENSIN 2010.

Results: There were found 314 micronutrients added foods, which were organized in 24 fortified foods categories, it was established that the percentage share of the most commonly used vitamins in voluntary fortification in Colombia are: vitamin A 14%, vitamin C 13%, 11% vitamin B9, and the percentage share of the minerals used are: Iron 41%, Zinc 29% and 24% Calcium. The categories with the highest percentage of participation of fortified foods were: for foods, breakfast cereals 30%, pasta 13% and others 19%, and for drinks: soy beverages 20%, juices (up to 24% of fruit) 16%, and fruit flavored beverages 13%. It was found that only the pasta from one company has voluntary fortification with micronutrients: vitamin A, C, E, Selenium and Zinc, and that, apart from the mandatory fortification of flour, there is an additional voluntary fortification for micronutrients folate and Iron. It was found that the categories of breakfast cereal and flavored milks have some micronutrients added, which supply 100% of the recommended daily value.

Conclusions: there are many products with voluntary fortification in the Colombian market that may help to decrease Iron, Vitamin A and Zinc deficiencies, wich is considering as a public health issue in the country. These products provide between 10 to 50% DV for Iron, 10 to 90% DV for Vitamin A and 10 to 96% DV for Zinc.

Key words: micronutrient, voluntary fortification, Euromonitor International.

PO1449

DOUBLE BURDEN OF MALNUTRITION AND DIETARY DIVERSITY IN SAME DISTRICT, TANZANIA

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Background and objectives: The double burden of malnutrition is documented in the Tanzania Demographic Health Survey 2010. Changes in diets and activity patterns play major roles in the increase of overweight and obesity, which already exceed rates of underweight in urban and rural settings. Dietary diversity increases, however, not among the healthy food choices. The current study assessed the prevalence of malnutrition and dietary diversity in an urban and rural setting in Same District, Tanzania in 2011.

Methods: This cross-sectional study included men and women, aged 25 to 55 years, without diagnosed nutrition-related disease. Demographic information was collected via standardized questionnaires. Malnutrition prevalence was calculated based on the following parameters: BMI, random blood glucose, blood pressure and clinical signs for vitamin A and iron deficiency. Dietary diversity was assessed with a dietary diversity score (DDS) based on data from a food frequency questionnaire.

Results: Of the 362 participants, 23% were overweight, 17% obese and 8% underweight. Significant differences for BMI were found between females and males (median 25vs. 21 kg/m^2) and urban and rural participants (median 25vs. 22 kg/m^2). Increased random blood glucose levels were found in 18% and frank diabetes mellitus in 6%. Around 37% had arterial hypertension. Clinical signs of micronutrient deficiency were apparent in up to 7%. Almost 70% of all participants had a high dietary diversity (DDS >6) and 6% a low dietary diversity (DDS <3). Fairly 100% of the participants consumed fats, 92% cereal products, and 37% sweets daily.

Conclusions: The double burden of malnutrition is present and already accompanied with secondary outcomes. Diets are dominated by fat and sugar but lack healthy diversity. Different prevalence rates among areas and sexes call for specific interventions to improve overall public health.

Key words: double burden, malnutrition, dietary diversity.

PO1450

THE EFFECTS OF PHYSICAL ACTIVITY AND DIETARY MANAGEMENT IN ADULTS WITH METABOLIC SYNDROME IN A RURAL DISTRICT IN MALAYSIA: AN INTERVENTION STUDY

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Background and objectives: The prevalence of obesity among adults in Malaysia is on the rise, while physical activity is on the decline, and at the same time there are increase cases of metabolic syndrome. Metabolic syndrome is associated with non-communicable disease such as diabetes mellitus, cardiovascular diseases and hyperlipidemia. The objective of this intervention study is to evaluate the effects of dietary management and physical activity on adults with metabolic syndrome after 6 months of intervention.

Methods: This is an intervention study which consisted of on 50 respondents each for both intervention and control groups in two health clinics in the rural district of Raub in Pahang, Malaysia. Assessment of nutritional status which include anthropometry measurements, biochemical and dietary assessment were measured during pre and post intervention.

Results: showed that there were significant difference in fat intake, body weight, waist circumference, fasting blood glucose, systolic blood pressure and diastolic blood pressure ($p<0.05$) among subjects from the intervention group. Meanwhile, among respondents from the control group, no significant decrease was detected for all variables measured.

Conclusions: The reduction in measurements of metabolic syndrome such as waist circumference, fasting blood glucose, systolic and diastolic blood pressure among respondents from the intervention group was more pronounced as compared to respondents from the control group.

Key words: Metabolic syndrome, dietary management, physical activity, intervention study.

PO1451

CONTRIBUTION OF BEVERAGES TO ENERGY INTAKE AND BALANCE IN A SAMPLE OF GENERAL POPULATION IN GREECE

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Background and objectives: All beverages hydrate and most provide also nutrients and energy. Our objective was to evaluate the contribution of beverages to energy intake in summer and winter in a sample of the general population in Greece.

Methods: The Water Balance Questionnaire (WBQ), validated in the past to reflect water balance in the general population, was validated for recording energy intake with the method of three day diaries in 78 participants. Data from a stratified sample of the general population in Athens, Greece (n=984) collected using the WBQ were analysed for the contribution of beverages to energy intake.

Results: In winter, mean energy balance was 346±897 kcal/day, energy intake was 2082±892 kcal/day, energy intake from beverages was 479±286 kcal/day and energy loss 1860±390 kcal/day. In summer energy balance was 63±982 kcal/day, energy intake 1890±894 kcal/day, energy intake from beverages 492±499 kcal/day and energy loss 1830±491kcal/day. Energy intake from beverages in summer was higher than in winter ($p<0.001$) and in men higher than in women in both seasons ($p<0.001$ in summer and $p=0.02$ in winter). Coffee, coffee drinks, milk, chocolate milk and alcoholic beverages contributed approximately 75% of energy from beverages. Sugar-sweetened beverages, including soft drinks and fruit juice based beverages, as well as fruit juice were consumed less frequently contributing up to 25% of beverage energy intake.

Conclusions: Consumers have a variety of choices for their hydration; however their energy intake from beverages may vary according to dietary habits and the energy content of the beverage. At present, in the population tested, beverages contribute approximately 1/5 of total energy intake, with coffee drinks, dairy products and alcoholic beverages being the major contributors.

Key words: Water balance questionnaire WBQ, winter, summer, hydration, sugar-sweetened beverages, drink

PO1453

NUTRITIONAL CONTENT OF FOOD, AND NON-ALCOHOLIC BEVERAGES ADVERTISEMENTS BROADCASTED IN COLOMBIAN PUBLIC NATIONAL TELEVISION.

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Background and objectives: Eating habits are influenced by several factors, including food and advertisement of non-alcoholic beverages; therefore, strategies should be developed to reduce the advertisement´s impact, especially on children. The objective of this research was to analyze the nutritional content of foods and non-alcoholic beverages advertised. Data were collected during morning hours in Colombian public national television by type of audience.

Methods and materials: A cross-sectional study was conducted including national channels Caracol and RCN. The recordings were performed simultaneously from 6:00 am to 12: 30pm, for four days in July 2012, randomly selected, two on working days (Morning slot), and two on weekends (Morning children's slot). The nutritional characterization of the advertised foods was performed in a 100gr/ml sample of the product, taking as reference the Food Standards Agency criteria, the WHO recommendations, and the 333 Resolution issued by the Ministry of Social Protection of Colombia in 2011. We used the Chi 2 test and the SPSS software version 18. A $p<0.05$ was considered as relevant.

Results: Out of 52 hours of recording time, 23% consisted of food or non-alcoholic beverage advertisements. In both slots, advertisement of food with high sugar and sodium content (78.4% and 82% respectively) prevailed; more ads for foods with high sugar content were broadcasted on the morning children's slot than on the morning slot (93%). As for protective nutrients, ads for foods that are not a source of the evaluated nutrients, prevailed in both slots.

Conclusions: Advertisement for food and non-alcoholic beverages were characterized by products with high content of sugars, and sodium and low contribution of protective nutrients. This information is important to design new policies or strengthening the existing ones, following the recommendations proposed by WHO in the WHA63.14 Resolution.

Key words: Advertisement, foods, non-alcoholic beverages, nutritional value.

PO1454

TIME TRENDS CHANGES IN THE CONSUMPTION OF PROCESSED AND ULTRA-PROCESSED FOOD AND DRINK PRODUCTS DURING THE 20TH CENTURY IN CANADA

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Background and objectives: Food processing is an important determinant of the nature of dietary patterns and related states of health and well-being, at the personal and at the population level. The objective of this study is to use a new classification of foodstuffs based on the nature, extent and purpose of food processing, to assess changes in household food expenditures and dietary energy availability during much of the 20th century in Canada.

Methods: Food acquisitions from household food budget surveys from 1938-39, 1953, 1969, 1984, 2001 and 2011 were classified into (1) unprocessed or minimally processed foods; (2) processed culinary ingredients; and (3) ready-to-consume processed or ultra-processed products. Contributions of each group to household food expenditures (Can $), and to dietary energy availability (kcal/per capita) were calculated. Shifts in household food expenditures and energy availability during 1938-2011 were assessed.

Results: Household expenditures have changed greatly since 1938-1939 in Canada. This was marked by falls in expenditure on both foods and culinary ingredients, and rises in ready-to-consume products. During this period, the share of foods (as defined here) fell from 34.3 to 25.6%, and of culinary ingredients fell from 39.6 to 12.8% of dietary energy, while the share of ready-to-consume products rose from 26.1 to 61.7% of dietary energy. More importantly, the share of ultra-processed products (as defined here) rose from 21.8 to 54.9% of dietary energy.

Conclusions: In Canada, in the course of the 20th century, ready-to-consume ultra-processed products have displaced food and culinary ingredients used together in the preparation of dishes and meals. The observed trend parallels the increase in the national prevalence of obesity in Canada. Public policy proposals are suggested.

Key words: food processing, ultra-processing, dietary patterns, obesity, public health nutrition, Canada.

PO1455

VERY LOW MICRONUTRIENT INTAKE ADEQUACY OF WOMEN IN RURAL BANGLADESH IS EXPLAINED BY LIMITED DIVERSITY OF NUTRIENT-RICH FOODS

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Background and objectives: Documentation of micronutrient intake inadequacies among women in developing countries is important for planning food-based interventions. The objective of this study was to quantify and assess adequacy of micronutrient intakes of women in rural Bangladesh.

Methods: We measured 24-h dietary intakes using weighed food records and recall in homes on two non-consecutive days in a representative sample of 480 women who were a primary caregiver of a young child. We calculated the probability of adequacy of usual intakes of 11 micronutrients, an overall mean probability of micronutrient adequacy (MA), and evaluated dietary diversity by counting the total number of nine food groups consumed. The relationship between overall adequacy of micronutrient intakes and dietary diversity scores or food group indicators was determined using multivariate regression analyses.

Results: The overall mean prevalence of MA was 26% ± 10%. Fewer than 1% of women had adequate intakes of calcium, riboflavin, folate, and vitamin B-12, and <25% of women had adequate intakes of iron, zinc, vitamin A, and vitamin C. Overall MA was primarily explained by energy intake and diet diversity score. The only food groups that explained variance in MA were vitamin A-rich leafy greens and vitamin A-rich fruits and vegetables.

Conclusions: Micronutrient adequacy among women of child-bearing age in rural Bangladesh is alarmingly low, and targeted food-based interventions are warranted. Funding: HarvestPlus, Washington, DC, USA.

Key words: Micronutrient intake, women, Bangladesh.

PO1456

EVALUATION OF SODIUM CONTENT IN PROCESSED FOODS IN ARGENTINA

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Background and objectives: In Argentina, hypertension is the first cause of cardiovascular events and salt intake is the main determinant. Although the recommended salt intake is 5gr/day, in Argentina there is a daily intake of 12gr. Two thirds of the salt intake comes from processed foods. This study is part of an international collaborative research study with over 29 countries to monitor nutritional composition of processed foods. The objective of this study is to evaluate sodium content in processed foods in Argentina over time in order to monitor the compliance of the policy changes.

Methods: pre- and post- comparison study design to evaluate sodium content in processed foods from selected food groups and categories. Sodium content was reported in mg/100gr of product. Baseline data collection was performed during August and December 2011 from food companies' websites. Baseline mean and range sodium values were calculated for each group and sub-category.

Results: Baseline results include 605 products from 9 groups of products: bread and bakery products, cereals and cereal products, dairy products, edible oils and emulsions, fish and fish products, meat and meat products, snacks, sauces and spreads, convenience foods. Baseline mean and range values for some sub-categories are: white bread 458mg (356-2000), crackers 686mg (11-1931), fresh ravioli 687, 5mg (396-1058), hard cheese 820mg (213-1166), butter 145mg (45-210), canned tuna 305mg (40-620), sausages 1200mg (87.5-1280), snacks 904mg (824-1104), sauces 533mg (413-698), mayonnaise 894.5mg (627-1040).

Conclusions: This project represents a first step to improve the quality of processed foods in Argentina. Our results show that most products, especially bread, meat and cheese, have salt amounts above reasonable benchmarks considering that a daily diet allows 2000mg/sodium. The variation between similar products shows that reformulation is feasible. This study provides baseline information to monitor future policy changes. **Key words:** sodium – processed foods – cardiovascular disease.

PO1457

CHANGES IN DAILY WATER INTAKE IMPACT MOOD OF HIGH AND LOW DRINKERS

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Background and objectives: The effect of dehydration on cognition including mood has been examined in fluid deprivation studies. However, such study conditions are far from real life conditions. This inpatient crossover trial evaluated the effect of mild changes in water intake on mood in 22 high volume (HIGH; 2-4L/d; 25 ± 1 y) and 30 low volume drinkers (LOW; <1.2L/d; 25 ± 3 y).

Methods: During days 1 and 2 HIGH consumed 2.5L of water/d and LOW 1L/d. On Days 3 through 5, HIGH restricted water intake to 1L/d and LOW increased to 2.5L/d. Several mood scales (Bond & Lader VAS, Profile of mood states, Karolinska Sleepiness Scale, Thirst & Emotional VAS) were administered at different time points. An ANOVA model including treatment, time point and treatment x time as fixed effects on mean values (i.e.; baseline data vs mean of 3 intervention days) for each mood scale was performed.

Results: In LOW increased water consumption resulted in a significant decrease in fatigue ($p<0.001$), confusion ($p=0.05$) and thirst ($p<0.001$) and a trend to lower sleepiness ($p=0.07$) compared to baseline. In HIGH the restricted water intake resulted in a significant increase in thirst ($p<0.001$) and a decrease in contentedness ($p<0.05$), calmness ($p<0.01$), positive emotions ($p<0.05$) and vigor ($p<0.001$).

Conclusions: Increasing water intake has a beneficial mood effect, especially on sleep/wake feelings, whereas restricting water intake can deteriorate mood. Water consumption should not only be recommended because it fits within a healthy dietary pattern, but also because of the short term beneficial effect on mood. Improvements in sleep/wake feelings and well-being might also reduce the barrier to increased physical activity.

Key words: water, fluid intake, mood.

PO1458

FOOD INSECURITY, ACCULTURATION AND ASSOCIATED DEMOGRAPHIC FACTORS AMONG MIGRANTS TO AUSTRALIA

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Background and objectives: Food insecurity is the limited access to or availability of nutritious, culturally-appropriate and safe foods or inability to acquire such foods by socially-acceptable means. The major determinant of food insecurity is poverty, placing particular population sub-groups at risk, including migrants, who may also experience difficulty acquiring culturally-familiar foods in a new country. However, as individuals acculturate, changes may occur to traditional diets. This may have implications for food insecurity, with the prevalence decreasing with longer duration of residence. This study investigated associations between food insecurity, country of birth (COB), acculturation and sociodemographic factors among migrants to Australia.

Methods: Data (n = 14, 407) from the 2004-2005 National Health Survey (the most recent national survey to measure food security) were analysed using logistic regression, to investigate associations between food insecurity, COB, acculturation and sociodemographic factors.

Results: Independent of socioeconomic position, graded associations existed between food security and duration in Australia; those born in a country other than a major English speaking country were up to 90% more likely to experience food insecurity. This group exhibited higher rates of unemployment and a four-fold increase in receipt of lower household incomes compared to Australian-born counterparts. Each of these factors increased the risk of food insecurity by four and twelve times respectively. Increased duration residing in Australia was associated with increased rates of employment and higher household incomes. Findings suggest that sociodemographic factors are important, but not sole, determinants of food insecurity among migrants. Further investigation using a comprehensive food security assessment tool is warranted. Interventions to alleviate food insecurity among migrant groups may be enhanced by strategies to improve employment opportunities.

Conclusions: Migrants to Australia may be at higher risk of food insecurity, in part due to increased rates of unemployment and lower household incomes.

Key words: Food insecurity, migrants.

PO1459

ASSOCIATIONS BETWEEN FOOD INSECURITY, DIET AND OBESITY AMONG THE AUSTRALIAN POPULATION

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Background and objectives: Food insecurity is the limited availability of or access to nutrititious, culturally-appropriate and safe foods or inability to obtain these foods by socially-acceptable means. Internationally, studies suggest that food insecurity may be associated with overweight and obesity, however existing evidence is conflicting. According to OECD data, Australia has the fastest rising food prices of any major developed nation. In particular, healthful foods are perceived as more expensive and 'less value-for-money', compared to their energy-dense counterparts. This study investigated the potential associations between food insecurity, fruit and vegetable intakes and weight status among the Australian population.

Methods: Data for 16, 428 participants from the 2004/2005 National Health Survey (the most recent national survey to assess food security) were stratified by gender and analysed using logistic regression to investigate associations between food insecurity, diet and weight status.

Results: Women from food insecure households were 30% more likely to be obese and 30% less likely to consume the recommended five servings of vegetables compared to their food secure counterparts. There was no association between food insecurity and weight status or vegetable intakes among men. Food insecurity was also associated with a two-fold increase in inadequate fruit intakes among both men and women. Consumption of adequate servings of fruits and vegetables was not associated with obesity among this sample. The positive association between food insecurity and obesity among women may not be mediated by intakes of fruits and vegetables. Further research investigating intakes of less healthful foods, and the eating patterns associated with food insecurity are warranted in order to understand and address the associations between food insecurity and obesity among women.

Conclusions: Women from food insecure households in Australia are at increased risk of obesity, however fruit and vegetable intakes do not appear to mediate this association.

Key words: Food insecurity, obesity.

PO1460

CONSUMPTION OF ULTRA-PROCESSED FOODS: EVIDENCE FROM MALAYSIA

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Background and objectives: The increase consumption of the processed foods brings a significant impact towards the nutritional status. The existing Malaysian dietary guideline suggests on the need of having to take minimally processed cereals however overlook the emerging of the whole processed foods. The aim of this study was to determine the consumption of ultra-processed foods in an urban area in Malaysia.

Methods: A total of 300 subjects living in Selangor, Malaysia, aged 20 to 59 years old were recruited. A semi-quantitative Food Frequency Questionnaire (FFQ) was used, and foods were grouped as: unprocessed or minimally processed foods (Group 1), processed culinary and food industry ingredients (Group 2), and ultra-processed foods (Group 3).

Results: showed that majority of these subjects were in the middle aged group, had received tertiary education, had household monthly income of more than RM3500 (GBP700) and encompassed household size of 3 to 5 persons. Total energy intake from the FFQ was 2435.85 kcal. Rice contributes 13.3% of total energy which is the highest contribution of energy in Group 1. Group 3 diets exceeded WHO upper limits for sodium, added sugar and saturated fat, with less fibre than recommended. Group 3 products taken together are more fatty, sugary, and salty than a combination of group 1 foods and group 2 ingredients. The food basket of the lowest quintile compared with the highest quintile is higher in fiber (1.76% compared with 1.1%); and is lower in added sugar (1.12% compared with 9.51%), saturated fat (7.71% compared with 12.02%), and sodium (1.12g/1000kcal compared with 1.98g/1000kg). There is a significant linear trend across all quintiles for all these indicators ($p<0.01$).

Conclusions: The data presented support that diets high in or dominated by ultra-processed products cannot meet WHO and other dietary recommendations/guidelines designed to prevent and control obesity and diet-related disease (Monteiro et al., 2010).

Key words: Ultra-processed.

PO1461

INNOVATION IN HEALTH PROMOTION EDUCATION: TEACHING NUTRITION TO FUTURE PHYSICIANS

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Background and objectives: Despite concerns raised for expanding nutrition training in health professional education, its implementation is below desired. The road to effective and efficient integration of nutrition in training of future physicians is still unpaved in developing countries. This is especially important in India where both under and over nutrition are the prime causes of morbidity and mortality. Objective: Present work is an innovative experiment in public health nutrition education for medical students. In India, physicians' training encompasses basic and clinical years.

Methods: It was attempted to provide the necessary orientation in first year when students get familiar to Biochemistry, Physiology and Community medicine with the objective of taking up nutritional inquiry when they move to clinical years. Intervention: The study was conducted in SCB Medical College, Orissa. Forty-four randomly selected first-year medical students were taught dietary behavior with a grounding on principles of medical anthropology and behavioral sciences; basics of nutritional assessment using anthropometrics and dietary intake assessment through FFQ. They calculated self anthropometric data, assessed own eating behavior from dietary intake analysis and compared the same with FAO's India-based dietary guidelines and ICMR-prescribed dietary recommendations. Next, using the data collected and consultations with registered dieticians working in hospital and faculty, these students were encouraged to develop dietary prescriptions to improve their overall nutritional wellness. Subsequently, they were given practicum where they applied the same skills to perform nutritional assessment and provide prescriptions to the patients.

Results: The experiment group students had better nutrition practice skills as assessed through OSCE performance outcome. A significant difference in knowledge and attitude were observed among intervention groups when compared to control.

Conclusions: Teaching nutrition to medical students in first year could prepare them adequately to impart effective nutritional counseling and support to their patient in clinical practice years.

Key words: nutrition education, innovation, medical student.

PO1462

INFANT AND YOUNG CHILD NUTRITION PROMOTION ACTIVITIES IN BURKINA FASO: ANALYSIS OF COVERAGE IN 2011

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Background and objectives: Optimal infant and young child nutrition (IYCN) practices are key to improve the nutritional status of children and reduce stunting. However, adequate IYCN is poorly practiced in Burkina Faso and stunting prevalence remains high (33% in 2012). To increase access to IYCN promotion activities by scaling up community interventions, the Government of Burkina Faso appointed a national network of 146 Communities-Based Organisations (CBOs). The objective of this study was to analyse the coverage of this national program in 2011.

Methods: In 2012, a questionnaire was sent to all 146 CBOs. Bottlenecks reducing the coverage of IYCN activities were identified using an adaptation of the Tanahashi method (1978). Different coverage indicators assessed the proportion of targeted mothers who were reached by CBO's (coverage indicator A); reached by CBOs delivering IYCN activities (B); actually offered to participate in IYCN activities (C); attending at least one activity (D).

Results: Coverage indicator A was good at national level (71.5%) but with regional disparities, from 33.6% to 100% (>60% in 11 out of 13 regions). As most of the CBOs delivered IYCN activities, coverage B (70.4%) was very close to coverage A. Coverage C was only 15.0%, reflecting a lack of resources to actually attain the targeted group. Finally, coverage D (11.0%) was close to coverage C, indicating that most of targeted mothers reached by the programme were willing to attend activities.

Conclusions: In all regions the main bottleneck was identified between the proportion of mothers living in areas covered by CBOs and those actually offered to participate in activities. In order to improve coverage, the government of Burkina Faso should increase the number of CBOs, and/or their human and financial resources, particularly in regions where initial coverage A and B were low.

Key words: Scaling up, Coverage, bottlenecks, Africa

PO1463

ASSOCIATION BETWEEN METABOLIC SYNDROME AND BREAST DENSITY IN PREMENOPAUSAL CHILEAN WOMEN

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Background and objectives: Metabolic syndrome (MS) has been associated with an increased risk of breast cancer (BC) in postmenopausal women. Mammographic density (MD) is the best predictor of risk of BC. There is little evidence about the association between MS and DM. To evaluate the relationship between metabolic syndrome and mammographic density in premenopausal Chilean middle and lower SES (socioeconomic status).

Methods: Cross-sectional. We studied 225 women (mean age 35 years, SD = 6.4), DERCAM cohort participants. Anthropometric (weight, height, waist), blood pressure and metabolic were assessed. Sociodemographic, gyneco-obstetrics variables were registered in a questionnaire. We estimated mammographic density: dense volume (DV), non-dense volume (NDV), and density percentage (%D) through bilateral digital mammography, using the software Volpara. The MS was defined according to the NCEP ATP III criteria. The association between MS and DM (DV, NDV, %D) was estimated by linear regression models.

Results: The mean BMI was 28.2 kg/mt2 (SD=6.4), 62% had abdominal obesity and 78% low HDL. One in four women had MS. After adjusting for sociodemographic and gyneco-obstectrics variables, the MS was associated with increased NDA (coef IC 263 149.02 to 377.03) and lower %D (coef -2.52 -4.14 IC to -0.91) however, these associations lost significance when adjusted by adiposity (BMI). No association with DV or crude or adjusted models.

Conclusions: Our results do not support the relationship between SM and DM. The relationship between adiposity and NDV and how this can influence the future risk of breast cancer should be deepened.

Key words: Mammographic density, Metabolic Syndrome. Funding: Fondecyt # 11100238

PO1464

AFRICAN STAKEHOLDER VIEWS OF RESEARCH OPTIONS TO REDUCE MALNUTRITION IN SUB-SAHARAN AFRICA

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Background and objectives: Setting research priorities for nutrition in Africa is currently ad hoc and led by donors and funding bodies based in the Global North. There is a need to shift the status quo in the light of the continent's slow progress in reducing malnutrition (under and over-nutrition). This study explored African stakeholders' views on research priorities, to inform a nutrition research agenda that is better adapted to responding to malnutrition.

Methods: Using Multi Criteria Mapping, quantitative and qualitative data were gathered from 91 stakeholders from >15 sectors (health professionals, food Industry, government, civil society, academics and research funders) in Benin, Mozambique, South Africa, Tanzania, Togo and Uganda. Stakeholders appraised six research options (ecological nutrition, nutritional epidemiology, community nutrition interventions, behavioural nutrition, clinical nutrition and molecular nutrition) for how well they could address malnutrition in Africa.

Results: Community interventions was ranked first by stakeholders, as it was seen as likely to have an impact relatively quickly, was inexpensive and cost-effective, involved communities and provided direct evidence of what works. Behavioural nutrition was the second most highly appraised research option. Many stakeholders, particularly academics and government were also optimistic about the value of ecological nutrition research in the long term. Research funders did not share this enthusiasm. Molecular nutrition was favoured least, considered expensive, slow to have an impact and requiring infrastructure. Mozambique was the only country to prioritize research into ecological nutrition. South Africa ranked clinical and molecular nutrition the highest of all countries.

Conclusions: Research funders should redirect research funds towards the priorities identified by giving precedence to developing the evidence base for effective community nutrition interventions. Expanding research funding in behavioural and ecological nutrition were also valued and require multi-disciplinary collaborations between nutritionists, social scientists, agricultural and climate change scientists.

Key words: research policy, stakeholders, malnutrition, Africa.

PO1465

PHYSICAL BURDEN OF STUDENTS FROM THE MAIN SCHOOL OF FIRE SERVICE (MFSF) DURING "ADJUST TO WORKING TOGETHER" FIELD EXERCISES.

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Background and objectives: Rescue activity is primarily a team work. Life of rescuers as well as rescued people depends on cooperation of all of them. The "Adjust to working together" exercises require from all participants maximum efforts up to the highest readiness. Time, precision and safety of exercises are assessed. The size of energy expenditure associated with carrying out different training activities by students of MSFS is a determinant that determines amount of daily energy expenditure. The aim of the work was to assess the size of energy expenditure during the "adjust to working together" exercises in field conditions.

Methods: Total of 24 students took part in the examination (eight in a group).

Results: The average age of examined students amounted to 19.8±1.2 years, body height and body mass amounted to 180.6±4.6 cm and 75.7±6.6 kg respectively. The BMI value was 23.2 ± 1.6 kg/m2 in an average. The percentage fat content and lean body mass amounted to 12.9±1.8% and 65.9±5.5 kg respectively. Examination of energy expenditure was based on measurements of heart contractions frequency registered by the Polar Sport Tester 810 heart rate meters. The average time of each exercise was 54 minutes 37 seconds, during which the average energy expenditure amounted to 10.8 kcal/min (9.6 kcal/min – 11.6 kcal/min). The heart contractions frequency was 133.6±17.1 in an average.

Conclusions: According to the generally accepted classification for the assessment of work heaviness, both minute energy load and minute heart contractions frequency, allow to include the work performed by students to the category of very heavy works that can be done without a break for up to 1 hour.

Key words: military service, energy expenditure, nutritional status.

PO1466

MATERNAL EDUCATION AND DECISION MAKING POWER MODIFY HOW CHILDREN 0-24 MO BENEFIT FROM HOUSEHOLD DIETARY DIVERSITY IN EASTERN BURUNDI

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Background and objectives: Burundi is one of the 10 poorest countries of the world, with extremely high levels of child stunting. Research on the specific causes of stunting in this country is virtually non-existent. Our objectives were twofold: 1) to assess whether household dietary diversity (HDD) was associated with child dietary diversity (CDD) and stunting, respectively; and 2) to test whether maternal characteristics (literacy, years of schooling, health and nutrition knowledge and decision-making power) modified these associations.

Methods: Data were collected in 2010 on a sample of 2, 562 children 0 to 24 mo of age from the eastern provinces of Cankuzo and Ruyigi. Linear regression was used to test the association between HDD and child height-for-age Z-scores (HAZ) and dietary diversity respectively, controlling for maternal characteristics and other covariates, and with relevant interaction terms included. Standard errors were adjusted for village clustering.

Results: More than 53% of children were stunted and both HDD and CDD were low (3.97±1.63 out of 12 groups; and 2.02±1.50 out of 7 groups, respectively). Higher HDD was associated with both child HAZ and CDD. There were significant interactions ($p<0.05$) between each of the maternal characteristics tested and HDD on both child outcomes; the associations between HDD and child outcomes were greater among households with better off mothers (literate, greater education, better knowledge and more decision-making power).

Conclusions: To maximize their impact on child nutritional status, interventions aimed at improving HDD and child nutrition outcomes need to be combined with efforts to improve women's literacy, nutrition and health knowledge and decision making power.

Key words: Burundi, child, malnutrition, maternal knowledge, decision making power.

PO1467

FOOD CHOICES AND PERCEIVED BARRIERS TO HEALTHY EATING IN EGYPT

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Background and objectives: Appropriate food choice is an essential factor in maintaining body function and health. Factors that influence healthful food choices are different and complex. This study was carried out to identify the major perceived influences on food choices and assess barriers to healthy eating among participants working in National Research Center, Egypt.

Methods: A cross sectional study was conducted using structured written questionnaires. A total of ninety hundred and fifty subjects aged 41.71+/-10.54 years (43.1% males and 56.9% females) participating in the study. Participants answered questions regarding social demographic characteristics. Food choices and perceived barriers to healthy eating were assessed.

Results: The major factors in food choices were: quality/freshness (77.3%), trying to eat healthily diet (68%), food preferred by family members (34.6%), taste (26.2%)and cost (18.2%). Lack of time was the most frequently barrier reported by 38.9%, followed by Resistance to change (26.1%), cost (23.6%), lack of knowledge (20.8%) and social influence (19.2%). Lack of knowledge and food prices were significantly higher among those who were singles and those with less than university level of education.

Conclusions: The findings suggest that food prices and nutritional knowledge must be addressed carefully when developing nutrition intervention.

Key words: Food choices, Barriers, Prices, Knowledge.

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PO1468

TOLEDO AREA STUDY: RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND CARDIOVASCULAR RISK FACTORS IN ADOLESCENTS

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Background and objectives: The Toledo Area Longitudinal Study (TALS) analyzes the possible influences of parents, birth status, diet and environmental factors on different lipoprotein markers and insulin resistance (IR) in children and adolescents of Toledo Health Area. The objective is to assess the relationship between physical activity (PA) and lipoprotein and anthropometric markers in adolescents aged 16-17 years.

Methods: 53 adolescents belonging to TALS completed a PA self-administered questionnaire based on the time in hours they spent half a day of activities qualified as rest, very light, light, moderate and intense. Cardiovascular risk variables were determined: total cholesterol (TC), HDL cholesterol (HDL-C), LDL cholesterol (LDL-C), apolipoprotein (Apo) A1 and ApoB. The anthropometric (weight, height and body mass index -BMI-). Descriptive statistics (median and interquartile range) and analytical (nonparametric tests) were performed by SPPS® 15.0.

Results: 12 adolescents (22.6%) performed a low-PA, 31 (58.5%) engaged in low to moderate-PA and 10 (18.8%) a high-PA. With the PA increased, decreased TG ($p = 0.012$), LDL ratios / HDL ($p = 0.086$), TG / HDL-C ($p = 0.001$) and TC / HDL-C ($p = 0.053$) and increased HDL-C ($p = 0.038$) and the ratio ApoA1/ApoB ($p = 0.069$). No significant differences in anthropometric parameters were found, although there was a trend to increasing BMI when PA degree increases.

Conclusions: Although adolescents PA is reduced, increasing PA induces lower LDL atherogenicity and better lipoprotein profile. In this adolescent sample, lipoprotein markers are more affected than anthropometric, probably because exercise promotes muscle development with relative increase in weight and BMI.

Key words: Physical activity, adolescents, cardiovascular risk markers.

PO1469

ASSOCIATIONS BETWEEN BODY MASS INDEX AND BREAKFAST CONSUMPTION IN CANADIAN ADULTS

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Background and objectives: It has been suggested that breakfast consumption is associated with more favorable values for Body Mass Index (BMI; kg/m2); however, available data are inconsistent. Accordingly, we used data from the nationally-representative 2004 Canadian Community Health Survey (CCHS) to explore associations between BMI and breakfast status (no breakfast – NoB; breakfast containing ready-to-eat cereal – RTECB; other breakfast – OtherB).

Methods: Data were included from CCHS participants (age >19 y) who were not pregnant or lactating, had measured values for height and weight, and had completed a multiple-pass 24-hr diet recall. BMI was compared among NoB, RTECB and OtherB groups for all participants combined, men and women separately, and by age group (19-30, 31-50, 51-70, and 71+ y) within sex. Covariates in the analyses were age, sex, race, smoking status, physical activity, marital status, education, food security, language spoken at home, and dietary supplement use (n=11, 654).

Results: 11% consumed NoB, 23% consumed RTECB, and 66% consumed OtherB. Among the entire group, mean BMI was significantly lower in RTECB vs. OtherB (26.6±0.2 vs. 27.2±0.1, $P<0.01$), and was identical between NoB and OtherB (27.2±0.3 vs. 27.2±0.1). Among men, differences were not significant (27.6±0.4, 26.9±0.3, and 27.3±0.2 for NoB, RTECB, and OtherB, respectively). Among women, RTECB had lower BMI than OtherB (26.2±0.3 vs. 27.1±0.2, $P<0.01$), but other pairwise comparisons were not significant. Differences by age group were more variable, but BMI of both men and women aged 71+ y was lower in RTECB than OtherB.

Conclusions: Among Canadian adults, the type of breakfast consumed was more consistently associated with BMI differences than was consumption versus non-consumption of breakfast. Overall, those who included RTEC at breakfast had lower mean BMI than those who consumed other breakfasts, and this was most apparent in women and older adults.

Key Words: breakfast, national survey, breakfast cereal, BMI.

PO1470

IMPACT OF NUTRITION IMPROVEMENT THROUGH COMMUNITY EMPOWERMENT (NICE) PROJECT ON NUTRITION INDICATORS IN MAKASSAR, INDONESIA

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Background and objectives: NICE Project is a loan from the ADB in collaboration with the MOH Indonesia started in 2008 and ended in December 2012. Makassar is one of the 24 districts of NICE location. The purpose of this study was to examine the impact of the NICE project on the management of the program by the community and nutrition indicators

Methods: NICE Project based on learning organization approach to community empowerment. It included three Community Nutrition Packages (CNP) in every village with USD 5, 000/package. Community Nutrition Group (CNG) was a core group to plan, implement and mobilize the community. Facilitated by Community Facilitator (CF) and supervised by multi-sector group. CNP proposal was developed based on the village's survey results and the village community meeting. Monthly financial and activity reports were based on accountability and transparency.

Results: 1.The process of the community-based nutrition improvement in Makassar occurred through the involvement of multi-sectors and integrated approach. 2.From 2008 to 2012: a.Coverage of program participation in NICE areas increased to 59%, 65%, 70%, 80%, and 89%, compared to Non-NICE areas are 65%, 61%, 67%, 70%, and 66% respectively. b.Coverage of program achievements in NICE areas increased to 67%, 69%, 75%, 82%, and 88%, compared to Non-NICE areas are 66%, 68%, 73%, 73%, 71% respectively. c.Prevalence of underweight decreased to 14.3%, 14.15, 11.8%, 9.85 and 7.1%, respectively. d.Coverage of iron-folic cid consumption by pregnant women increased to 32%, 33%, 37%, 46% and 79%, respectively e.Coverage of vitamin A increased to 69%, 74%, 85%, 86% and 97%, respectively.

Conclusions: NICE Project has successfully empowered communities to improve nutrition through multi- sector involvement with an integrated approach. Increase in output and outcome indicators was significant.

Key words: NICE, nutrition, multi-sectors, integrated.

PO1471

NUTRITIONAL STATUS TREND OF INDONESIAN UNDER FIVE CHILDREN IN 2007-2010 AND POSSIBLE ACHIEVEMENT OF MDG TARGET IN 2015

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Background and objectives: Indonesia has a strong commitment to the improvement of nutrition. However, the improvement has not been encouraging. The objectives of this study was to assess the nutritional status of children under five trends and possible achievement of MDG target.

Methods: Time series analysis on the Basic Health Research (BHR) data 2007 and 2010. Correlation analysis was performed between the prevalence of stunting and obesity.

Results: Prevalence of underweight, stunted, wasted and obesity of under-five in 2007 were 18.4%, 36.8%, 13.6% and 12.2% respectively; and in 2010 were 17.9%, 35.6%, 13.3% and 14.0% respectively. Accelerating decline in prevalence of underweight, stunted, and wasted was 0.17%/year, 0.4%/year, and 0.1%/year respectively. Conversely, an increase in the prevalence of obesity was 1.8%/year. With the same acceleration, the prevalence of underweight was only 17.05 in 2015, which is far above the MDG target (15.5%). There was a positive correlation between the prevalence of stunted and obesity (R=0.379 p=0.000). This indicates that Indonesia has experiencing double burden of childhood nutritional problems, with the occurrence of an increased prevalence of NCD in the future.

Conclusions: 1.Accelerating decline in the prevalence of underweight, stunted and wasting is very slow but prevalence of obesity increases quickly. 2.Indonesia has experienced a double burden of nutrition with increased prevalence of NCD risk in the future. 3.Without multi-sector intervention, Indonesia will not meet the MDG targets by 2015 and have to address the issue of malnutrition and NCD in the future.

Key words: Indonesia, nutritional status, MDG.

PO1472

IS SECULAR TREND IN HEIGHT DELAYING OVERWEIGHT RAISE AMONG ADOLESCENTS? THE BRAZILIAN CASE

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Background and objectives: The body mass index (BMI) is used to evaluate overweight in population because the independency of weight and height. Such assumption is not widely confirmed to adolescents. To assess if secular trend in height is contributing to delay overweight raise among Brazilian adolescents.

Methods: Data are representative of Brazilian adolescents and come from four national surveys carried out from 1974/75 to 2002/2003. We considered as overweight adolescents with BMI equal to or greater than 25 kg/m2. Changes in BMI mean over time were fitted using linear regression including as independent variables survey year, height, survey-specific income quintiles, age, and an interaction term height-survey year as explanatory variables. Changes in overweight prevalence over time were fitted using Poisson regression with overweight status as outcome.

Results: Mean values of height and BMI increased over the period, for both sexes and in all age range, except for girls from 14 to 19-years from 1989 to 2002/03. The average increment and mean rate of height was greater for 10-to-15-years old. The highest mean rate of height was between 1989 to 2002/03. The annual increment of height decreased from 2002/03 to 2008/09 in parallel of the increment in BMI rate. After fitting the regression model, interaction height-survey year and per capita income were strong vectors to increase BMI mean. Changes in increment rate of height played a protective role against overweight in the two last periods for both sexes, mainly for girls. Period of 1989 to 2002/03 was the strongest vector associated with overweight in boys and association decreased to the next period, from 2002/03 to 2008/09.

Conclusions: BMI and height increased in a different way over the last forth years. These trends suggested height played a protective role in evolution of body mass mean and overweight indicators across time in Brazilian adolescents.

Key words: adolecents, obesity, secular trends.

PO1473

CHANGES IN THE PREVALENCE OF CHILD UNDERNUTRITION AND OVERNUTRITION IN NIGERIA FROM 1990-2008

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Background and objectives: Malnutrition – undernutrition and overnutrition – is a major risk factor for morbidity. Knowing past prevalence of malnutrition and changes in prevalence with time can thus be vital for understanding and reducing morbidity. This study provides such knowledge for Nigeria, which bears a remarkable proportion of the global burden of morbidity.

Methods: Nationally representative cross-sectional data for children under five years of age from the 1990, 2003, and 2008 Nigerian Demographic Health Surveys were used. For each survey year, stunting, wasting, and overweight were defined, using the 2006 WHO standards, as height-for-age z-score <-2, weight-for-height z-score (WHZ) <-2, and WHZ >+2 respectively. Descriptive statistics were obtained using complex survey design in Stata 11.2.

Results: Nationally, there was a reduction in stunting from 48.7% prevalence in 1990 to 40.6% in 2008. In contrast, wasting prevalence increased from 10.8% in 1990 to 14% in 2008. Overweight prevalence also increased from 2.5% in 1990 to 8.8% in 2008. Similar trends were observed when the national prevalence of each indicator in 2008 was compared to that in 2003. However, when stratified by wealth quintile, the results showed important differences in levels and magnitude of changes in malnutrition between poor and rich children. From 1990 to 2008, stunting decreased from 36.7% to 24.2% among the richest children, but only from 53.7% to 52.3% in the poorest children. Likewise, while wasting increased from 7.1% to 9.1% among the richest, it increased from 13.9% to 20.7% among the poorest children. Yet, for both poorest and richest children, overweight increased from little over 2% in 1990 to 9% in 2008.

Conclusions: Unless measures are taken to reverse observed trends, poor Nigerian children are and will continue to be at the greatest risk of both undernutrition and overnutrition.

Key words: double burden of malnutrition, poverty.

PO1483

IMPACT OF SOLAR POWERED IRRIGATION ON FOOD SECURITY, WATER SECURITY AND INCOME IN THE DISTRICT OF KALALÉ OF NORTHERN BENIN

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Background and objectives: In spite of all efforts and investments in smallholder irrigation schemes to improve rural household food security through improved productivity in developing countries, pressing issues such as rural poverty, food insecurity and social problems still prevail, which results in the scheme being undermined. The main objective of the study was to evaluate the impact of solar powered drip irrigation (PVDI) systems on household food security and on lifestyle changes in the Kalalé District of Benin.

Methods: Solar-powered drip irrigation (PVDI) systems were installed in conjunction with local women's agricultural groups engaged in horticulture as a way to reduce poverty and impacts of climate adaptation, and to improve food security. Results were compared with other women groups in other villages and random samples of households in the same villages. A household questionnaire based on FAO food security pillars (access to food, availability of food, utilization of food and the overall factor of food stability) was used to evaluate food security before (n=244) and 1-year after (n=286) the PVDI systems were installed (2007-2008).

Results: Severe food insecurity decreased by 46% and severe water insecurity decreased by 32% in women's group with PVDI while it was unchanged in other households. Only women's groups decreased their health care insecurity but this was not associated with PVDI over this time period. Agricultural sales increased in all households over the 2-year period but greatest in women's groups who used PVDI (150%), compared with women's groups without PVDI (100%) and in 2 random samples of other households (58% and 41%).

Conclusions: The research findings depict that solar powered drip irrigation enhanced food security and household livelihood through access to water and income generation.

Key words: Food insecurity, solar-powered drip irrigation, livelihood, income.

PO1474

THE STRATEGIC CAPACITY TO ADDRESS THE DOUBLE BURDEN OF MALNUTRITION AND DISEASE IN NIGERIA

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Background and objectives: Overnutrition and noncommunicable diseases (NCDs) are significant problems in Nigeria. Yet, the country still bears an alarming burden of undernutrition and infectious diseases. Policy interventions have been recommended as an integral approach to simultaneously addressing these issues. However, strategic capacity is required to initiate and sustain the policymaking process. Strategic capacity is the ability of individual and institutional policy actors to envision, create, agree upon, and generate commitment to a long term approach to address an issue. This study assessed the strategic capacity for addressing NCDs in Nigeria in addition to ongoing efforts to address undernutrition and infectious diseases. Previous evidence from Nigeria had revealed notable policy awareness but no formal policy on NCDs.

Methods: Semi-structured interviews were conducted with 34 key, multisectoral, Nigerian policy actors identified through snowball sampling. Participants' views about NCDs, potential policy responses, and enablers/challenges for action were assessed. Interview transcripts were analyzed and aggregated using Atlas.ti 7.

Results: Each policy actor possessed a partial understanding of causes and potential long-term approaches for NCDs in Nigeria. When the responses of individual policy actors were aggregated, they presented a broad perspective on feasible policy responses. However, a primary constraint was that there were no formal or informal mechanisms through which policy actors could pool their knowledge, expertise and other resources to forge consensus on such policy responses. Furthermore, the strong leadership needed for building trust, organizing effective coalitions and moving forward with a coherent policy agenda did not exist.

Conclusions: Nigeria possesses human and institutional resources that could be mobilized to address NCDs but the strategic capacity for doing so does not presently exist. There is a need to recognize strategic capacity as a distinctive concept and to purposefully plan for and build this capacity.

Key words: strategic capacity, NCDs, nutrition policy.

PO1475

WHEN IS A HEALTHY DIET NOT A SUSTAINABLE DIET?

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Background and objectives: One of the challenges facing public health nutrition today is to define a healthy and an environmentally sustainable diet and how to communicate this to consumers, as there are both synergies and conflicts between these issues.

Methods: Linear programming was used to create dietary scenarios to illustrate how widely the estimated greenhouse gas emissions (GHGE) associated with the diet can vary while still meeting UK dietary recommendations for health. Dietary scenarios were generated using the same basic meal structure (7-day menu), but changing some of the types or quantities foods within the meals. Four scenarios were created, with either healthy or unhealthy diets (either meeting dietary requirements or not) and high or low in associated GHGE.

Results: The different scenarios showed that making small changes to the foods in the diet but still meeting dietary recommendations could double the GHGE associated with the diet. It was also possible to create two diets with similar GHGE; one that met dietary recommendations for health and the other that met none of the recommendations.

Conclusions: This modelling exercise highlights one of the fundamental differences between dietary recommendations for health and GHGE associated with the diet, which is that dietary recommendations tend to be based the nutrient content of the diet and can usually be achieved from a relatively wide combination of foods, while GHGE associated with the diet are dictated by a small number of food items with no consideration of the nutrient content. This creates a challenge for providing simple a healthy sustainable diet since it cannot be assumed a healthy diet will have lower associated GHGE.

Key words: sustainable diets, healthy, greenhouse gas emissions, food, nutrients.

PO1476

COMMUNICATING THE CONCEPT OF HEALTH, ENVIRONMENTALLY SUSTAINABLE DIETS: DEVELOPMENT OF AN INTERACTIVE EDUCATIONAL TOOL

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Background and objectives: The concept of sustainable diets includes many different elements (e.g. health, environment, economic, social factors) and therefore is a complex issue to communicate. Current dietary intakes in the UK are neither sustainable for long term health nor the environment and the challenge is to communicate the combined dietary advice for healthier and more environmentally sustainable diets. The aim of this study was to develop an educational tool that incorporated the concept of both a healthy balanced diet and one lower in greenhouse gas emissions (GHGE).

Methods: In collaboration with the Global Food Security Programme, an interactive computer-based educational tool was developed using on the principles of the UK Eatwell plate. This is a plate divided into the five main food groups showing the relative proportions that make up a healthy diet. The tool allows the user to manipulate the proportions of the food groups on the plate, which is linked to two sliding scales (health and GHGE). Changing the proportions of the food groups alters the health score and GHGE score of the diet.

Results: The tool demonstrates how different elements of sustainability (i.e. heath and GHGE) can work either together or against each other depending on the different proportions of the food groups chosen, e.g. increasing high fat/high sugar foods reduces the health score, but also lowers the GHGE. Initial testing of the tool found it to be acceptable and usable by the general public and cognitive testing is now being used to test the interpretation of the material.

Conclusions: The complexity of communicating the concept of a healthy and environmentally sustainable diet should not be underestimated and simple educational tools are needed to try and convey dietary changes needed for healthy and more environmentally sustainable diets.

Key words: sustainable diets, educational tool, healthy, greenhouse gas emissions.

PO1477

EFFECT OF PHYSICAL ACTIVITY AND NUTRITIONAL EDUCATION ON BLOOD PRESSURE AND LIPID PROFILE IN A PEDIATRIC POPULATION.

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Background and objectives: The cultural and social changes of recent years have changed the eating habits and physical activity of children. The objective was to determine the effects of nutritional education and vigorous extracurricular physical activity on blood parameters on children in primary education.

Methods: The sample group consisted of 87 children (9-11 years) divided between three groups: 41 students in the control group (G0), 21 students in nutritional education group (G1), and 25 students in physical activity and nutritional education group (G2). The intervention program was carried out in 6 months of moderate to vigorous physical activity in 2 weekly lessons of 60 minutes, in addition to 6 sessions of nutrition education, held with the parents as well as the students, lasting approximately 2 hours each. The following parameters were measured: glycemia (GL) (mg/dl), total cholesterol (TC) (mg/dl), HDL cholesterol (cHDL) (mg/dl), LDL cholesterol (cLDL), triglycerides (TG) (mg/dl) and both systolic (SBP) and diastolic (DBP) blood pressure (mmHg). We performed T tests and Wilcoxon tests for two related samples to compare blood parameters changes. All analyses were conducted using the SPSS 19.0 statistics package.

Results: SBP increased in G0 and decreased in the rest of groups, without significant reductions. DBP increased in G0, was unchanged in G1 and decreased in G2 ($p<0.05$). G0 achieved significant increases in TC $p<0.05$), G2 achieved significant reductions in GL ($p<0.05$), cLDL and TC ($p<0.001$). TG showed a significant reduction in G1 ($p<0.05$) while the other groups showed significant changes.

Conclusions: The results of this study provide evidence that a school-based program incorporating vigorous physical activity and nutritional education for children and parents can improve blood parameters in children.

Key words: Nutritional education, Physical activity, Blood parameters, Children.

PO1478

FOOD SECURITY AND NUTRITIONAL STATUS AMONG ORPHANS AND OTHER VULNERABLE CHILDREN IN JOMORO DISTRICT, GHANA

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Background and objectives: Orphans and other vulnerable children (OVC) are likely to experience food insecurity due to the absence of one or both parents from households. It is still difficult to determine whether the nutritional needs of orphans and other vulnerable children are different from that of other children. The main objective of this study was to determine association between OVC status and child nutritional status and household food security.

Methods: A cross-sectional survey employing purposive sampling was used to identify 168 female caregivers, with OVC (84) and without OVC (84). Sociodemographic and modified USDA household food security questionnaire was used to assess food security. Weight and height of the children were used to compute the WAZ, WHZ and HAZ using WHO Anthro v3.2.2. Bivariate Chi-square analysis and T-test were used to assess the relationship between food security and OVC status. Binary logistic was used to determine the predictors of food security.

Results: Only 25.6% of all households sampled where food secured. Households with OVC were less food secure (13.1%) compared to those without OVC (38.1%); ($p<0.001$). Caregivers without OVC were significantly more likely to be employed ($p=0.034$) and married ($p=0.002$). Households without OVC were 3.7 times more likely to be food secured compared to those with OVC ($p=0.003$). Households with only one child under 5 years were 2.6 times more likely to be food secure than those with more than one child. There was no clear association between underweight, stunting and wasting, and food security or orphan status.

Conclusions: Food security is a problem in the Jomoro district, with households with or without OVC being vulnerable to food insecurity and malnutrition. Further understanding of how low-income families manage limited food resources is necessary address food security in this district.

Key words: Food security, Orphans and vulnerable children, nutritional status.

PO1479

PHYSICAL ACTIVITY, BIOCHEMICAL AND ANTHROPOMETRIC PROFILE AMONG HEALTH-CARE PROFESSIONALS (UNIVERSITY OF ANTIOQUIA, COLOMBIA). LATINMETS STUDY

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Background and objectives: Cardiovascular disease is closely related to physical inactivity, body mass index (BMI), waist circumference, and lipid profile changes. This study correlates physical activity (in MET) to biochemical profile, BMI, and waist circumference among health care professionals.

Methods: Cross-sectional study conducted in 283 students and professors from the health-care area schools at University of Antioquia, Colombia (2010-2011). The Minnesota Leisure-time Physical Activity Questionnaire was used to define the levels of physical activity among participants (somewhat active (SA) <143 kcal/day, active (A) 143-283 kcal/day, and very active (VA) >283kcal/day). Blood chemistry and anthropometry assessment (BMI and waist circumference) were performed. A descriptive and analytical study was performed using χ^2 test and $\alpha = 0.05$. SPSS v.18

Results: 283 volunteers participated in the study, 71% female, 42, 8% teachers, 57, 2% students; according to physical activity level -PAL- SA 11, 3%, A 17% and VA 71, 7%. We found that both A and VA subjects showed lower (though not significant, p>0, 05) levels of triglycerides, total cholesterol, and LDL cholesterol. Blood glucose showed a slight increase among A and VA participants compared to SA (p>0, 05). Waist circumference was inversely associated to PAL (p<0, 05).

Conclusions: Through PAL is possible to obtain a waist circumference level and some lipid profile variables closer to normal ranges. Cardiovascular risk in this population could be reduced by increasing physical activity levels, which should be encouraged through life. The World Health Organization (WHO) recommends 300 minutes of moderate physical activity or 150 minutes of intense physical activity every week in order to achieve greater health benefits.

Key words: Physical activity, body mass index, waist circumference, cholesterol, blood glucose.

PO1480

PROMOTING HEALTHY LIFESTYLE USING COMPLEX COMMUNITY-BASED APPROACH FOR AT-RISK POPULATIONS OF DIABETES IN THAILAND: FORMATIVE EVALUATION

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Background and objectives: The ultimate goal is to promote healthy lifestyle for Thai people and to prevent the burden of diabetes among high-risk Thai populations, through the public health leadership, community linkages and innovative technologies for long-term outcomes. To achieve this goal, multiple cohesion stakeholders; community health care workers (CHCWs), health volunteers (HVs), at-risk people for diabetes (ARPD), and change agents (students) are involved to establish lifestyle modification program regarding diabetes prevention. To investigate barriers to and supports for implementing a healthy lifestyle to prevent diabetes for at-risk people in Chiang Mai province, Thailand.

Methods: We conducted formative evaluation at communities, healthcare centers and schools with stakeholders. Interviews were used to gather gaps and supports in services, program needed that suited for Thai health care system. We interviewed CHCWs (n=4), HVs (n=4), ARPD (n=5), teacher (n=5) and students 'parents (n=3). Focus groups conducted to get insight key issues of barriers and opportunities for health promotion. HVs (n=21), ARPD (n=21) and students (n=22) were invited for focus groups. Coded transcripts from audiotaped interviews and focus groups were analyzed by hand and using NVivo software. Concept mapping illustrated findings.

Results: CHCWs, HVs, and ARPD identified potential barriers to program success as motivation for regular participation (e.g., physical activity program, school lunch program and quality management), lack of nutritional education and supporting healthy environments (e.g., junk foods and soft-drinks at schools and communities) and lack of health promotion policy supported for sustainability. However, CHCWs and teachers identified opportunities to integrate health promotion and disease prevention into their duties. HVs and ARPD suggested to integrate increasing physical activity into their lifestyle, e.g., traditional Thai dancing, walking, bicycle.

Conclusions: Formative research supports the need for the effective, sustainable lifestyle modification program to support ARPD in the communities.

Key words: health promotion, lifestyle modification program, Thailand.

PO1482

A HIGH FAT, HIGH GI, LOW FIBRE DIETARY PATTERN IS ASSOCIATED WITH INCREASED TYPE 2 DIABETES RISK IN BRITISH ADULTS

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Background and objectives: Evidence suggests a protective role against Type 2 Diabetes (T2D) for some dietary factors, in particular, low glycaemic index (GI) foods, dietary fibre and a diet low in fat. However, few studies have considered these three dietary factors simultaneously, in relation to T2D risk. The objective of this analysis was to examine the relationship between a dietary pattern (DP) characterised by GI, fibre density and fat density and incident T2D risk in a British adult population.

Methods: Subjects were 1257 adults from the 1946 British Birth Cohort. Dietary intake was measured at age 53 using a 5-day diet diary. Reduced rank regression was applied to identify a DP characterised by high GI, low fibre-density and high fat-density. Each subject received a DP z-score measuring how much their intake reflected this DP. T2D incidence was identified using validated self-report, fasting blood glucose and haemoglobin A1c levels. Logistic regression models, adjusted for socio-economic class, education, smoking, body mass index (BMI), waist circumference (WC) and physical activity, were used to examine prospective associations between DP z-scores at 53 y of age and risk of T2D at 64 y of age.

Results: The DP was characterised by low intakes of fruit, vegetables, yogurt and high-fibre cereals and high intakes of white bread, chips, fried foods and butter. After 10 years of follow-up 119 people developed T2D. People in the highest tertile of DP z-scores had more than double the risk for T2D (OR=2.11, 95%CI: 1.08-3.09) compared to those in the lowest tertile. This association remained significant after adjustment for BMI and WC (OR=1.81, 95% CI: 1.01, 3.23).

Conclusions: A high-fat, high-GI, low-fibre dietary pattern may increase the risk of T2D in older adults predominantly via pathways that are independent of BMI and WC.

Key words: Type 2 diabetes; dietary patterns; diet.

PO1484

GLYCEMIC INDEX AND GLYCEMIC LOAD AND RISK OF MORTALITY: THE PREDIMED STUDY.

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Background and objectives: Dietary fiber has been related with a lower risk of all cause mortality. However, there are different types of carbohydrates that have diverse glycemic response. Dietary glycemic index (GI) and glycemic load (GL) are indicators frequently used to assess this variation. The effect of GI and GL in all-cause mortality has not been sufficiently studied. To estimate the association between dietary GI/GL and risk of all-cause mortality in the PREDIMED study.

Methods: The PREDIMED study is a nutritional intervention trial for primary cardiovascular prevention in individuals at high cardiovascular risk. From 7, 447 participants from the PREDIMED trial we followed 3, 707 non-diabetic men and women (55-80 years) with complete and plausible dietary data. Dietary information was collected using a validated 137-item food frequency questionnaire (FFQ). We assessed baseline GI and GL values of each item by a 5-step methodology, using the International Tables of Glycemic Index and Glycemic Load Values. Deaths were ascertained through medical records and consultation of the National Death Index. Cox regression models were used to estimate multivariable-adjusted hazard ratios (HR) and 95% Confidence Intervals (CI) for mortality, according to quartiles of GI/GL adjusting for potential confounders.

Results: After a median of 4.65 year of follow-up, 123 deaths were observed. Participants in the highest quartile of baseline GI showed an increment in the risk of mortality [HR= 2.04 (95% CI: 1.08-3.84] as compared to those in the lowest quartile. Moreover, a significant dose-response relationship was observed [P for trend = 0.033]. Baseline dietary GL was not associated to mortality risk.

Conclusions: A direct association between baseline dietary GI and mortality was found within non-diabetic participants from the PREDIMED trial.

Key words: Glycemic index, Mortality, Elderly.Acknowledgements: CIBEROBN and RTIC 06/0045 are an initiative of the Instituto de Salud Carlos III, Science and Innovation Ministry, Spain.

PO1485

LOW PHYSICAL FITNESS SCORE ASSOCIATED TO CARDIOVASCULAR HEALTH FACTORS IN CHILEAN SCHOOL CHILDREN FORM SIX TO 14 YEARS OLD

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Background and objectives: Chile faces increased obesity prevalence and low physical activity in children. Adequate physical fitness (PF) protects cardiovascular health (CVH). The objectives were: a) associate physical fitness to simple markers of CVH, b) detect children at risk, by generating a Z-Score composed of waist circumference (WC) blood pressure (BP), excess fat and associate it to tertiles of physical fitness in children.

Methods: In Santiago urban sector, a sample of 1686 children was selected from 17 state funded, semi-funded and private schools. Subjects were selected at random, by level and sex at schools. Standardized anthropometry, maturation, blood pressure, six minutes walk test (6MWT), standing long jump (SLJ) and grip strength (GRS) were measured.

Results: Obesity prevalence was 19, 7 % of obesity (22, 1% in girls and 17% in boys). CV risk expressed as WC>P90 occurred in 16, 5%, 3, 5% had PA >P90 and had 51, 3 23, 9 mm subcutaneous fat. Two z-scores were built and compared to PF test. Thus, children in the PF lowest textiles, increased 2, 7 their CV risk. Children from state schools and girls had the worst PF and CV risks.

Conclusions: Excess fat, WC> P90 and BP> P90 were found in children with worst PF. Thus, with routine and easy measurements at schools, children at CHV risk could detect, without collecting blood samples. Low PF is a potent marker of CHV health risk in school children.

Key words: physical fitness, zscore, cardiovascular health.

PO1486

REDUCING ADDED SALT IN VEGETABLE SOUP: HEDONIC IMPACT IN ELDERLY AND PRE-SCHOOL CHILDREN

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Background and objectives: Reducing salt intake and implementing a strategy of small reductions is often advised. The objective of this study was evaluate the impact of a 30% reduction of the vegetable soup salt content on elderly and children's hedonic preferences.

Methods: This study took place in a natural setting (institutional canteens). Elderly subjects were 29 older adults (79.7±8.9 years, 20 females), who were recruited in two public nurseries (NH1 and NH2). The 49 children (4.5±1.29 years, 26 girls) were recruited from a public pre-school (PS). Through randomization and cross-over, the subjects tasted and evaluated a vegetable soup prepared as usual and a variant soup with a 30% salt reduction, in consecutive days. The order of presentation of the two soups was different across nurseries and schools. Salt content was determined using flame photometry method. A hedonic description of the food variants was performed; elderly evaluated hedonic perception using a visual analogue scale with 10 cm line scale (from "very good" to "very bad"), and children evaluated hedonic perception through perceived liking ranking using a five point facial scale.

Results: The mean baseline salt levels/100 g soup were 300.7 mg, 206.7 mg, and 147.0 mg, respectively in NH1, NH2, and PS; reductions of 30% were prepared on these values. Statistical significant differences on hedonic evaluation between reduced salt content soups and soups with usual salt levels were not observed. The results of hedonic evaluation, before and after reduced salt content were 0.7 and 0.8 in the elderly, and 4 and 4 in children.

Conclusions: No impact of a 30% decrease in salt content of vegetable soup was found either in children and elders. The reduction of 30% of added salt could be considered without suppressing the hedonic value of vegetable soups.

Key words: Elderly, Pre-school Children, Salt, Hedonic, Soup.

PO1487

THE COST OF HOME DELIVERY SCHEMES FOR LIPID-BASED NUTRIENT SUPPLEMENT PRODUCTS: A POLICY EXPERIMENT FROM RURAL MALAWI

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Background and objectives: Public policy makers may play a role in promoting products demonstrated to be efficacious in addressing hidden hunger. Home delivery reduces the out-of-pocket costs of accessing these products, to zero if they are provided for free. However, home delivery is not cheap, especially in rural areas; little is known costs. This paper provides evidence based on a home-delivery scheme undertaken by the International Lipid-Based Nutrient Supplements (iLiNS) Project research team in rural Malawi.

Methods: Estimates of home delivery costs for lipid-based nutrient supplements (LNS), including product procurement, transportation, staffing and storage costs, are based on those faced by the iLiNS-DOSE Project. A cost model was developed and used to run a hypothetical five-year policy experiment to provide nationally produced LNS to 60% of the approximately 12, 000 young children aged 6-24 months. LNS is delivered bi-weekly to all children in the targeted age bracket; thus, older early-enrollees and young late-enrollees would not receive the full 18-month intervention.

Results: Total cost of the hypothetical five-year intervention would be approximately US$3.3m. Cost per treated-child is US$69; cost per fully-treated-child is US$89. 63% and 21% of the total cost is attributable to product purchases and personnel costs, respectively.

Conclusions: Low effective demand for products proven to combat hidden hunger may prod delivery of these products directly to targeted children's homes. A five-year hypothetical policy experiment suggests that the cost of procurement, storage and weekly home delivery of a nationally produced LNS product can be large. Changes to intervention protocol (target population, frequency of delivery, etc.) will affect costs. The expected health and other benefits associated with each proposed intervention strategy would have to be compared to these costs in order to set priorities.

Key Words: Nutrient Supplements; Home Delivery; Malawi
Acknowledgement Funded by the Bill & Melinda Gates Foundation.

PO1488

EFFECTS OF ALTERNATIVE SPATIAL DISTRIBUTION SCHEMES ON HOUSEHOLD ACCESS COSTS OF LIPID-BASED NUTRIENT SUPPLEMENTS: CASE STUDY IN RURAL BURKINA FASO

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Background and Objectives: Identifying cost-effective strategies for delivering efficacious nutrient supplements is a policy challenge, especially in rural areas. This paper examines the effects of alternative distribution outlet schemes on transportation costs of 3, 146 households in the Dandé health clinic catchment area (1, 600 sq. km), Burkina Faso, site of the International Lipid-Based Nutrient Supplements Zinc research project.

Methods: Spatially referenced data on households, hospitals, clinics and markets, and on the road networks that link them, are combined with the motorized transportation fare structure to construct a distance-based transportation cost overlay. This overlay is then used to estimate the household-specific, one-way transportation costs under alternative lipid-based nutrient supplement (LNS) distribution outlet schemes.

Results: If the full-service Bobo Dioulasso Hospital is the only outlet, there is a wide range of household-specific one-way transportation costs; average transportation cost is US$ 1.96. Extending the distribution network to include the local, limited-service Dandé Hospital reduces the average transportation cost to US$ 1.16; the spatial distribution of household access costs changes. Extending the network to include all health centers reduces average transportation cost to US$ 0.60. Adding markets as distribution outlets does not further reduce average transportation costs. Results of this distance-based approach could be expressed in other metrics, e.g., walking time, without loss of generality but perhaps with different policy implications.

Conclusions: Full-service hospital-based (only) distribution is the most costly LNS distribution scheme to households.

Extending the network of outlets to include all hospitals, health centers and clinics reduces average households access costs by nearly 70%; doing so shifts the cost burden from households to other entities charged with managing this larger outlet network. Using this model, involving retail outlets offers no household transportation costs savings.

Key Words: Transportation Costs; Burkina Faso; LNS Acknowledgement Funded by the Bill & Melinda Gates Foundation.

PO1489

EPIDEMIOLOGY OF FOOD POISONING IN CHILDREN

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Background and objectives: Food-borne diseases are a widespread and growing problem of public health. They spared no age, no country region and can happen at any time. One of the main vulnerable groups is the children. This study aims to determine characteristics of food poisoning among children aged less than 6 years old in Morocco, in order to better understand this problem to reduce the morbidity and mortality resulting from it.

Methods: A retrospective analysis of food poisoning cases occurred in Morocco, notified between 1992 and 2008 in the Moroccan Poison Control Center (MPCC), was performed.

Results: During this period, 2 589 cases of food poisoning among children under the age of 6 years have been reported to MPCC, 97% to the emergency department. According to reported data, boys were more exposed to poisoning than girls ($p<0.01$). Of the 1 468 cases for whom the food has been identified, dairy products were the most accused. The mean consultation length was 9 hours. Most patients had shown digestive disorders accompanied by general, neurological and respiratory disorders. Of the 1719 cases for whom the evolution is known, 12 of them died and 2 children aged 2 and 6 years had developed sequelae. The health status of other children has improved under decontamination and symptomatic treatment.

Conclusions: The efficient treatment remains prevention focused on public awareness about the dangers of this type of poisoning, especially for those at risk, children and the elderly.

Key words: Food; Poisoning; Child; Epidemiology; Morocco.

PO1490

STAPHYLOCOCCUS AUREUS IN DAIRY PRODUCTS AND FOOD POISONING IN MOROCCO

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Background and objectives: In Morocco, Staphylococcus aureus is the most common cause of bacterial gastroenteritis, due to consumption of contaminated food. The aim of this study is to describe the epidemiological and microbiological profile of dairy poisoning in the Rabat-Salé-Zemmour-Zaer region.

Methods: A retrospective study was conducted on food poisoning cases reported to the Moroccan Poison Control Center (MPCC), between 2004 and 2008, and data of dairy products samples (sold in small and large commercial surfaces) analyzed in Laboratory of Food Microbiology at the National Institute of Hygiene in Rabat, during the same period.

Results: During 2004-2008, the MPCC has recorded 141 cases of dairy poisoning whose 127 cases were from Rabat. Urban area was the most affected ($p<0.001$). Nearly half of cases were recorded in autumn. The average age of victims was 7 years old. Milk and milk beverages were frequently involved (62%). Most patients had shown hepato-digestive disorders. Six cases were presented in addition, asthenia, cutaneous signs and dizziness. The health status of patients has improved under symptomatic treatment. Analysis of variance showed significant effects of age and consultation length on patients' health status. During the study period, 1 383 samples were analyzed, of which 677 dairy products samples were unfit for consumption. Enterotoxin-producing Staphylococcus were detected in 6% (41/677) of these samples at mean levels of 106 CFU.g-1. Contamination peak was recorded in autumn (27%). Cream is the dairy product that has been most involved (34%).

Conclusions: Due to the universal standards, some dairy products had not a proper quality for use by consumers, even in times of cold weather. High levels of contamination by S. aureus may be due to bad storage mainly, and lack of equipment and staff hygiene.

Key words: Dairy; Poisoning; Staphylococcus aureus; Morocco.

PO1492

CONSTRUCTION AND ON-LINE PUBLICATION OF A DATABASE OF WORLDWIDE FOOD AND NUTRITIONAL GUIDES AND BENCHMARKS

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Background and objectives: In this research work, food and nutritional guides and benchmarks, from several countries around the world were identified and compiled. All collected documents are related to the food and nutrition education theme and to healthy lifestyles strategies, capable of reflecting the nutritional recommendations directed towards various target groups. This information refers to 64 countries and totalizes 601 food and nutritional guides and benchmarks.

Methods: For database construction, the documents were separated by continents and, for a better organization, 7 regions emerged: Europe, North America, Central America, South America, Africa, Asia and Oceania. In total, 66 tables were created, presenting 7 different sections: institution identification, guide/benchmark name, publication year, legal deposit (only available for Portugal and Spain), ISBN (only for countries with this information available), access link for the on-line document availability and, finally, the date when each document was first accessed.

Results: A database entitled "Food and Nutritional Guides and Benchmarks in the World" was built being freely available and downloadable in the official web site of the Public Higher Education Institution "Escola Superior Agrária de Coimbra" (Instituto Politécnico de Coimbra) through the electronic address www.esac.pt (in the banner entry "trabalhos de alunos", translated in English as "students' works").

Conclusions: Recognizing that all this information will never be complete, this database is potentially a useful tool, not only for students, but also for researchers, teachers, educators, instructors and health professionals in the areas of food and nutrition sciences. Additionally, it is intended that the database should be seen as a dynamic instrument able to potentiate the interest due to its continuous update, encouraging the search for new knowledge.

Key words: guides, benchmarks, food, nutritional, on-line database.

PO1493

POLICY IMPLICATION OF QUALITATIVE EXPLORATION OF STAKEHOLDERS PERSPECTIVES ABOUT INTEGRATION OF ESSENTIAL NUTRITION ACTIONS/INTERVENTIONS INTO NIGERIA HEALTH SYSTEM

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Background and objectives: Significance of an enabling environment for nutrition has not been studied in Nigeria and contextual issues continue to affect scale-up of efficacious nutrition interventions. Within Nigeria health system, it is not clear how nutrition interventions are being integrated into critical contact periods. This study examined perceptions of key stakeholders involved with nutrition planning and implementation, to understand enabling environment for integrating essential nutrition actions/interventions (ENAs) into the Nigeria health system.

Methods: Semi-structured interviews were conducted with 30 nutrition stakeholders from donor agencies, federal and state ministries and agencies of health, academia and independent nutrition consultants who were recruited through snowballing technique. Interviews focused on respondents perception of nutrition as it relates to WHO's six building blocks of the health systems. Thematic analysis was then conducted to identify common themes.

Results: In-depth analysis showed that most stakeholders perceived that leadership and governance for ENAs programmes in Nigeria is weak and characterized by poor- coordination, commitment and resource allocation and low-level of advocacy, . Financing and supplies for ENAs in Nigeria are donor and development partners driven with very little government commitment. Human resources for nutrition were perceived as deficient since most personnel implementing ENAs are not trained nutritionists. Stakeholders further adjudged that ENAs implementation have not been systematically integrated into the primary health care system. Nutrition information systems in Nigeria were likewise considered as non-existent, with no harmonized method of data collection and integration.

Conclusions: In Nigeria, integration of ENAs is weak across the six building blocks of health systems. Stakeholders recommended that having a coordinating agency for nutrition directly under the Presidency is the best for integrating ENAs into the Nigeria health system. It is implied that engaging policy makers through advocacy is necessary to improve nutrition integration.

Key words: Nutrition interventions, Stakeholders perspectives, policy.

PO1494

SITUATIONAL ANALYSIS OF NATIONAL POLICY ON FOOD AND NUTRITION IN NIGERIA

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Background and objectives: Since the launch of the Nigerian National Policy on Food and Nutrition in year 2002, there has been no assessment of the state of implementation of its key elements. Indeed, although the active period of the document ends in four years (year 2016), it is not clear what has been achieved in its implementation. This study therefore assessed the nutrition policy performance through a desk review of nutrition related programmes documents in Nigeria.

Methods: Content analysis of the National Policy on food and Nutrition (NPFN), and the National Plan of Action for Nutrition (NPAN) were conducted with a focus on health related content. Performance of the health related nutrition interventions and activities were assessed based on availability of guidelines, training manuals and programmes implementation documents as well as technical reports.

Results: The NPFN had five specific objectives of which three were directly related to health sector implementation. As detailed in the NPAN, health sector tasks related to policy has been achieved through the Federal Ministry of Health (FMOH) with the development and dissemination of training manuals for IYCF and revision of these guidelines in the year 2011. Guideline on Nutritional Care and Support for People Living with HIV in Nigeria was also developed in year 2011. The National Primary Health Care Development Agency (NPHCDA) likewise developed the Maternal Newborn and Child Health Week training manual among others. Content analysis showed that actual interventions implementation has been fragmented and uncoordinated. Information about programme financing was also deficient, so it was not possible to assess policy and programmes financing. Available information showed high donor reliance in financing of nutrition activities.

Conclusions: Although certain health related elements of the nutrition policy have been implemented, they have neither been implemented at scale nor coordinated.

Key words: Nutrition Policy, Situation Analysis, Implementation.

PO1495

EFFECT OF MEDITERRANEAN DIET COMPONENTS ON SELECTED CARDIOVASCULAR RISK FACTORS,ALL-CAUSEMORTALITY AND CARDIOVASCULAR MORTALITY: SYSTEMATIC REVIEW

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Background and objectives: Mediterranean diet has been associated with lower risk of cardiovascular diseases. Objective: To evaluate the cardioprotective effect of some of the popular Mediterranean dietary components: olive oil, fish, fruits and vegetables, wholegrains and wine and to propose suitable recommended dietary dosage and frequency of the consumption.

Methods: A updated systematic review of observational and intervention studies in Scopus database (including Medline database) was performed. Inclusion criteria include English-publication studies published since 2001 up to 31 January 2013, adult participants (?18 years old), interventions which stated frequency of consumption of each investigated component.For studies which showed at least one significant improvement of outcome was considered as cardioprotective.

Results: A total of 4,033 abstracts were obtained prior to title and abstract screening. Out of this, 67 original research studies were reviewed and 39 studies were included in the final rigorous list for review.Of these 39 studies, 34 had shown protective effects.

Conclusions: Current recent evidence showed that consumption ofolive oil, nuts, legumes, fruits and vegetables, wholegrains, and moderate alcohol/wine consumption) could help to reduce the risk of cardiovascular disease and mortality.

Key words: Mediterranean diet cardiovascular risk all-cause mortality cardiovascular mortality

PO1497

WHAT IS THE OBESITY PREVELANCE OF NORTHERN CYPRUS?

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Background and Objectives: Obesity is a complex multifactorial chronic disease and its prevelance increases day by day on all around the world. Thus, in this study it's aimed to evaluate adult obesity prevelance of Turkish Republic of Northern Cyprus (TRNC).

Methods: The subjects were 1740 adults (738 males, 1002 females) aged 19-65 years (39.1±13.3 year) who were selected

to constitute a representative Northern Cyprus population as a whole between June-July 2012. Height and weight were obtained using standardized equipment. Overweight was considered at BMI of 25 to 29.9 kg/m^2 and obesity at a BMI of >30 kg/m^2.

Results: The mean BMI was 27.2±4.5 kg/m^2 in men and 26.8±6.1 kg/m^2 in women. The prevalance of overweight and obesity was 34.4% and 26.4%, respectively in Northern Cyprus. This results significantly differs between five main area of country. Remarkably, Güzelyurt has the lowest (16.4%), Nicosia and Iskele have the highest (28.8%) prevelance. The prevalance of obesity increases by the age groups (19-30yr, 31-50yr, 51-65yr); 11.7%, 27.4% and 44.3%, respectively ($p<0.05$). There was statistically significant positive correlation between age and BMI. The prevalance of overweight and obesity in men was 40.2% and 25.7%, respectively. The corresponding percentages in women were 30.0% and 26.9%.

Conclusions: The prevalance of overweight and obesity in Northern Cyprus adult population is very high. A national plan of action to overcome obesity is urgently needed to reduce the economic and health burden of obesity in this country.

Key words: obesity, body mass index, nutrition.

PO1498

URBAN GHANANIAN CHILDREN WITH LESS PHYSICAL ACTIVITY ARE MORE PRONE TO OVERWEIGHT/OBESITY

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Background and objectives: Childhood obesity, a growing public health concern in developing countries, puts children at risk of serious health problems later in life. In Ghana, there is limited data on the magnitude and determinants of overweight/obesity in children to inform public health interventions. We aimed to determine the prevalence and determinants of overweight/obesity among school-age children in two major urban centers in Ghana.

Methods: Cross-sectional survey of 3, 089 pupils aged 9 to 15 years attending private or public schools in Ghana's two largest urban centers (Accra and Kumasi). Children and their mothers were interviewed on socio-demographic characteristics and the children's dietary intake and physical activity in the past week. Children's weight and height measurements were taken and their BMI for age and sex computed. Logistic regression was used to explore household and individual factors associated with overweight/obesity (WHO BMI Z-Score >1SD) in the children.

Results: More children were overweight/obese (14.7%) than underweight (3.9%). Female children were 2.4 (CI: 1.79, 3.13) times more likely to be overweight/obese than male children. Household factors associated with increased risk of overweight/obesity among the children included mother having completed post-secondary education vs. mother having no formal education (OR=1.84; 95% CI: 1.02, 3.32) and household in the third tertile of socioeconomic status vs. being in the first tertile (OR=.5; 95% CI: 1.12, 1.99). Children who never walked to school and children who engaged in a sporting activity fewer than 3 days a week had at least 36% higher odds of being overweight/obese compared to those who sometimes walked to school or engaged in a sporting activity at least 3 days a week.

Conclusions: Improving physical activity habits among school-age children is important for addressing overweight/obesity in this population. The study was funded by International Development Research Center (IDRC, Canada).

Key words: overweight, obesity, school-age children, Ghana.

PO1499

VOLUME AND PATTERNS OF PHYSICAL ACTIVITY IN RURAL CAMBODIAN CHILDREN AGED 15-MONTHS

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Background and objectives: At present the physical activity of young children resided in low-income countries remains relatively unexplored. The main purpose of this study is to contribute to fill out a knowledge gap regarding the prevalence and patterns in young Cambodian children's physical activity.

Methods: 397 toddles (M: n = 215, F: n = 182) wore accelerometers GT3X+ Actigraph accelerometers for six consecutive days. Outcomes were total activity, expressed as mean counts per minute (cpm), sedentary activity (SED; cpm < 100) and moderate-to-vigorous intensity physical activity (MVPA; cpm > 1676) and the percentage of children meeting the current recommendations of 180 minutes physical activity per day. Gen-

der differences in outcomes were tested in multiple regression models.

Results: Despite 25% and 11% of children presenting chronic and acute malnutrition, respectively, children expressed high levels of total activity (891cpm) and MVPA (18%). However, the majority of time was spent sedentary (64%) and roughly 55% of children met recommendations for daily physical activity. Despite similar hour-by-hour patterns between genders, girls were 2- 4% less sedentary between 8:00-9:00 PM whereas boys demonstrated significantly higher total activity and accumulated more MVPA over the whole day ($p < 0.001$).

Conclusions: Though gender discrepancies in physical activity are present at an early age, both genders displayed high-active-high-sedentary profiles. The results also indicate a need for early prevention of physical inactivity among Cambodian children and further provide information on specific time points in which opportunities for reducing SED may be more effective if each gender is targeted. Longitudinal monitoring of physical activity levels and changes in activity patterns are recommended from the onset of early childhood in order to assess a potential impact of the transition to school on physical activity levels.

Key words: Sedentary Behaviour, MVPA, Accelerometer, Early Childhood, Malnutrition.

PO1500

INTAKE OF PROCESSED AND ULTRA-PROCESSED FOOD PRODUCTS IN BRAZIL AND THEIR IMPACT ON OVERALL DIET QUALITY

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Background and objectives: Increased consumption of industrially processed food products is a major cause of the current pandemic of obesity and related chronic non-communicable diseases. Potential mechanisms to explain this association include their high energy density and unbalanced nutrient profile. The objective of this study was to assess the intake of these products in Brazil in 2008-2009 and their impact on the overall quality of diets.

Methods: Data analyzed came from 24-hour food records applied to a probabilistic sample of 34, 003 Brazilians aged 10 and older as part of the 2008-2009 National Household Budget Survey. Foods were classified as unprocessed or minimally processed foods (Group 1), processed culinary ingredients (Group 2) and processed and ultra-processed products (Group 3). Dietary indicators were calculated according to quintiles of the contribution of Group 3 products to the total energy intake.

Results: Food products supplied 30.5% of the total energy intake. Energy density and the percentage of total and saturated fat, trans fatty acids and free sugars, all significantly increased with increases in the contribution of Group 3 products to the diet, while the opposite was observed for dietary fiber, iron, zinc, potassium and vitamin C. These significant associations were not changed after control for income and other socio-demographic confounders. Group 3 products taken together were more fatty, sugary, salty and energy dense than a combination of Group 1 and Group 2 items. Only the 20% lowest consumers of food products were anywhere near reaching World Health Organization nutrient goals for the prevention of obesity and chronic non-communicable diseases.

Conclusions: The high energy density and the unfavorable nutrient profile of food products indicate their potential harmful effect on human health. Healthier diets involved low consumption food products and high consumption of meals based on minimally processed foods.

Key words: Food; Food processing, Nutrition; Nutrient profile.

PO1501

NUTRITIONAL CONDITION, INTESTINAL PARASITOSIS AND LEUKOGRAM OF NURSERY CHILDREN IN SERRINHA, JUAZEIRO AND SALVADOR (BRAZIL)

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Background and objectives: Nutritional condition abnormalities bring immunologic deficiencies on children which makes leukogram abnormalities mainly, If there is intestinal parasitosis. Nutritional classification on children at Serrinha, Juazeiro and Salvador nurseries (Bahia-Brazil) in 2012 and results correlation with leukogram results and parasitosis presence.

Methods: It was valued 140 children of both sex between 2 to 6 years old from Serrinha, Juazeiro and Salvador (Bahia). They were valued by weight, height and sex using antrophomethic evaluation through Epinut/Epi-Info, (3.5.2) and National Center for Health Statistics - NCHS standarts. Parasitologic exams were made from faece samples using Hoffman, Pons and

Janer methods. Leucograms were made by hematologic counter Pentra 120 Retic Horiba/ABX using EDTA preservated blood.

Results: it was analyzed 140 children (48 boys and 92 girls) which ages are between 2 to 6 years old. 74% (n=104) eutrophic children and 21% (n=29) children with low weight and 5% (n=7) children with obsesity. 56% (n=78) of children were positive for intestinal parasitosis. It was monoparasitosis or polyparasitosis for protozoo and helmits like Endolimax nana, Entamoeba coli, Entamoeba histolytica, Giardia intestinalis, Trichuris trichiura, Ascaris lumbricoides and Enterobius vermicularis. 3 year old children presented the most frequency of parasitosis. Leukogram results were varied: total leukocytes (5, 332 to 13, 008 $x10^3/\mu L$), neutrophils (2, 024 to 6, 800 $x10^3/\mu L$), eosinophils (0, 215 to 1, 901 $x10^3/\mu L$), basophils (0, 071 to 0, 235 $x10^3/\mu L$), typical lymphocytes(2, 050 to 4, 182 $x10^3/\mu L$), atypical lymphocytes (0, 067 to 2, 120 $x10^3/\mu L$), monocytes (0, 470 to 1, 105 $x10^3/\mu L$).

Conclusions: Children were positive for intestinal parasitosis, most of them were eutrophic, but the rest had malnutrition and obesity. It exists leukocytosis and high eosinophilia on some children which must be caused by the pathologic agent presence. In order to reduce malnutrition and parasitosis a long-term intervention is needed.

Key words: Leucocytes. Malnutrition. Parasitosis.

PO1502

EFFECT OF RECOMMENDED PHYSICAL ACTIVITY DOSE ON OBSTETRICAL, NEONATAL AND MATERNAL METABOLIC OUTCOMES IN PREGNANT LATINA WOMEN

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Background and objectives: To evaluate the influence of recommended physical activity dose on obstetrical, neonatal and maternal metabolic outcomes in in pregnant latina women.

Methods: The study included Sixty-seven nulliparous in gestational week 16–20, attending for prenatal care at three tertiary hospitals in Colombia who were randomly assigned into one of two groups: 1) The experimental group took part in aerobic exercise at an intensity of 55–75% of their maximum heart rate for 60 min, three times a week for 12 weeks, 2) The control group undertook their usual physical activity. The primary outcomes were changes in immediately after the 12 weeks intervention on blood lipids, insulin sensitivity (HOMA-IR), body composition and cardiorespiratory fitness. Obstetrical and neonatal outcomes measures were type of delivery, postpartum hemorrhage, newborns maternal and complications, gestational age, birthweight, fetal growth and APGAR score.

Results: At the end of the 12-week program, there was no difference in blood lipids or insulin sensitivity. The experimental group showed lower values in BMI, fat-free mass, body fat and skinfold thicknesses than did the control group, but these differentials were non-significant. Intention-to treat analysis revealed that the exercise group had a greater cardiorespiratory fitness at the end of the intervention, measured by VO2. Experimental group showed lower complications during delivery (postpartum hemorrhage modearate) than did the control group, (58% compared with 75%, P = 0.05) and lower complications in newborns (meconium, cyanosis or respiratory distress) than did the control group, (21% compared with 46%, P = 0.01).

Conclusions: The potential public health benefits of exercise are too great and this study supports existing guidelines indicating that latina women may begin or maintain an exercise program during pregnancy.

Key words: Physical Activity; Pregnancy; Newborns; Maternal complications.

PO1503

HOW MUCH LAND IS REQUIRED TO PRODUCE A HEALTHY DIET WITH REDUCED GREENHOUSE GAS EMISSIONS IN THE UK?

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Background and objectives: One of the challenges facing public health nutrition today is changing peoples' dietary behaviour to meet dietary recommendations for health whilst ensuring environmental and economical sustainability. Recently there has been a focus on estimating the environmental impact of national diets and modelled diets, meeting nutrient requirements, based on dietary associated greenhouse gas emissions (GHGE). However, environmental sustainability is a multifaceted challenge encompassing not only reduction of greenhouse gas emissions, but also ensuring sufficient appropriate agricultural land is available to met the requirements of a healthy GHGE reduced diet. The aim of the current study was to predict the area of land required in the UK to deliver a healthy, GHGE reduced diet for a woman.

Methods: Linear programming was used to create a sample food list for a seven day diet meeting UK dietary recommendations for an adult women and a 25% reduction of dietary associated GHGE (compared to 1990 levels). Assessment of land requirements was completed after conversion of food items to their equivalent raw food commodity weight, before annual per capita and UK population land areas were calculated.

Results: A diet meeting UK dietary recommendations for a woman achieving reductions in GHGE requires 0.412 hectares/person/year. Adjustment to the UK population indicates 28 million hectares would be needed to sustain a healthy, GHGE reduced diet annually. Cereal crops accounted for the largest acreage.

Conclusions: When compared to agricultural land in the UK (18.3 million ha), it would be impossible for the UK to be self sufficient in food production. When designing healthy diets the acreage demands on limited agricultural land to ensure food availability needs to be considered.

Key words: sustainable diets, healthy, greenhouse gas emissions, food, land use.

PO1504

FOOD ADVERTISING AND MEDIA: HOW DO THEY INFLUENCE DIETARY BEHAVIOR?

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Background and objectives: Dietary behavior is formed by a combination of factors among which may also be included the media. The main aim of the study was to evaluate and compare the level of basic nutrition knowledge of three different age groups.

Methods: A new validated questionnaire was devised and completed by 371 subjects. It was divided in 3 main sections which tested 5 knowledge domains. Questions focused on areas of nutrition which interested both adolescents and adults.

Results: Carbohydrates and fiber related questions were the most known. Salt and white sugar were shown to be "guilty", since most participants seem to believe that they should avoid their consumption because of their energy content.

Conclusions: For the interpretation of these findings, the researcher suggested that they could be partly correlated to the multiple advertisements of the grain industries as well as the mass media's impact on the consumer's nutrition update. Thus, although food advertising may be of considerable help for the public, it can be misleading too. Current data highlight the importance of providing the right message in the appropriate way to the suitable audience.

Key words: Nutrition behavior, food advertising, sugar.

PO1505

DESIGN OF A WORKPLACE INSTRUMENT FOR HEALTH MEASURE, HEALTHY LIFESTYLE PROMOTION, SURVEILLANCE OF CARDIOVASCULAR RISK FACTORS AND METABOLIC SYNDROME DIAGNOSIS

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Background and objectives: Guatemala is currently on an epidemiological and nutritional transition with increasing prevalence of chronic diseases. Considering workplace as a priority for health promotion, the objective of the study was design an instrument of health measure, that represent in one indicator biochemical test and health status parameters, at the same time promotes healthy lifestyle, do surveillance of cardiovascular risk factors and identify the risk group by the diagnosis of metabolic syndrome, useful for planning effective intervention programs.

Methods: Cross sectional study in 2, 537 employees in the construction area. The instrument GS1 evaluate and score 10 parameters: body mass index, body fat percentage, waist circumference, fasting glucose, HDL cholesterol, triglycerides, maximum oxygen consumption, abdominal muscle strength and upper limb strength. Metabolic syndrome was diagnosed using AHA/NHLBI criteria, information on lifestyle was collected and healthy lifestyle promotion was provided. Linear regression was used on each indicator, to establish the score of GS1. Descriptive statistics and chi-square test for hypothesis testing was performed in PASW 18.0.

Results: 89% of the study population was male, with a mean of 36.35 years old (SD: 9.6). 57% of participants were classified in excellent -acceptable health. The score predicted correctly the overall value of the note (p: 0.000). The most prevalent cardiovascular risk factors were overweight and obesity (71.6%), high triglycerides (58.3%), low HDL cholesterol (61.5%), physical inactivity (70.2%) and low intake of fruits and vegetables (92.1 %). 35.8% of the study group presented metabolic syndrome, associated with poor performance on the instrument (p:0.000). Association with smoking was also presented.

Conclusions: A valid and practical instrument has been designed that properly score health status based on the established parameters, promotes healthy lifestyle, do surveillance of cardiovascular risk factors and identify the risk group.

Key words: Health Measure, Cardiovascular Risk Factors, Metabolic Syndrome, Healthy lifestyle promotion.

PO1506

ENTEROPARASITOSIS PRESENCE IN LOW RENT 2 TO 6 SIX YEAR OLD CHILDREN IN SALVADOR NURSERY (BAHIA)

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Background and objectives: Enteroparasitosis represent a high public health problem, especially in developing countries. They appear on different ways: diarrhoea, intestinal proteic loss, malnutrition, anaemia and abdominal pain… Scholar children are especially vulnerable group, it means there are risk factor and physic and cognitive development disturbance. To determinate intestinal parasitosis frequency in public nursery children sample at lacking economic zone between October to December 2011.

Methods: Through quantitative methodology 50 children between 2 to 6 six years old were randomly selected from a nursery placed at Doron (Salvador, Bahia), prior authorization of Research Ethics Committee. Parasitologic exams were made from faece samples using Hoffman, Pons and Janer methods at parasitology laboratory of Department of life science of Estado de Bahía University. Data was analyzed through EpiInfo 3.5.2 software.

Results: 64% (n=32) of children were male and 36% (n=18) were female. Parasitosis presence was detected in the 60% (n=30) of them. 50% (n=15) of female children had protozoan parasitosis and 40% (n=12) of male children had monoparasitosis. Some of parasites found were: Giardia intestinalis 50% (n=15), Ancilostomideo 6, 7% (n=2), Blastocystis hominis 6, 7% (n=2), Endolimax nana 57% (n=17), Entamoeba coli 20% (n=6) and Entamoeba histolyica. 3, 3% (n=1). 50% of children had more than one parasite.

Conclusions: Results demonstrate the need of a good health education in this place.

Key words: Enteroparasitosis. Children. Financial support: Centro de Iniciativas de Cooperación al Desarrollo (CICODE)/Universidad de Granada (UGR).

PO1507

EFFECTIVENESS OF COMMUNITY INTERVENTIONS FOR THE REDUCTION OF DIETARY SALT INTAKE: A SYSTEMATIC REVIEW

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Background and objectives: High salt diets are strongly linked to raised blood pressure which is a major risk factor for cardiovascular diseases, particularly stroke. Community based salt reduction strategies which usually have a strong focus on consumer education, have been employed in various settings to ameliorate the rising burden of salt related disease. The objective of this research is to provide a systematic assessment of such interventions and to identify key strategies of successful programmes.

Methods: Electronic databases were searched up to July 2012 using search terms "salt" or "sodium" and "community" in combination with "campaign", "initiative", "project", "strategy", "intervention" or "program". Data from both evaluate and unevaluated interventions were included. Studies were assessed for quality, characteristics, intervention components and outcome measures by two independent reviewers.

Results: In total, 33 community programmes were identified. The settings for these were varied, ranging from whole communities (n=13), local groups (n=12), schools (n=5) and workplaces (n=3). The strategies employed within these programmes could be categorised into: nutrition education programs, public education campaigns, or other 'novel' approaches. Of the 15 studies that evaluated intervention effectiveness significant decreases were observed in terms of urinary sodium excretion (n=5) and Systolic Blood Pressure (n=5) and 3 reported positive changes in consumer behavior.

Conclusions: Current evidence suggests that community interventions to reduce dietary salt are possible in a range of settings. Scaling up consumer awareness initiatives in coordination with activities to reduce the large amount of unnecessary salt in the food supply would provide the most effective and sustainable reduction in salt intake.

Key words: Salt reduction, Community intervention, Cardiovascular disease.

PO1508

FAMILY FARMING AND SCHOOL FEEDING: STRATEGY FOR PROMOTING HEALTHY EATING?

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Background and objectives: In Brazil, Law 11.947/2009 determines that 30% of funds transferred to municipalities by the Federal Government to support the National School Feeding Program (PNAE) must be applied in purchasing from family farming food that promote healthy eating. The objective of this study was to identify the profile of acquiring food from family farming for PNAE in a cutout of the western region of Santa Catarina state, southern Brazil.

Methods: Data about food quantities purchased from family farming in three cities in 2010 were obtained and converted into energy. The food acquisitions were classified according to a Brazilian researchers' proposal that considers the extent and purpose of food processing: fresh, unprocessed or minimally processed food (group 1); cooking ingredients (group 2); ultra-processed food (group 3). One of the three municipalities evaluated did not record purchases from family farming during the study period, despite the legislation. The following results are from two municipalities.

Results: The average share in total calories acquired from family farming was 55.8% for group 1 (acquisition of beans, meat, milk, fruit, vegetables, roots, tubers), 10.4% for group 2 (acquisition of animal fat , sugar, pasta, flours, starches), 33.8% for group 3 (acquisition of breads, cookies, jelly, salami, cheeses). Favorably, the average share of group 1 in total calories was significantly higher than that observed for the household availability of these foods in Brazil, while the share of group 2 was much lower, showing the potential of acquiring food from family farming for promoting healthier eating habits in school environment. However, the relevant share observed of processed food high in saturated fat, sugar and sodium (group 3) lead us to conclude that the opportunity to promote healthy eating through the largest Brazilian public program of food and nutrition is being underutilized.

Acknowledgements: CNPq/Brasil (102231/2011-7).

Key words: Public health nutrition, Public policies, Nutrition programs and policies.

PO1509

THE PRICE OF FOOD FROM FAMILY FARMING CAN INHIBIT THEIR PARTICIPATION IN PUBLIC SCHOOL MEALS

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Background and objectives: Brazil has recently introduced a new model of public procurement with a view to health promoting and local development, easing the process of buying food from family farming to the National School Feeding Program (PNAE). The aim of this study was to evaluate the influence of food price from family farming on its participation in PNAE.

Methods: The amounts of food purchased from family farming and from conventional suppliers between 2008 and 2010 were obtained in three municipalities in Santa Catarina state, southern Brazil, and converted into energy. Foods were classified in fresh foods, minimally processed or unprocessed (group 1), culinary ingredients (group 2), ultra-processed food (group 3).

Results: The price of food purchased was expressed in U$/1000 kcal. The average price of food from family farming was U$1.11; the average price from conventional suppliers was U$0.79. By year, food prices from family farming were U$1.06 (2008), U$1.14 (2009) and U$1.11 (2010); prices from conventional suppliers were U$0.87, U$0.79 and U$0.74. According food group, the average prices from family farming were U$1.36 (Group 1), U$0.48 (Group 2), U$0.99 (Group 3); prices for conventional suppliers were U$1.32, U$0.30 and U$0.82. The prices from family farming were always higher, inhibiting its greater participation in PNAE, to the detriment of local development and healthy eating. The price difference between both kinds of suppliers increased during the study period. The relative decrease in the price of products from conventional suppliers may represent a coping strategy of reducing the volume of sales to the school feeding due to the implementation of simplified purchase from family farming.

Conclusions: We conclude that the price of food from family farming may be inhibiting the full deployment of this new Brazilian public policy. Acknowledgements: CNPq/Brasil (process number 102231/2011-7).

Key words: Public health nutrition. Public policies. Nutrition programs and policies.

PO1510

A STUDY ON LIFESTYLE AND DIETARY BEHAVIORS OF ELEMENTARY STUDENTS INVOLVED IN EXTRACURRICULAR ACTIVITIES IN KOREA

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Background and objectives: Parents in South Korea are known for their high educational zeal for their children. As a result, their children usually take extra classes in institutions as well as participate in other extracurricular activities such as sports and music. The purpose of this study was to examine the lifestyle and dietary behaviors of Korean elementary students involved in such activities.

Methods: The number of total subjects was 550 fourth to sixth graders in elementary schools in Sejong, Korea.

Results: Of the total subjects, 88.0% were involved in extracurricular classes or other activities for an average of 7.34 hours/week. The subjects were assigned into one of four groups based on the degree of extracurricular activities: No extra-class (n=66), Low extra-class (1¡Âtaking time<5 hour/week, n=118), Medium extra-class (5¡Âtaking time<10 hour/week, n=184), and High extra-class (taking time¡Ã10 hour/week, n=182). More subjects of the High extra-class group went to bed late ($p<0.01$), were under stress, and skipped breakfast than those in the other groups ($p<0.01$). The reasons for skipping breakfast were mostly 'no time' and 'no appetite'. The ratio of the students who answered 'I go to an institute without a meal', 'I prepare a meal for myself', or 'I go out before going to an institute' was higher in the High extra-class than in the Low extra-class with a significant difference ($p<0.001$). The frequency of eating fast food in the High extra-class was higher than that in the other groups.

Conclusions: These results indicate that a high amount of extracurricular studies may affect the children's lifestyles and dietary behaviors in a negative way. Therefore, this study alerts parents to the potential harm of excessive extracurricular activities to their childrens health.

Key words: Dietary Behaviors, Elementary Students, Extracurricular Activities.

PO1511

BARRIERS TO VITAMIN A CAPSULE COVERAGE IN HARD TO REACH AREAS: FINDINGS FROM THE CHITTAGONG HILL TRACTS, BANGLADESH

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Background and objectives: Vitamin A-related morbidity has decreased dramatically in Bangladesh, primarily through distribution of Vitamin A Capsules (VAC). However, pockets remain where VAC coverage is inadequate and Vitamin A deficiency (VAD) continues to affect approximately one in five pre-school age children nationwide. Coverage is worst in hard-to-reach areas such as the Chittagong Hill Tracts (CHT), where poor infrastructure, a scattered population and often ethnic exclusion limit access to services. As part of a VAC program in the CHT, Helen Keller International (HKI) conducted a qualitative study to assess challenges in hard-to-reach areas.

Methods: Data was collected through key informant interviews and focus group discussions (FDGs) involving health facility managers and 20-24 community members in each of nine CHT sub-districts. Approximately 60% of FDG respondents were female.

Results: Reported VAC coverage varies, with health facilities reporting 94% coverage and FDGs reporting 87% coverage. Most community members were not aware of VAC's benefits, with only 15% reporting VAC improves children's health and 16% reporting VAC prevents night blindness. Barriers in accessing VAC included transport and/or road infrastructure (87%), engagement with agricultural tasks (25%) and superstitions (25%). Challenges with the delivery system were also highlighted, with 14% of community members reporting that VAC had run out by the time they reached the health center and several health facility managers reporting difficulty in reaching remote locations.

Conclusions: Coverage levels indicate that some children remain beyond the reach of health workers, and that systems to determine the number of eligible children and provide sufficient capsules still face challenges. Results highlight the need to develop innovative strategies for overcoming barriers to this life-saving intervention, including ensuring services are provided in the most remote locations (to address transport barriers) and families are mobilized to participate in VAC campaigns.

Key words: Vitamin A Capsule, Vitamin A Deficiency.

PO1512

DIGITAL FOOD GUIDE: MOBILE APPLICATION TO INCORPORATE HEALTHY FOOD CHOICES

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Background and objectives: There is an increasing prevalence of obesity, and this epidemic raises the budgets of health systems. In Brazil, 50.1% of adults are overweight and 12.4% are obese. A key strategy for the prevention of chronic diseases is to change the eating pattern. The increased interest and access to information technology is an opportunity to promote healthy food choices. This study presents the Digital Food Guide (DFG), in the form of smartphone mobile application and aims to evaluate the app as a resource to promote healthy food choices.

Methods: Retrospective cohort study through the analysis of food intake and body weight reported by application users, ages ranging from 19 to 50 years.

Results: Among the 442 subjects in the sample, there was a positive shift pattern of 31.45% in diet quality; 60% of users experienced a weight loss.

Conclusion: The application allows the reprogramming of food choices with the help of digital language and is an additional resource to disseminate food education with the aim of encouraging the individual to consume food consciously, favoring the prevention of chronic diseases and promoting a healthy diet.

Key words: Nutrition education. Dietary Guidelines. Cellular phone.

PO1513

ASSOCIATION BETWEEN ENVIRONMENTAL FACTORS OF SHOPPING AND NUTRITIONAL STATUS IN JAPENESE AGED OVER 65 YEARS

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Background and objectives: Insufficient nutritional status is a frequent problem in elderly people. Objective of this study was to determine the relationship between environmental factors of shopping and the nutritional status in women aged over 65 years.

Methods: A cross-sectional study was carried out in 2012 for 107 elderly women living independently in Fukuyama, Japan. A dietary assessment was conducted using a brief self-administered diet history questionnaire (BDHQ) for the previous month. Subjects were divided into group A (65~74 years old) and group B (75~89). An analysis of covariance (ANCOVA) was used to examine the association between nutrient intake and enviromental factors such as living alone and the shopping environment.

Results: The 64 group A, and 43 group B subjects‘ average ages were 69.5±2.7 and 79.8±3.8, respectively. The ratio of the subjects that felt shopping was inconvenient was significantly higher in group B (25.6%) compared with group A (9.4%) (p=0.03). The percentage of licensed drivers in group A was 57.8% (including 7.8% who were drivers in name only) and 11.6% in group B (P<0.001). Some 28.0% of subjects who live alone (average age, 77.5±6.5) was significantly higher than that of other subjects (72.2±5.0) (p<0.001). There was no difference in the intake of energy, protein or carbohydrate of all subjects. However, the intake of vitamin C was significantly lower for living alone subjects (p=0.002) after an adjustment for age and living area. The intake of vitamin C had no significant difference at subjects that felt shopping was inconvenient.

Conclusions: Environmental factors may affect the nutritional status of elderly Japanese women. This study showed an association between living alone and a lower intake of vitamin C. It might be beneficial to support elderly people who must shop but cannot drive to shopping.

Key words:nutritional status, shopping status, aging, cross-sectional study, epidemiology.

PO1514

HEALTHY FEEDING IN TEENAGERS: HOW TO PROMOTE IT? INTERDISCIPLINARY EDUCATIONAL EXPERIENCE MADE FROM COLLEGE TO THE COMMUNITY, SANTA FE, ARGENTINA

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Background and objectives: In Argentina there is plenty of food, yet few people have access to sufficient and varied amounts. Others lack the knowledge to make a diet that contributes to improving their quality of life. In both cases a poor diet can lead to diseases. The Nutritional Feeding Education is conceived as a tool for the exercise of autonomy, self-care and responsibility, being vital its application in children and teenagers. Argentine universities consider a priority to contribute to the promotion of The Nutritional Feeding Education.

Methods: In this research, we worked with 161 adolescents aged between 15-16 years, attending the 3rd. year of secondary school in Argentina. We followed a qualitative interpretive model through surveys, interdisciplinary workshops and interviews in depth. The questions that guide the process help to identify knowledge and social representations that this age group has about the concept of healthy feeding, so that then we can design and implement interdisciplinary educational activities, with the aim of promoting from the school, a reflective and self-critical attitude in participants. After the implementation of these strategies we investigated theoretical categories such as: - Alternative Conceptions - Theoretical knowledge- Eating Habits - Importance and Appropriation of the concept - emerging from the analysis of the stages mentioned above.

Results: There was a high percentage of students - 62% - with solid knowledge when making the diagnosis; and after the workshops, 48% of the surveyed modified their eating behavior.

Conclusions: The pre and post activities evaluations show a significant advance in the incorporation of water as a key element of the Argentine Oval Feeding: from 4% in the diagnostic test to 22% in the post-test.

Key words: Nutritional Feeding Education, Teenage years, Healthy Feeding, theoretical categories.

PO1515

EATING BEHAVIOR AND BODY IMAGE AMONG MEDICINE STUDENTS

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Background and objectives: Eating disorders are defined as deviances on eating behavior that may lead to serious physical and psychological consequences. The onset of eating disorders appears to happen around 16 to 20 years of age, especially in women. Female university students are a high-risk population, but there is little scientific information regarding eating disorders in this group, especially from health related courses. This study aims to characterize eating habits, body shape image and their relation as risk factors for eating disorders among medicine students.

Methods: This is a cross-sectional study with a significant sample of 189 female undergraduate medicine students, aged 18 to 22 years. Body Mass Index (BMI) was calculated considering self-reported weight and height and the Bulimic Investigatory Test Edinburgh (BITE), Eating Attitudes Test (EAT-26), and Body Shape Questionnaire (BSQ) were applied. Descriptive statistics and correlation Spearman test were used; significance was set at p<0, 05.

Results: Mean (SD) age and BMI were 20.8 (2.2) years and 21.5 (2.6) Kg/m2. BITE results showed prevalence of medium (some abnormal behavior) and high (risk for bulimia) scale symptoms of 31.7% and 6.3%, respectively. For severity, 6.3% of the girls presented moderate and 1.6%, intense symptoms. EAT-26 showed 19% prevalence for positive result (>21 points) associated with risk of developing eating disorders; and 27, 7% presented some body distortion by BSQ. Significant association (p<0.001) was observed between BMI classification and abnormal eating behavior.

Conclusions: Although mean BMI was eutrophic, female undergraduate medicine students may represent a high-risk group for sub-clinical compulsive eating habits or an initial stage of bulimia. Although the majority of cases were not severe, attention must be given to eating behavior in this population; future health professionals may have their health and practice impaired in cases they present risk for eating disorders.

Key words: Eating disorders, body image, public health.

PO1516

CHILEAN SCHOOLCHILDREN WITH THE LOWEST SOCIOECONOMIC LEVEL HAVE THE WORST NUTRITIONAL STATUS AND PHYSICAL FITNESS

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Background and objectives: Nutritional status (NS) and physical fitness (PF) are determinant factors of children and adolescents' health. Low socioeconomic level (SEL) affects eating habits and physical activity level. In Chile, SEL is related to the school type, those with low, medium and high SEL attend to Public (Pub), Subsidized (Sub) and Private (Pri) schools, respectively. School type is a SEL marker. The aim was to compare the NS and PF between children and adolescents, attending to different school types.

Methods: Schoolchildren were measured (N=1656; 29% Pub, 57% Sub, 14% Pri). BMI, waist circumference >90th percentile (WC>p90) and 4-skinfold sum (FAT) were used as NS markers; while the 6-minute walk test (6MWT), dynamometry and standing long jump as PF markers. Chi-square test established associations by the school type, sex and school levels.

Results: Pub schoolchildren had the highest overweight/obesity prevalence and WC>p90 ($p<0.05$). After sex analysis, differences were observed only in girls. Pub girls presented the highest FAT values ($p<0.01$). When both sex and levels were considered, differences in WC>p90 and FAT were present in girls from the oldest school levels ($p<0.01$). In muscular strength tests, the lowest performances were identified in Pub schoolchildren ($p<0.05$). By sex analysis, differences were found in girls, mainly from oldest school levels ($p<0.01$).

Conclusions: The results demonstrated an association between SEL (according to school type) and both NS and PF. The lower the SEL, the worse NS and PF. This relationship was mainly found in the oldest schoolgirls.

Key words: socioeconomic status, physical fitness, overweight.

PO1517

SUGAR CONSUMPTION AMONG CHILDREN AGED 3-6 YEARS OLD AND ITS RELATED FACTORS IN JAKARTA 2011

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Background and objectives: Indonesian Basic Health Research 2007 found that 12.2% of children under-fives and 6.4-9.5% of school-children were obese. There is no study yet aiming to observe linked to this condition. This study aims to evaluate child sugar intake from foods and beverages consumption among Indonesian children aged 3-6 years, and its relationship to overweight-obese, tooth-decay and cognitive function status.

Methods: A cross-sectional study was applied to get the amount and food sources of sugar intake and its related factors among children aged 3-6 years from kidergarten and playgroup in Jakarta. Data on demographic characterisitics, nutrients intake, anthropometric measures and cognitive function test by using standardized methods were collected. Descriptive and analytic statistics were performed accordingly.

Results: One-hundred children aged 3-6 years were recruited in 2011. This study revealed that based on body-mass-index indicator, 5% and 19% of the subjects were overweight and obese, respectively. Accordingly, based on waist-circumference indicator, 26% was classified as having central-obesity. Tooth-decay and/or loss of tooth was found in 76% of the subjects. Low average and extremely low cognitive-function status was 26%, 17% and 17% based on verbal IQ, performa IQ and fulld-scale IQ, respectively. Fourty-three percent of the subjects had energy intake status of more than 120% of Indonesian RDA, and 99% of the subjects had sugar intake of more than 10% of total energy intake.

Conclusions: This study failed to show significant relationships between sugar intake, overweight-obese status and low cognitive status of the subjects.

Key words: Indonesia, sugar-intake, toddler.

PO1519

EFFECT OF BLACK-RICE EXTRACTS INTAKE AND EXERCISE ON THE BODY COMPOSITION OF RAT

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Background and objectives: It is known as a health food that black-rice is including many vitamins and minerals as compared to white rice. In addition, exercise is important to spend on health throughout life. Purpose of this study was to investigate the effect of black-rise extracts intake and exercise on body composition of rat.

Methods: Male Wistar rats were individually housed in cages at temperature of 23±1 degree centigrade, and 40-60% humidity. After basically 5 weeks breeding, 20 rats were divided 4 groups each 5 rats and were fed standard powder diet and water and rest (C), standard powder diet, water and training (CTr), standard powder diet include black-rice extract and water and rest (B), standard powder diet black-rice extract and water and training (BTr) a certain time once a day. Also, CTr and BTr were trained running (230 m/s) on treadmill to 1 hour per day, during the experimental period of 9 weeks. This animal experiment was carried out in accordance with the Japanese law, which allows experiments on laboratory animals in Nippon Sport Science University accordance to the principle of laboratory animal care.

Results: Result of this study, body weight of B was higher than C, and BTr was higher than CTr. Fat around kindly of B showed the highest value compared to the other groups. But it was not significant difference between fat around kindly of BTr and CTr. In addition, there was no significant difference in the weight of heart, liver, kidneys and brain between all groups.

Conclusions: This result suggests that it is possible to healthy life not only the including black-rice extract but also continuous exercise.

Key words: black-rise, exercise

PO1520

INTENSIVE COUNSELING BY HEALTH WORKERS IMPROVED INFANT AND YOUNG CHILD FEEDING KNOWLEDGE AND PRACTICES IN A LARGE-SCALE PROGRAM IN BANGLADESH

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Background and objectives: In Bangladesh, the Alive & Thrive (A&T) initiative aims to improve infant and young child feeding (IYCF) practices of mothers through intensive counseling by skilled frontline health workers (FHWs) and a mass media campaign. Well-trained and supervised FHWs counseled mothers of children 0-24 months of age on IYCF through regular home visits – 6 visits between 0-6 months and 6 between 7-24 months. We studied the early impacts of the intervention on mothers' IYCF knowledge and practices.

Methods: We conducted a program theory-driven process evaluation within a cluster-randomized impact evaluation design comparing A&T intensive and A&T non-intensive interventions (10 subdistricts in each group). In 2012, a survey was conducted in 10 subdistricts (5 subdistricts in each group) to gather data on interim outcomes. Data on IYCF knowledge and practices were compared for mothers of children 6-24 months at baseline (2010) and in 2012. We examined trends over time and compared outcomes between groups in 2012.

Results: At baseline, maternal IYCF knowledge and practices were not different between the two areas. At follow-up, maternal knowledge about breastfeeding (initiation, exclusivity and continuation) and complementary feeding (timing of introduction, frequency and quantity) improved in both groups. Improvements in IYCF indicators were greater in A&T intensive compared to A&T non-intensive areas. In 2012, feeding of iron rich foods (66% vs. 42%) and minimum dietary diversity (52% vs. 34%) were higher ($p<0.05$) in A&T intensive than A&T non-intensive areas.

Conclusions: It is feasible to integrate IYCF counseling by skilled FHWs into a large-scale health program and thereby improve mothers' IYCF knowledge and practices. Funding: Bill and Melinda Gates Foundation, through Alive & Thrive, managed by FHI360.

Key words: IYCF knowledge, IYCF practices, frontline health workers, Alive & Thrive, Bangladesh.

PO1521

A COMPREHENSIVE TRAINING AND SUPERVISION PROGRAM IMPROVED FRONTLINE HEALTH WORKERS' KNOWLEDGE OF INFANT AND YOUNG CHILD FEEDING IN RURAL BANGLADESH

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Background and objectives: In Bangladesh, the Alive & Thrive (A&T) initiative aims to improve infant and young child feeding (IYCF) practices of mothers through intensive counseling by frontline health workers (FHWs) and a nationwide mass media campaign. A comprehensive IYCF training and performance improvement package (3-day classroom discussion, 3-day field practice, monthly refreshers, routine supervision and performance-based incentives) for FHWs was developed based on formative research. We evaluated the impact of this performance improvement package on FHWs' knowledge of IYCF.

Methods: We conducted a process evaluation in the context of a cluster-randomized impact evaluation design comparing A&T intensive (A&T-I) and A&T non-intensive areas (A&T-NI) (10 subdistricts each). FHWs in A&T-I areas received IYCF training and supervision; FHWs in both areas were exposed to mass media campaign. Data were collected from FHWs in 2010 and 2011 in these 20 subdistricts to capture FHWs' IYCF knowledge over a year.

Results: At baseline, FHWs' IYCF knowledge was low with no significant difference in A&T-I and A&T-NI areas, with little exposure to IYCF topics at pre-service (5.5%) or refresher (2.0%) training. At follow-up, IYCF was a key topic of discussion in A&T-I areas (91.0%). In A&T-I areas, FHWs' IYCF knowledge improved significantly. Knowledge of early initiation of breastfeeding increased from 27.1% to 63.2%, knowledge of timing of introduction of complementary foods improved, particularly for animal source food (mean age 9.6±2.6 months at baseline vs. 6.8±1.4 months at follow-up). Similarly, knowledge of frequency and quantity of complementary feeding at different ages improved in A&T-I areas.

Conclusions: Comprehensive training with performance improvement package improved FHWs' IYCF-related knowledge, thus assuring that a critical point in the impact pathway for this intervention was in place. Funding: Bill and Melinda Gates Foundation, through Alive & Thrive, managed by FHI360.

Key words: IYCF, frontline health workers, Alive & Thrive, Bangladesh.

PO1522

FORMATIVE RESEARCH FOR THE DEVELOPMENT OF A HOME FORTIFICATION PROGRAMME FOR CHILDREN IN ZAMBIA

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Background and objectives: In response to the high prevalence of anaemia in Zambia, the Ministry of Health plans to introduce home fortification with Micronutrient Powders (MNP) for children 6-23 months. International recommendations for new MNP programmes include formative research to ensure the intervention package is culturally acceptable. Therefore, the objectives of this research were: 1. To investigate attitudes and practices on complementary feeding and the potential for home fortification with MNP; 2. To develop culturally acceptable MNP communication and training materials; 3. To evaluate the acceptability of MNP.

Methods: Focus groups (n=10) and key informant interviews (n=60) were conducted regarding infant and young child feeding, anaemia, and the feasibility of home fortification, prior to a 30-day MNP trial with 60 mother-child pairs. Mothers were interviewed at baseline, Day 10 and Day 30 regarding perception of changes in the child, ease of MNP use, and acceptability. Sample packaging and training materials were field-tested.

Results: Most mothers had heard of anaemia, although knowledge of iron-rich foods was low and dietary iron sources limited. Almost all mothers reported family members were supportive of MNP although fewer reported community support, indicating neighbours associated MNP with Satanism. Almost 80% of mothers reported positive changes in their child's health or behaviour. All mothers said they would continue giving MNP and 78% said they would pay a small amount to purchase MNP.

Conclusions: The results of the formative research provided support for home fortification with MNP in Zambia. Acceptability and utilization were high in the trial as mothers found the MNP easy to use and perceived health benefits for their children. The importance of educating the whole community on MNP was widely apparent. Importantly, there is the potential for charging for MNP, which could increase sustainability.

Key words: Home fortification, micronutrient powders

PO1523

SALT INTAKE AND EDUCATION LEVELS IN ADULTS OF MONGOLIA

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Background and objectives: The Government of Mongolia has been taking several actions to reduce the incidences of NCD and their related mortalities in recent years, and a number of projects and programs are being implemented with the support of WHO and the Millennium Challenge Account. The objective of this study is to determinate actual salt intake adults of Mongolia and compared to education levels of the population.

Methods: A total of 1, 034 people in the age range of 25 to 64 years old were randomly selected from the 4 economic regions of Mongolia. A 24 hours urine sample was collected from each participant for determinate sodium intake.

Results: There was a 95.8% response rate. According to the survey, 24.9% (male were 35.8%, and female were 20.4%) of participants had no formal schooling and incomplete secondary school, 38.2% (male were 34.5%, and female were 39.7%) had complete secondary school, 36.9% (male were 29.8%, female were 39.9%) had completed college/university ($p<0.001$). The participants 24 hours urine sample contains 11.1g (SD 7.7g/d.) salt on average, and 83.2% (95% Cl 80.6-85.5) of participants consume more than 5g salt per day. Salt intake was who has none and incomplete primary education level were 11.9g/d, St.dev 8.4g/d, participants who has completed secondary education level were 10.9g/d, St. Dev 6.9g/d, and who has college and higher education level were level 10.7g/d, St. Dev 7.9g/d ($p<0.01$).

Conclusions: Salt intake in adults of Mongolia was two time higher than WHO recommended. The comparison of education status by gender demonstrated that the education level of females was higher compared to men, which shows females could have a positive effecton trainings and promotional activities towards salt reduction awareness among the population.

Key words: non-communicable diseases, salt intake, education level.

PO1524

PREVALENCE OF METABOLIC SYNDROME IN MEXICAN ADULTS. RESULTS OF THE NATIONAL HEALTH AND NUTRITION SURVEY OF STATE WORKERS AND RETIRED

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Background and objectives: Metabolic syndrome (MS) has been associated with coronary heart disease, stroke and diabetes type 2. In Mexican adult population, MS has been reported with a high prevalence which is increasing in the time. To describe the prevalence of MS and its main associated factors in Mexican adult population with data derived of the National Health and Nutrition Survey from State Workers and Retired during 2007 (NHANSSWR-2007).

Methods.: A national representative sample of 4595 adults, 20 years and older, was surveyed. They were questioned about chronic diseases including diabetes, hypertension, coronary heart disease, cancer, renal disease and obesity. Seric levels of glucose and lipids were determined. Blood pressure and anthropometry were taken. Definitions of MS included: National Cholesterol Education Program (NCEP-ATPIII), American Heart Association/National Heart Lung and Blood Institute (AHA/NHLBI), and International Diabetes Federation (IDF). Prevalence (%) and 95% confidence intervals are reported. Exact Fisher's test was applied to statistical significance. Statistical software SPSS v20 was used.

Results. The national prevalence of MS was 44.0, 48.8 and 57.4% according with definitions NCEP-ATPIII, AHA/NHLBI, and IDF, respectively. The prevalence of MS was higher in man than women, independently of the definition, due mainly to higher levels of glucose, triglycerides and blood pressure. The prevalence of MS increased with age, poor educational level and central region of the country.

Conclusions: The prevalences of MS found in the NHANSSWR-2007 are higher than those reported in the general population of the National Health and Nutrition Survey in 2006. These results do mandatory the necessity to install primary and secondary preventive programs conducted to the State sector with more than 10 millions of beneficiary population.

Key words: metabolic syndrome, national survey, Mexican population.

PO1526

LOW PREVALENCE OF INTRA-INDIVIDUAL DOUBLE BURDEN OF MALNUTRITION IN URBAN TUNISIAN CHILDREN

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Background and objectives: In the context of nutrition transition, North-African countries are facing rapid increases in overweight/obesity while under-nutrition such as anaemia and iron deficiency (ID) remains highly prevalent. This study aimed at describing the magnitude of this double burden of over- and under-nutrition both at population and individual levels among Tunisian urban children and exploring the relationship between these nutritional co-morbidities within subjects.

Methods: The nutritional status of 1134 children (562 boys; 572 girls), 6mo to <10y old living in Great Tunis was assessed through a cross-sectional survey (stratified two-stage clustered sample). Overweight/obesity were defined by age and sex specific BMI z-scores (2007 WHO). Anaemia was defined by age specific WHO cut-offs and ID by serum ferritin concentration (<12µg/L or <15µg/L in those <5y and >=5y of age, respectively), after correction for inflammation (CRP>5mg/L and/or orosomucoid>1g/L). Relationships between overweight/obesity and anaemia/ID status were estimated by logistic regression analysis with sex interaction.

Results: Nutritional status did not differ between sexes. Overweight and obesity were more prevalent (P<0.0001) in school-age children (>=5y) (19.1%[15.7-23.1]; 7.6%[5.7-10.1], respectively) vs. preschool-age (<5y) (9.6%[6.8-13.4]; 2.4%[1.3-4.5]). Anaemia prevalence was higher (P<0.0001) in preschool-age (33.1%[29.0-37.6]) compared to school-age (19.2%[15.3-23.7]) whereas ID prevalences were high and similar in the two age-groups (19.4%[14.5-25.4]; 20.5%[17.0-24.5], respectively). ID anaemia affected the tenth child and inflammatory was higher in preschool-age (18.8%[15.1-23.1]) vs. school-age (9.6%[7.5-12.1]; P=0.023). Coexistence of overweight/anaemia or overweight/ID was low in preschool-age (3.8%[2.2-6.5]; 1.8%[0.8-4.0], respectively) and school-age (2.7%[1.6-4.6]; 3.8%[2.3-6.1]). The prevalence of obesity/ID was rare in preschool-age (1.8%[0.8-4.0]) but doubled in school-age (3.8%[2.3-6.1]; P=0.023). Anaemia/ID prevalence was not associated with overweight/obesity among children.

Conclusions: Despite a high prevalence of overweight/obesity and anaemia/ID in young urban children, the intra-individual double burden was rare and the risk of anaemia or ID was not increased when overweight/obesity.

Key words: overweight; anaemia, iron status; children; North-Africa.

PO1527

ASSOCIATION BETWEEN PHYSICAL ACTIVITY AND LIVER ENZYMES IN ADOLESCENTS: THE HELENA STUDY

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Background and objectives: We aimed to examine the association between physical activity (PA) and liver enzymes levels in adolescents from 9 European countries (10 centers).

Methods: The study comprised 718 adolescents (397 girls) participating in the HELENA cross-sectional study. PA was measured by accelerometry and expressed as total PA (counts/min), and time (min/d) engaged in moderate to vigorous intensity PA (MVPA). We measured serum levels of alanine aspartate aminotransferase (AST), alanine aminotransferase (ALT), and γ-glutamyltransferase (GGT), and the AST/ALT ratio was computed. We also measured waist circumference and skinfold thickness, and computed the fat mass index (FMI, fat mass in kg divided by height in squared meters).

Results: There was an association between MVPA and AST and AST/ALT (age, sex and center adjusted R=0.096, 95% confidence interval (CI): 0.016 to 0.118, P=0.011; and R=0.090, 95% CI: 0.006 to 0.112, P=0.029, respectively). Meeting the PA recommendations (60min/d of MVPA) was associated with higher AST and AST/ALT (P=0.002 and P=0.003, respectively), which persisted after further adjusting for sedentary time (P=0.003 and P=0.002, respectively), and FMI (P=0.002 and P=0.009, respectively) or waist circumference (P=0.002 and P=0.003, respectively).

Conclusions: Our findings support that meeting the current PA recommendations of 60min/d of MVPA is associated with higher levels of AST and AST/ALT regardless of time spent sedentary as well as total and central body fat in European adolescents.

Key words: Aspartate aminostrasferase, alanine aminostransferase, γ-glutamyltrasnferase (GGT), youth, exercise.

PO1528

PCBS AND HEAVY METALS EXPOSURE AMONG FISHERMEN IN MALAYSIA

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Background and objectives: Fish as source of high-quality protein also contribute to vitamins and important fat such as essential fatty acids (EPA and DHA). Besides being an important source of nutrients, fish also may contribute to exposure to organochlorine and heavy metals that can harm health.

Methods: In this study we determined exposure to PCBs and heavy metals via dietary intake of fish and shellfish among fishermen (n=90). Dietary intake of fish and shellfish was measured using food frequency questionnaire (FFQ) while exposure to contaminants was estimated by multiplying amount of fish intake with concentration of individual contaminants in each species (previously determined) per body weight of subjects.

Results: The mean age of fishermen (Malay, 55.6%; Chinese, 43.3% and Indian, 1.1%) was 47 ± 10.60 years old. Generally, mean dietary exposures to PCBs, Hg, As, Cd and Pb were within tolerable daily intake by WHO (2005) at 2.77 ± 0.261 pg/kg bw/day, 0.017 + 0.003, 4.517 + 0.400, 0.090 + 0.009 and 0.453 + 0.037μg/kg bw/day, respectively.

Conclusions: Although exposures to the contaminants were relatively low at present, continued monitoring of the contaminants in food, especially fish and shellfish is warranted especially for vulnerable groups (children and pregnant/ lactating women) as well as the general population.

Key words: Fish, Shellfish, Dietary exposure, Fishermen.

PO1529

DECLINING OF HOUSEHOLD INCOME LEADS TO A CHANGE IN NUTRITION - FINDINGS FROM CASE STUDIES OF GIESSEN, GERMANY

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Background and objectives: The widening gap between rich and poor in Germany leads to unequal nutrition and health security. Surveys identify vulnerable households (e.g. unemployed or retired) but do not contribute to a deep understanding of coping strategies and individual impacts of recent financial restrictions on food consumption. Gender-oriented research and its results concerning underlying attitudes and motives are needed for social and nutrition policies.

Methods: The study is based on mixed-methods using a sequential design starting with a quantitative secondary analyses of available data by the second German National Nutrition Survey. Based on the results of the secondary analysis (n=7490) guideline-based face-to-face interviews were done surveying in depth women (n=11) and men (n=3) who actually had a decrease of income (job losses/retirement).

Results: Regarding the dimensions of food deprivation (FEICHTINGER) the respondents (n=14) face constraints in material, psychological and socio-cultural quality. For some of them healthy eating can no longer be realised. Due to financial limitations food purchasing fail individual preferences and common recommendations, e.g. fresh fruits, vegetables, fish and meat. Respondents are forced to buy low status food and feature a lack of choice (supermarkets vs. discounter). The socio-cultural quality is pointed out by them, besides invitations/celebrations eating out is missed the most. Financial restriction leads to more consciously handling with food: there are less food wasted, more attention is paid on labels/information on food packages, prices and package sizes. Spontaneous purchases are reduced.

Conclusions: Benefits for unemployed or retired people need to be improved to allow a healthy eating. To prevent food deprivation education programmes for low income groups should include not only healthy eating but also consider women's and men's readjustment to the new financial situation (mental, social wellbeing). Positive modifications like increased awareness of food purchasing should be strengthened.

Key words: Food purchasing, food deprivation.

PO1531

PHYSICAL ACTIVITY OF STUNTED, UNDERWEIGHT AND WASTED MALAWIAN CHILDREN

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Background and objectives: Nutrition intervention trials for young children have traditionally measured growth as the main outcome and a marker for overall wellbeing. Physical activity offers a potential new outcome but its relationship with growth outcomes is not well characterized. This study tested a hypothesis that children who are stunted, wasted or underweight are physically less active than their normally nourished counterparts.

Methods: The study was done in rural Malawi, among 18-month-old children who had participated for one year in a nutrition intervention trial (www.ilins.org). To assess physical activity, 1350 children wore an accelerometer (ActiGraph GT3X+) for seven days in their normal home environment. Activity was expressed as mean daytime activity counts/15 seconds. Participants who had a minimum of six hours of acceptable accelerometer data per day on at least four days were included. Anthropometric measures were taken using standardized methodology. Anthropometric indexes were calculated with the latest WHO standards. Stunting, underweight, and wasting were defined as a z-score below minus two z-score units. The hypotheses about a difference in mean activity counts between participants with low and normal z-scores were tested with Student t-test.

Results: A total of 1085 (80%) children had sufficient anthropometric and physical activity data. Mean (SD) activity for all children was 300 (64) counts/15 seconds. Stunted children (n=460, 44%) were less active than non-stunted children (difference 11 counts/15 seconds, 95% CI 3 to 19, p=0.006). Underweight children (n=199, 19%) were slightly less active than non-underweight children (difference 11, 1 to 21, p=0.03). Wasted children (n=57, 5%) were also less active than non-wasted children, but this difference was not statistically significant (difference 14, -3 to 31, p=0.10).

Conclusions: Undernourished children are physically less active than children who are not undernourished.

Key words: physical activity, stunting, wasting, underweight
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PO1532

TEMPERAMENT TRAITS AND FOOD INTAKE IN THE HELSINKI BIRTH COHORT STUDY

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Background and objectives: The temperament traits novelty seeking (NS), harm avoidance (HA), reward dependence (RD), and persistence (P) are associated with health behaviors, but their associations with the whole diet remain to be explored. Our objective was to study the associations between temperament traits and food intake.

Methods: Subjects (n= 1681, mean age 61, 5 y) from the Helsinki Birth Cohort Study filled in the Tridimensional Personality Questionnaire and a validated 128- item food frequency questionnaire. We tested separately in men and women using linear regression analysis, whether temperament traits are associated with food intake while adjusting for age, education, and energy intake.

Results: In men, HA was associated with higher total fruit intake (29.7 g/d for every 1 SD increase in the temperament score, P= 0.01) and NS with higher soft drink intake (4.1 g/d, P= 0.02). In women, RD associated with lower intakes of meat and meat products (-2.4 g/d, P= 0.001), red meat (-1.3, P= 0.02), and poultry (-1.1, P= 0.01), and a higher intake of fruits, berries and fruit juices (8.5 g/d, P= 0.01). These results are in line with a previous study finding high RD and HA to associate with a healthy eating pattern and high NS to associate with an unhealthy eating pattern.

Conclusions: In general there were only few statistically significant results, but they support the hypothesis that temperament traits are associated with food intake (e.g. HA was associated with fruit intake).

Key words: food intake, temperament, food frequency questionnaire.

PO1533

ECOLOGICAL RISK FACTORS OF OVERWEIGHT WOMEN IN INDONESIA: IMPLICATIONS FOR NUTRITION AND WELLNESS CHANGING BEHAVIORS

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Background and objectives: Overweight including obesity is now so common and be a rapid growing threat to health of global population. Amongst all age-sex groups in Indonesia, women aged 30-49 years (WTY) has the highest prevalence of overweight; while very limited data available on the ecological risk factors of overweight WTY in Indonesia. The aim of this study is to analyze ecological risk factors of overweight amongst WTY in Indonesia based on the current nation-wide survey data.

Methods: A current national health survey data set collected by the Health Research and Development Institute of the Ministry of Health was used and analyzed. The electronic files data consist of 38319 WTY. Overweight subject was identified by BMI more than 25. Based on the availability of the data, a logistic regression model was applied to suspected ecological risk factors of overweight such as energy adequacy from carbohydrate (EAC), energy adequacy from sugary sweetened foods (ESF), energy adequacy from fat (EAF), physical activity, family income, education level, and marital status.

Results: One-third (35.3%) of the WTY is overweight. The ecological risk factors of the overweight WTY in Indonesia are marital status (OR for married=1.751, CI: 1.604-1.911), family income (OR for high income =1.543, CI: 1.467-1.623), urban-rural settlement (OR for living in urban=1.255, CI: 1.193-1.321), physical activity (OR for sedentary=1.445, CI: 1.361-1.534), ESF (OR for ESF>10%=1.117; CI: 1.038-1.202), EAC (OR for EAC >55%=1.111; CI: 1.043-1.185), and education level as a proxy of nutrition education level (OR for senior high school and above =0.890, CI: 0.843-0.939).

Conclusions: Controlling overweight amongst WTY in Indonesia should focus on major changeable ecological risk factors such as physical activity, energy adequacy and nutrition education, which implies the important of nutrition and wellness changing behaviors.

Key words: overweight women, risk factors, ecological factors, physical activity, energy adequacy.

PO1534

FACTORS ASSOCIATED WITH NUTRITIONAL STATUS IN ELDERLY LIVING IN TWO CITIES OF CENTRAL AFRICA: THE EDAC STUDY.

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Background and objectives: Nutritional status has been scarcely investigated in elderly living in Sub-Saharan Africa compared to younger populations. However, identifying factors associated with nutritional status could be of importance in order to prevent malnutrition in ageing populations.

Methods: Two cross-sectional population-based studies were carried out in capitals of Central African Republic (CAR) and Republic of Congo (2008-2009). Participants aged>65 years old were included and underwent nutritional assessment including the following measurements: weight, height, waist circumference, arm circumference and triceps skinfold thickness. A food investigation was also conducted. Nutritional status was defined according to the WHO BMI classification (BMI<18.5 for malnutrition and BMI>30 for obesity). After full description of the characteristics of the population, multinomial regression analysis was realized in order to identify factors associated with nutritional status.

Results: Above 1055 elderly contacted in both Bangui and Brazzaville, 1016 accepted to participate to the study. Unfortunately, height or weight measurements were impossible for 26 of those participants due to bad physical condition. Considering both settings, prevalence of malnutrition was estimated to 19.2% (95%CI[16.8-21.8]) and prevalence of obesity to 8.8% (95%CI[7.1-10.7]). Adjusted on study site, increasing age (OR=1.59 (95%CI=[1.09-2.31]) for 75-84 years compared to 65-74 years, and OR=2.57 (95%CI=[1.36-4.83]) for 85+ years old), occupation (farmer/breeder, OR=2.17 (95%CI=[1.11-4.22])), smoking (OR=1.71 (95%CI=[1.14-2.56])) and low sugar consumption (OR=1.72 (95%CI=[1.11-2.65])) were significantly associated with malnutrition whereas female gender (OR=4.97 (95%CI=[2.24-10.98])) was significantly associated with obesity.

Conclusions: The prevalence of malnutrition is high in the elderly population of these countries. These new data concerning African elderly nutritional status need to be implemented by further investigations, particularly comparing urban and rural areas.

Key words: denutrition, obesity, elderly, risk factors, Africa.

PO1535

NUTRITION KNOWLEDGE AND FOOD CHOICE BEHAVIOUR AMONG GHANAIANS: IMPLICATIONS FOR HEALTHY LIFESTYLE PROMOTION

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Background and objectives: Proliferation of shopping malls and supermarkets in major cities in Ghana, coupled with the globalization of our food market systems are clear evidence that consumers now have a wider choice of food products. Given the increasing prevalence of diet, nutrition and health related diseases, there is the need for greater nutrition knowledge and understanding of factors underlying consumers' food choice behaviour to facilitate outcome of successful interventions. The objective was to determine Nutrition Knowledge and its influence on Food Choice Behaviour among Ghanaians in the Greater Accra Region.

Methods: A cross-sectional survey, mainly by questionnaire, was used to source information from randomly selected consumers between the ages of 18-75 years, who patronize some super markets and shopping malls. Logistic regression analysis was used to examine and establish associations. 'P' value less than 0.05 was considered statistically significant.

Results: Majority (70%) of the respondents had good knowledge about healthier food choices. Higher educational level was a key determinant of nutrition knowledge. Advertisement of product and use of Nutrition and Diet Books were key determinants of food choice behaviour. Advertisement of product on mass media was more likely to influence respondents with poor level of nutrition knowledge (vs. good nutrition knowledge, OR, 9.53; 95% CI, 1.12—81.41; P= 0.039).

Conclusions: Though Nutrition knowledge was generally good and a link established between it and some determinants of food choice behaviour, the studies did not find significant associations between nutrition knowledge and dietary behaviour. This is because knowledge about healthy food choices does not lead to direct action when individuals are unsure how to apply their knowledge. Accurate and consistent messages through

various media are needed to educate consumers to use the knowledge to impact positively on their food choice behaviour.

Key words: Nutrition knowledge, food choice behaviour, Healthy lifestyle, Ghana.

PO1537

LAW AND LAW PROJECTS REGARDING HEALTHY SNACK STAND REGULATION IN ARGENTINA

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Background and objectives: As a consequence of the increase in the prevalence of overweight and obesity in infant population, Argentina needs regulation of school snack stands. The aim of this work was to evaluate the legislation on healthy snack stands at national and regional level in Argentina.

Methods: A descriptive-cross-sectional study was conducted. To learn about the projects of law and existing laws for the regulation of healthy-snack-stands, nutrition schools and province associations were contacted through the Argentinian Federation of Nutrition Graduates (FAGRAN) and consulted on the current regulations in their jurisdiction. At the same time a systematic internet search was conducted and the national and provincial houses of representatives and senates were contacted to inquire about the status of projects and laws.

Results: In 2008 a national law was sanctioned focuses on eating behavior with special attention on healthy-snack-stands (N´º26.396/08) but it did not specify its implementation and responsibilities. Nowadays the national House of Representatives had sent to the Senate a national law about healthy-snack-stands. In Argentina 83% (20) of the provinces have some regulation or project concerning healthy-snack-stands. Twenty-five percent (6) of them have regulated laws, 13% (3) have sanctioned and promulgated laws and 25% (6) have law projects. Twenty-nine percent (7) of the provinces have municipal ordinances and 17% (4) have projects of municipal ordinances.

Conclusions: This study shows the complexity of the instauration of a national health legislation in the context of a federal country. Laws concerning healthy-snack-stands were enacted by provinces. Many laws have been enacted since 2008, but with complex regulations and implementation processes. It is very important to analyze the regulatory aspects to accelerate changes in the marketing and communication of foods which are associated with the childhood-obesity epidemic.

Key words: Healthy snack stand, Law and Project law, regulation.

PO1538

MILK AND DAIRY PRODUCTS CONSUMPTION IN ARGENTINA

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Background and objectives: Milk and dairy products are important sources of calcium, high quality proteins and vitamins and are included in Argentinean Food Guidelines. Our aim was to assess the consumption of milk and dairy products in Argentinean population.

Methods: A cross-sectional nutrition survey was conducted on a random probabilistic sample considering age, sex and region quotas, in the main cities of Argentina. Analysis was based on 1137 individuals (563men and 574women), aged 2-65 years using a self-administered 7-day questionnaire. One serving size was defined as: 200ml of milk, 200ml of yogurt, 50g of fresh cheese, 60g of spread cheese and 15g of hard cheese. Data were compared with the dietary guidelines for the Argentinian population. Total calcium intake was estimated as the sum of dairy products calcium and calcium from other sources taken food balance sheets. Total calcium was compared to EAR by sex and age.

Results: The mean daily servings of dairy products for the population was 2.1±1.2. For children (2-4yo) 3.3±1.3, for scholar-age children (5-12yo) 2.6±1.0, for adolescents (13-18yo) 2.0±1.0, for young adults (19-30yo) 1.7±0.9, for middle-age adults (31-50yo) 1.7±1.0 and for older adults (51-61yo) 1.6±1.1. Compared with the dietary guidelines: 45% of children (2-4yo), 72% of scholar age children, 87% of adolescent were below the 3 recommended servings per day, and 65% of young adults (19-30yo) and 69% of adults older than 31yo were below the 2 recommended servings which is consistent with the 16% of children, 76% of scholar-age-children, 97% of adolescent, 87% of young adults (19-30yo) and 90% of adults older than 31yo were below calcium estimated average requirement.

Conclusions: The consumption of dairy products falls sharply in scholar age children and stays low throughout adulthood. Therefore its consumption habits should be promoted from early ages.

Key words: milk, dairy product, dietary guidelines.

PO1539

EXCLUSIVE BREASTFEEDING. EFFECT ON GROWTH AMONG CHILDREN BELOW TWO YEARS IN MALAWI

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Background and objectives: Exclusive breastfeeding for the first six months of life is considered best even in HIV/AIDS affected countries like Malawi. In September 2011, a cross- sectional nutritional baseline survey was conducted in Kasungu and Mzimba District of Malawi within the IMCF research project to assess the nutritional status of children below two years and its determinants.

Methods: In total 1041 randomly selected households with children below two years were interviewed based on a standardized questionnaire. Anthropometric measurements were taken from both parents and the child. In order to analyze the effect of exclusively breastfeeding, predominant breastfeeding and mixed feeding on height-for-age-Z-score, an ANCOVA was performed in the age group 0 < 6 months only (n=205) with age of child, BMI and height of mother as covariates.

Results: Prevalence of stunting among the children below 6 months of age was 29% (mean= -1.41). Most mothers (n=180) and all fathers (n=18) who had been measured had a normal BMI (87% and 100%, respectively). Exclusive breastfeeding was less common (43%) than predominant breastfeeding and mixed feeding taken together (21% and 36%, respectively). Influence of breastfeeding pattern on HAZ, adjusted for age of child and height of mother, was significant ($p<0.05$). Exclusively breastfed children had higher mean HAZ compared to mixed fed children (-1.16 versus -1.61; $p<0.05$). There were no significant differences in HAZ between exclusively breastfed and predominantly breastfed children and between predominantly breastfed and mixed fed children.

Conclusions: The results show the need to continue the promotion of exclusive breastfeeding and a timely introduction of adequate complementary foods in Malawi to prevent stunting among children below 6 months of age.

Key words: Exclusive Breastfeeding, Predominant Breastfeeding Growth, HAZ, Malawi.

PO1540

COMPLEMENTARY FEEDING PRACTICES AND THEIR POTENTIAL DETERMINANTS IN INDONESIA: A REVIEW OF LITERATURE

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Background and objectives: Around 36% of Indonesian underfive children are stunted. Appropriate complementary feeding is recognized to be highly effective to reduce undernutrition. Only 41% of children 6-23 months are fed as recommended. Yet, national aggregates hide disparities between locations. To fill the gap, studies have been conducted to assess child feeding practices as well as their underlying factors in different locations of Indonesia. Nevertheless, no attempt has been made to reconcile available literature to identify gaps in current knowledge. The aim of the paper is to provide a comprehensive review of the current literature on feeding practices among children above 6 months of age and their potential determinants.

Methods: A systematic literature research was conducted in several databases using combinations of different search terms: feeding, child, Indonesia, MPASI/complementary food, gizi/nutrition, factor, determinant, praktek/practices. The review of all documents was conducted using a 3-step procedure to assess content appropriateness and research quality. Information was analysed using a conceptual framework for behaviour change.

Results: In all studied areas, child feeding practices are not optimal. Available data on individual factors underlying those practices relate mostly to mother`s attributes, namely knowledge, attitudes, beliefs and skills which are positively linked to better feeding practices. Although, literature on group factors does not provide a full picture of their contribution to child feeding practices as it is limited to health services, home and peer environment, it shows that such support is conducive to good practices. Literature on societal factors affecting childhood complementary feeding is limited to cultural norms with some of them detrimental to optimal practices.

Conclusions: The results stress the need to strengthen research on child feeding and its underlying determinants. Results are useful for providing guidance to nutrition program to improve overall child's well-being.

Key words: children, feeding, factors, review, Indonesia.

PO1541

DOUBLE BURDEN OF MALNUTRITION IN CASABLANCA

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Background and objectives: The epidemiological situation in developing countries is rapidly switching to a model where obesity and associated diseases are becoming a major public health concern. Unfortunately, other deficiency issues are still persistent in prevalent, we are now noticing both malnutrition aspects among the same populations, sometimes in the same households, and sometimes even in the same person. Objectives: This study aimed to assess the severity of malnutrition among women and children from Casablanca, and the prevalence of households with overweighed mothers and undernourished children, also, to see if mothers' level of education is associated to these aspects of malnutrition.

Methods: A survey was carried out in 6 neighborhoods of Casablanca, 426 adult women and 240 preschoolers were randomly selected using a cluster sampling. Anthropometric parameters were measured according to the guidelines of the World Health Organization (WHO). Obesity in adults was determined using the body mass index cutoffs from the WHO. Underweight, stunt and obesity in children were determined using the WHO child growth standards.

Results: Results showed 47% obesity and 36% overweight among women, while 19% children were underweight and 15% were stunted, we also noticed 8% obesity among children. Data also showed that 13.7% households had obese mothers and malnourished children, while 9.8% households had obese mothers and children. Obesity, underweight, and stunting were not associated with mothers' level of education, age, or marital status.

Conclusions: Results allowed us to assess the severity of the double burden of malnutrition in low and middle income households from Casablanca, The fact that we found it in a considerable part of the population is an indicator of other possible malnutritions. It is becoming imperative to conduct a thorough study of the food behavior of these households to understand the complexity of this phenomenon.

Key words: Malnutrition, Casablanca.

PO1542

DETERIMANTES OF CHILD CHRONIC MALNUTRITION IN THE PROVINCE OF VILCASHUAMAN IN THE CENTRAL PERUVIAN HIGHLANDS

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Background and objectives: Child malnutrition is a serious public health problem in Peru, affecting children's academic performance and future economic productivity. This study analyzes the determinants of chronic malnutrition in Vilcashuaman, Ayacucho.

Methods: The study used quantitative and qualitative methods, including a two stage sample with a 95% level of confidence and 5% accuracy to measure malnutrition rates in 496 children under 3 years of age. A survey covered the situation for health, nutrition, water and sanitation and food security. A further part included focus groups, interviews and observations with 50 families.

Results: 64.4% of children under 6 months are exclusively breast fed. 65.3% of those from 6 to 35 months receive balanced complementary foods, with local products and adequate frequency, usually characterized as soups. 46.3% of children from 18 to 35 months have complete vaccinations. 51.7% of those under 3 suffered respiratory problems and 15% had diarrhea in the preceding two weeks. 38% of municipalities aim to reduce child malnutrition, but have not assigned a corresponding budget. 74.2% of dwellings have running water, but the majority is not chlorinated. 73% of dwellings have latrines. Subsistence agriculture takes place in small plots, irrigated by rain, with low yields, and animal herds are small. In January and February 30% of families face food scarcity. Prevalence of chronic child malnutrition is 31.5% in those under 3, with higher rates in children with mothers with only primary education compared to those whose mothers attended secondary school.

Conclusions: Chronic malnutrition in children under 3 is high, affected by factors such as limited food diversity, high prevalence of infections, deficient health services, low quality basic services, limitations in agricultural production and lack of attention to cultural issues. There is an inverse relationship between mothers' education and child chronic malnutrition.

Key words: malnutrition, agriculture, education.

PO1543

INEQUALITIES IN THE AVAILABILITY OF FOOD STORES AND FOOD ACQUISITION PATTERN OF FAMILIES LIVING IN URBAN AREAS OF SANTOS, BRAZIL

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Background and objectives: To assess household food acquisition patterns and its relation to the geographical distribution of food stores in urban neighborhoods.

Methods: A cross-sectional survey was conducted in four administrative region of Santos City (2010). Households were selected by random sampling of 36 census tracts. Families were interviewed (n=538) to collect the household food acquisition in the last month (31 food/beverage groups) and socioeconomic data. All food stores in the study area were audited using a validated instrument to assess food availability, quality and price. Stores were classified as More or Less Healthy Eating Promoter (MHEP; LHEP) according to the degree of industrial processing and food nutrient content. Per capita food acquisitions in grams were log transformed, and scores were attributed to the quartiles of distribution (1–4;0=no acquisition). Principal Component Analysis (orthogonal rotation/varimax method) was performed to achieve patterns of food acquisition (factors). The internal consistency of the items that comprised the pattern was evaluated by Alpha Cronbach coefficient (P>0.6). Geographical distribution was used to compare the neighborhoods availability of stores.

Results: Seafront and Intermediate regions showed a higher economic level. Northwest and Downtown presented lower socioeconomic and education levels. Maps illustrated that the higher availability of MHEP stores was related with high-income areas. Three patterns were retained in analysis. Seafront and Intermediate showed a similar pattern, based on fruits, vegetables, tubers and unprocessed meat (P=0.80 for both). Less healthy patterns were identified in low-income areas: Northwest based on refined grains, flour, pasta, beans, fats and sugar (P=0.82); and Downtown on fruits, vegetables and soft drink (P=0.70).

Conclusions: Neighborhood disparities in food environment are a concern due to their potential to influence purchase behaviors, dietary intake and obesity. Interventions are needed to increase the availability and access to healthy food.

Key words: food acquisition; food environment; food stores; urban health.

PO1544

SEASONAL UNCONDITIONAL CASH TRANSFERS AND WASTING IN NIGER

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Background and objectives: The use of unconditional emergency cash transfers (CTs), prior to and during annual seasons of poor food security are becoming increasingly popular amongst agencies involved in tackling undernutrition. Yet there is little evidence of their impact on childhood nutrition outcomes, even with improvements in dietary diversity and calorie intake. The Moderate Malnutrition cash Study (MMS) attempts to understand why CTs may not directly impact on nutritional status by examining potential synergies and barriers within the causal framework.

Methods: The MMS was a prospective community-based cohort study of a Save the Children CT programme in Maradi region, Niger. 453 households, with a non-wasted child 6-36 months, were enrolled at baseline and followed for 5 months. Exit from the study was detection of wasting; weight-for-height z score (whz) <-2, Mid-upper arm circumference (MUAC) <125mm or bilateral pitting oedema. Pre-distribution baseline data were collected on community, household, mother and child variables; time variant data was collected monthly. Data was analysed by adjusted Cox proportional hazards survival regression.

Results: The final adjusted model showed significant associations with wasting remained for; poorer socio-economic status (2.78, p<0.001), baseline whz (0.36, p<0.001), disease incidence (1.86, p=0.01), expenditure on medical care (1.39, p=0.01; expenditure controlled for disease: 0.74, p=0.01), and younger age group (0.97, p<0.03). Distance to medical services was weakly significant in the final model (HR= 1.56; p=0.06). Improvements in household food security and dietary diversity, and children's dietary diversity and food expenditure were similar across the sample.

Conclusions: These results suggest that if cash transfers benefits are to be maximised to help prevent the occurrence of wasting in under-fives then attention needs to focus on removing health-related barriers. This will require enhanced coordination across the health, Water Sanitation and Hygiene (WASH), livelihoods and nutrition sectors.

Key words: Cash transfers, Niger, Wasting, Cohort, Pathways.

PO1545

CORRELATES OF FRUIT AND VEGETABLE CONSUMPTION AMONG 11-YEAR OLD SCHOOLCHILDREN: RESULTS FROM THE PRO GREENS PROJECT IN PORTUGAL

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Background and objectives: To investigate which personal, social and environmental factors were more strongly correlated with fruit and vegetable intake after an intervention program to promote their consumption in a sample of 11-year-old Portuguese schoolchildren.

Methods: A cross-sectional survey was performed, both at baseline and follow-up, as part of the Pro Greens cross-Europe survey in order to assess the effect of a one-year intervention on the frequency of fruit and vegetable consumption and to identify potential correlates of consumption. A total of 690 Portuguese children participated, divided into intervention (n=310) and control (n=380) groups. Data was analysed using t test and Spearman's correlation coefficients with SPSS® version 20.0; statistical significance was established at $p<0.05$.

Results: Regarding the mean frequency of intake of fruit and vegetables at the follow-up period, the intervention group revealed some small but significant differences compared with the control group (Fruit: 0.93 vs. 1.11 times per day, p=0.006; Vegetables: 1.46 vs. 1.67 times per day, p = 0.038. In the intervention group, daily fruit and daily vegetable intake were significantly correlated with liking, positive self-rated intake and attitudes, habit, intention and parental encouragement, demand and allowance.

Conclusions: This study shows that interventions to promote fruit and vegetable consumption must take into consideration various personal and social correlates. The modest albeit significant effect reinforces the need for longterm and sustained promotion of F&V intake.

Key words: fruit and vegetables, schoolchildren, correlates.

PO1546

TEACHERS' PERCEPTIONS OF AN INTERVENTION PROGRAM TO PROMOTE FRUIT AND VEGETABLE CONSUMPTION IN SCHOOLCHILDREN

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Background and objectives: Intervention programmes within the school setting require an extended collaboration from teachers in order to be carried out and to be effective. The aim of the present study was to examine the perceptions of school teachers regarding an intervention program to promote fruit and vegetable consumption in 11-year-old schoolchildren – the Pro Greens project - in two Portuguese schools.

Methods: Data derived from a follow-up self-administered questionnaire, filled out by teachers belonging to the intervention schools of the Pro Greens project. The questionnaire included questions regarding the overall program quality, activities and support materials made available to teachers and children and also questions about the impact of the program on the awareness concerning fruit and vegetable intake. Descriptive statistics were performed using SPSS® version 20.0.

Results: All teachers involved in the project have completed the survey. A total of 16 (87.5% female) teachers have completed the questionnaires. 43.8% considered Pro Greens intervention very good, and 75% said that the perception of students on the program was good. Most of the participant teachers (87.5%) considered the overall quality of the classroom curriculum of the project good. Regarding teachers' manual provided by the project, 25%considered it very good. 50% of the teachers consider that Pro Greens intervention has contributed, to a large extent, to increase children's awareness about fruit and vegetable intake, whereas 62.5% believes that to some extent, the intervention has contributed to increase his/her own awareness and interest about this issue.

Conclusions: These findings provide useful information to work on the improvement of such programs in order to create more appellative and useful materials and activities for teachers and that fit better on the school curricula, which could therefore result in a more effective program.

Key words: schoolchildren, intervention program, fruit and vegetables, teachers.

PO1547

FOOD, BELIEFS AND THEMATICAPPEALS IN ADVERTISEMENTS OF BRAZILIAN MAGAZINES

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Background and objectives: The study of advertisements can show social practices, meanings of life and forms of relationships throughout history. The objective was to analyzebeliefs, thematic appeals and quality of products in advertising campaigns.

Methods: We selected four magazines per year of Seleções Reader's Digest (1944-1948) and Claudia (2004-2008). Only the ads of food and beverage (non-alcoholic drinks) with the figure of the female body were submitted to semiotic analysis.

Results: The statements in the ads were grouped into two categories: attributes (flavor, smell, color, texture and yield) and benefits (health, nutrition, wellfare; body shape, energy; love, friendships; pleasure, satisfaction, convenience). The thematicappeals were classified into six categoriesbased on the central idea of the ad: fun/joy; love/feeling; appetite; status/prestige; relaxation/vacation; and humor. We found 82 food and beverage ads, 33 of Seleções and 49 of Claudia. In Seleções, the attributes of the products were more valued and the appetite appeal was more frequent. In Claudia, the benefits were more important, without strong evidence of a specific appeal, the fun/joy appeal was more common. Among the products of Seleções, the main representative was the refrigerants. Fruits and vegetables were not announced. However, more than half of the ads of Claudia presented specifics versions of the product such as light/diet/zero, skimmed, rich in fibers, soy-based, whole grains and fast food.

Conclusions: The increase of obesity, characteristic of the nutritional transition process, is related to dietary practices of the individual in society. The exchange of technical-scientific Knowledge of Nutrition with the discourse of Advertising can provide important information to the consumers to decide about their food, based on the cultural standard, to ensure health and well-being for the individual and society.

Key words: Food. Nutrition. Advertising. Beliefs. Appeals.

PO1548

SCHOOL FOOD POLICY AND EVIDENCE – AN INTERNATIONAL APPROACH

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Background and objectives: Schools provide an excellent platform from which to promote good child nutrition and health, including social and financial safety nets through engagement with local communities and food providers.(1) Better integrated evidence is needed internationally to support policy development worldwide.

Methods: An international workshop hosted in London in January 2012 by the Children's Food Trust and WHO Regional Office for Europe(2) brought together a group of experienced researchers and policy leads from 20 middle- and high-income countries to discuss how to improve the evidence base for school food policy development. The workshop covered current school food policy across Europe, United States, Brazil, and China, and links between evidence and policy development.

Results: The workshop developed recommendations to strengthen links between evidence and policy: conduct a review of school food research; develop a map showing links between policy, evidence, and tools for workforce development; develop a regularly updated repository of research and guidance relevant to school food policy; establish an international network for experts involved in strengthening school food policy, spanning government representatives, experts in education, school principals, civic organizations, public health nutritionists, caterers.

Conclusions: Organizers and participants from the London workshop met in Israel in March 2013 to discuss the assembly of a European network to promote better school food policy development and implementation through sharing of methodologies, building a strong evidence base, garnering political support for school food regulation, and facilitating the sharing of learning outcomes and training.

Key words: school food policy (1)Bundy D et al (2009). Rethinking School Feeding. World Bank (2)Nelson M, Breda J. School Food Research: building the evidence base for policy. Public Health Nutrition 2013

PO1549

PREDICTORS OF INFANT OVERWEIGHT IN A RURAL AND URBAN AREA OF THE ECUADORIAN HIGHLANDS

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Background and objectives: Recently in developing countries, the proportion of overweight children has increased considerably in all age groups. This study aimed to identify and compare the socio-demographic determinants of overweight of infants aged 0-24 months between an urban and a rural area of the Ecuadorian highlands.

Methods: A cross-sectional study was conducted between June to September 2008 in a sample of 227 infants from a rural and 476 from an urban canton of Azuay province, Ecuador. Household key indicators (KPC survey); socio-demographic characteristics (questionnaire on Unsatisfied Basic Necessities), and anthropometric measurements were collected. The WHO 2006 growth standard references were used to estimate the BMI-for-age index.

Results: The prevalence of overweight children was higher in the urban area than in the rural area (12.4% vs 8.8%); while the prevalence of obesity was similar (5.7% and 6.2%, respectively). Compared to the rural area, there was a significantly higher assisted delivery (96.6% vs 53.7%; P-value<0.001) and a higher preference to frequent medical centers (85.1% vs 76.7%; P-value=0.006) in the urban canton. Unassisted delivery was found as significant predictor for infant overweight in both urban (OR: 0.29; 95%CI: 0.10, 0.81) and rural setting (OR: 0.48; 95% CI: 0.23, 1.01). Only in the rural setting child's age was positively/negatively associated with infant overweigth (EFFECT=0.046), whereas in the urban setting older maternal age at birth of the first child appeared protective against infant overweight (OR: 0.94; 95%CI: 0.89, 0.99).

Conclusions: Infant overweight was associated with different factors in urban and rural in Ecuador. In contrast to the large cultural and socio-economic differences, only maternal status and frequentation to medical services was significantly associated with infant overweight.

Key words: Overweight, infants, rural-urban differences, socio-demographic determinants.

PO1550

FACTORS ASSOCIATED WITH NUTRITIONAL SUPPLEMENTS CONSUMPTION BY EXERCISE PRACTITIONERS IN SÃO LUIS, BRAZIL

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Background and objectives: Sports nutrition aims to establish dietary strategies to improve performance and ergogenesis. This study aimed to analyze factors associated with nutritional supplements consumption among exercise practitioners in health club at São Luis, Northeast of Brazil.

Methods: A convenience sample was defined by considering the number of health clubs in operation in São Luis. The dependent variable was the use of supplements and the explanatory variables were how long one has been practicing exercise, schooling, weekly attendance at the heath club, gender, age, self-perception of weight, smoking, goal of exercise, training session duration, self-awareness of training intensity and self-perception of own power. The association of variables was analyzed using Poisson regression, adopting a significance level of 0.05.

Results: The final sample consisted of 723 exercise practitioners, of which 64.7% reported using some type of supplement. A higher proportion of men (52.6%) was observed. Age between 20 to 39 years-old was more frequent (74.4%). Regarding schooling, 24.1% had post-graduation degree, 41.1% superior graduation degree, 30% had completed high school and 2.8% elementary school. Smoke was observed in 3.5% of participants. Most respondents (46.1%) were physically active for over a year. Variables associated with nutritional supplements consumption were self-evaluation of below the ideal weight ($p < 0.001$), smoking ($p < 0.001$), practicing exercise for 7-12 months ($p = 0.028$) or for more than 1 year ($p < 0.001$), practice exercise for more than two hours each session ($p = 0.053$) and self-evaluation of training to be moderate ($p = 0.024$).

Conclusions: Socioeconomic, demographic and own power do not interfere in the decision regarding the consumption of supplements that are strongly associated with the characteristics of the training and dissatisfaction with body weight.

Key words: Nutritional Supplement, Physical Exercise, Poisson Regression.

PO1551

CONSUMPTION OF PROCESSED AND ULTRA-PROCESSED FOOD AND DRINK PRODUCTS IN THE USA, 2007-08

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Background and objectives: Increased consumption of processed food products is a major cause of the current pandemic of obesity and related chronic non-communicable disease. The objective of this study was to assess processed and ultra-processed products consumption in the US in 2007-08.

Methods: Dietary data analyzed came from the 2007-08 National Health and Nutrition Examination Survey-NHANES conducted on a probabilistic sample of 10, 149 people of all age groups. Breastfed children were not included. Food items were converted into dietary energy and assigned to: (1) unprocessed or minimally processed foods and freshly prepared dishes made up mostly from these foods, or (2) ready-to-consume food products. This second group is of processed products, manufactured by adding substances such as salt, sugar, or oil to whole foods; and ultra-processed products, formulated mostly or entirely from industrial ingredients, typically containing little or no whole foods. The contribution of ready-to-consume products to the diet, expressed as a percentage of total dietary energy, was calculated.

Results: The average contribution of ready-to-consume products to dietary energy was 69.6%. This was made up from 4.9% from processed products and 64.7% from ultra-processed products. The most consumed processed product was cheese (3.0%). The main ultra-processed products were: pre-prepared ready-to-eat or to-heat mixed dishes (16.8%), candies (sweets) and desserts (7.8%), sugar sweetened soft drinks (7.6%), breads (6.9%), sweetened pastries and cakes (5.2%), and salted snacks (4.2%). The overall US figure of 69.6% is slightly higher than in Canada (62.0 %) and the UK (63.4%), somewhat higher than in Chile (55.4%), and much higher than in Brazil (27.8%).

Conclusions: The US diet is dominated by ready-to-consume food and drink products, almost all of which are ultra-processed.

Key words: Diet, Food Processing; ultra-processed food products; NHANES.

PO1552

VALIDATION STUDY OF WEIGHT CONCERNS SCALE APPLIED TO COLLEGE STUDENTS

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Background and objectives: The Weight Concerns Scale (WCS) proposed in the english language, aims to evaluate the degree of concern with body weight. Objective: perform cultural adaptation of the instrument to portuguese and estimate its reliability and validity in college students.

Methods: 343 college students (female) from a Brazilian public university were participated. The validity of the scale was measured by means of factorial and convergent validity. Then, the confirmatory factor analysis was conducted using as the fit indices the £q2/df, the CFI, GFI and RMSEA and estimated the average variance extracted (AVE) and composite reliability (CR). The factorial invariance was estimated by analyzing multigroups considering the groups as "eutrophic" and "non-eutrophic" defined from the body mass index of the participants. The internal consistency was estimated by Cronbach's alpha (α).

Results: 442 participants performed the Health course and 655 the Humanities course. The average age was 20.9±, 6 years and 6.7% were underweight, 74, 8% were normal weight, 9.9% were overweight and 7.2% were obese. The portuguese version of the WCS showed adequate factorial adjustment in the total sample (ƒÜ=0, 55-0, 78; ƒÓ2/df=9, 06; CFI=0, 98; GFI=0, 98; RMSEA=0, 09). The convergent validity (AVE=0.49, CR=0.83) and internal consistency were adequate α=0.77). The simultaneous adjustment of the groups was excellent (ƒÜ=0.55-0.79; ƒÓ2/df=5.21; CFI=0.95; GFI=0, 96; RMSEA=0, 06) with invariance of the models (ƒÜ: ƒ´ƒÓ2=4.58; p=0.33; Cov:ƒ´ƒÓ2=12.10; p=0.03; Res: ƒ´ƒÓ2=48.09; p=0.00).

Conclusions: the portuguese version of the Weight Concerns Scale applied to female college students showed adequate reliability and validity.

Key words: validity; college students; reliability; body weight. Grant number FAPESP: 2010/13475-4

PO1553

ULTRA-PROCESSED FOOD AND DRINK PRODUCTS AND OBESITY: A NEW HYPOTHESIS, AND EVIDENCE

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Background and objectives: Increased consumption of industrially processed food products is considered to be an important cause of the current pandemic of obesity. However, direct evidence linking the intake of these products to obesity is restricted to a few products such as soft drinks. This is in part because criteria to define and classify foods according to industrial processing have not yet been agreed. This study proposes that one increasingly consumed group of processed foods, ultra-processed food and drink products, are an important cause of obesity, and presents supportive preliminary evidence.

Methods: We used a new food classification based on the nature, extent and purpose of industrial food processing. This defines ultra-processed products as formulations mostly or entirely of industrial ingredients, typically containing little or no whole foods. The purpose of ultra-processing is to create durable, accessible, convenient, and highly-palatable products. These include sugared breakfast cereals; many baked goods; chips and several snack products; soft cola and 'energy' drinks, and ready-to-heat products such as pre-prepared pizza and pasta dishes, burgers and hot dogs, and poultry and fish 'nuggets' or 'sticks'.

Results: Population-based studies on national-representative samples of adolescents and adults in Brazil indicate that higher consumption of these products (upper quintile) increases the risk of obesity by 20-30%. There are many reasons why ultra-processed products are likely to increase the risk of obesity. They are energy-dense (added fat and sugar, reduced water). They increase accessibility (they are convenient, packaged, with long shelf life). They favor snacking and mindless eating (they are readily accessible, minimal utensils needed). They are liable to be over-consumed (they are highly palatable and often aggressively marketed).

Conclusions: Preliminary epidemiological evidence and other evidence indicate that the increase in the consumption of ultra-processed food products is one cause of the obesity pandemic.

Key words: Obesity, diet, food processing.

PO1554

WORLDWIDE FOOD AND NUTRITIONAL PICTORIAL REPRESENTATIONS

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Background and objectives: The food and dietary guidelines related to the food education theme can be transmitted in the form of guidelines or through pictorial representations. In this work 40 worldwide pictorial representations of food and nutritional guides available in 23 countries are presented and discussed.

Methods: An Internet search about food and nutritional guides and benchmarks and also nutritional plans, policies and strategies of a healthy lifestyle worldwide was conducted systematically. The search was done only in recognized institutional and official institutions web sites of each country or global organizations (such as World Health Organization or Food and Agriculture Organization). The intention was to include all regions of the world and their different development stages.

Results: The main goal, found in all of the 40 pictorial representations evaluated, was similar - to educate the target public regarding proper eating habits and nutrition education, promoting a culture of food education and encouraging healthy lifestyles. It was intended to instill rules, guidelines and nutritional advice, gathering the foods and classifying them so as to teach the relative proportions of food ingestion.

Conclusions: The pictorial representations for each country are presented as symbols representing a familiar image to the target population. The written messages associated with the pictures are simple, direct, clear and flexible in order to transform the message more effectively and spread it more efficiently. It is also clear that the food availability, culture, religion, social and economic environment are relevant factors that affect food choices and the image display of each pictorial representation is taken into account.

Key words: pictorial representations, food, nutrition, country.

PO1555

CHILDREN AND MOTHERS' PERCEPTION ON ACTUAL AND DESIRED HEALTHY BODY SHAPE IN URBAN INDONESIA

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Background and objectives: The prevalence of overweight amongst children in developing countries has increased. Recent studies in developed countries showed that perceived body image is one of factors related to overweight, but no study has been done to examine this in Indonesia. This study aimed at assessing the nutritional status of school children (SC) and perception of children and their mothers on children's actual (ABS) and desired healthy body shape (DBS).

Methods: A cross-sectional study was conducted in SC (N=524, 8–10 years old) from different socio-economic status (SES) in urban Jakarta and Bogor. Data collected include SC body weight and height, perceived ABS and DBS by SC and mothers. SC nutritional status was assessed using BMI/age (underweight, normal, overweight), and body image perception was assessed using seven levels of silhouette charts designed for SC.

Results: Prevalence of underweight and overweight groups amongst SC was 7.3% and 8.1% respectively. Prevalence of overweight SC in high SES was double of low SES. While 30.7% of SC perceived their actual body shape to be underweight, 50.1% of mothers perceived their ABS to be underweight. A positive correlation was found between SC nutritional status and their perceived ABS categories (r=0.50), suggested some SC correctly assessed their ABS. However 44.8% SC perceived their DBS is overweight; and 23.3% of mothers perceived their children's DBS is overweight. They shared the same perception that the DBS for children should be larger than the ABS.

Conclusions: Overweight is higher amongst urban high SES children. SC and mothers are more likely to expect a larger body shape for SC to be identified as healthy children. This implies that the perceived body image by children and mothers can be unrealistic and shall be addressed in nutrition education to prevent childhood obesity.

Key words: Overweight children, body image, Indonesia

PO1556

HOUSEHOLD DETERMINANT OF MALNOURISHED IN PREGNANCY DUE TO LOWER ENERGY AND PROTEIN INTAKE (REANALYZED INDONESIAN BASIC HEALTH SURVEY IN 2007 DATA)

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Background and objectives: Approximately 20% pregnant in Indonesia are malnourished not only caused by low intake of protein and energy but also related to household determinant. Objectives: To analyze determinant of household toward malnourished pregnancy due to low intake protein and energy from the data Indonesian Basic Health Survey in 2007.

Methods: Case control approach are using to Analyze the risk factor, which were 1435 malnourished pregnancy as a case, and control were 2947 pregnant in normal, with matching on age and cluster census. Indicator risk if: intake energy and protein <80 % RDA and stratification analysis by household determinant (household expenditure, mother's state and residential) Results Pregnancy with intake energy <80 % RDA are OR: 1.305 (CI 95%: 1.008-1.565), and intake protein <80 % RDA are OR: 1.338 (CI95%: 1.120-1.559). Stratification risk analysis for malnourished pregnancy due to low energy-protein intake, Household expenditure, educational level of mothers, working mothers and rural-urban residential are confounders risk factors.

Conclusions: Intervention only Intake energy and protein without any intervention about household determinant, cannot effective to solve malnourished in pregnancy.

Key words: Malnourished Pregnancy, Energy-Protein intake, household determinant.

PO1557

ESTIMATE OF THE NUTRITIONAL STATUS AND DIETARY INTAKE OF ADULT PEOPLE LIVING WITH HIV/AIDS IN DHAKA

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Background and objectives: People living with HIV/AIDS (PLHIV) are vulnerable to poor nutritional status due to increased nutrient requirements. PLHIV need adequate

nutritional support prevention of HIV related infections and maintain good nutritional status. According to the estimation of UNAIDS, 11, 000 people living with HIV in Bangladesh. However there is lack of information on the nutritional status and food intake of the PLHIV in Bangladesh. This research was conducted to estimate the nutritional status and assess dietary intake of adult PLWHA of Dhaka.

Methods: It was a cross-sectional study, conducted during November-December, 2009 in Dhaka. About 65 adult PLHIV were selected randomly from Infectious diseases Hospital, Icddr'b and Ashar Alo Society. Height and weight was measured to calculate the BMI of the subject to estimate their nutritional status. Dietary intake, frequency of taking food, Dietary habit, personal hygiene and other related data was collected with semi-structured questionnaire.

Results: This study found that nutritional status of 55.4 % PLHIV was normal, 30.8% were underweight (BMI less than 18.5kg/m2) and 13.8% were overweight. BMI was lower than 16 kg/m2 among 18.5% PLHIV. About 54% of the subject's were unemployed and 12 % dependent on their relatives to meet their basic need of life. Mean calorie intake of the subjects was 1588 (± 329) kcal/day which was 29% less than their calorie requirement (P <.001). Most of the subjects were sick with various diseases like fever, caught, frequent diarrhea, TB, asthma, skin diseases.

Conclusions: Study found that nutritional status of most of the PLHIV was normal. However they are highly vulnerable to be malnourished due to low calorie intake and frequent exposure to diseases.

Key words: Nutritional status, Dietary intake, malnourished, PLHIV.

PO1558

RISK FACTORS ANALYSIS FOR MALNUTRITION OF PLHIV OF BANGLADESH

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Background and objectives: People living with HIV/AIDS (PLHIV) are vulnerable to poor nutrition status due to increased body requirements. The objective of the study was to identify risk factors for malnutrition in HIV-AIDS subjects.

Methods: It was a cross-sectional study. To identify the risk factors 85 male and female HIV positive people aged 18 to 50years were interviewed by semi-structured questionnaire. The subjects were randomly selected from a national NGO Ashar Alo Society and Infectious Diseases Hospital who provide health care service to the PLHIV in Bangladesh.

Results: The study found that Mean (± SD) age of underweight HIV positive subjects was 33 (± 9) years, Mean (± SD) height was 160 (± 8) cm, mean weight was 44 (± 5.6) kg and mean BMI was 17.2 (±1.3) kg/m^2. Study also recognized that less calorie intake was highly associated with underweight condition (OR=27.5). Calorie intake of the underweight PLHIV was 25% less than their daily requirement. Less protein intake was also associated with underweight (OR=2.80). Nausea (OR=2.60), Vomiting (OR=2.02), change in smell or taste (OR=2.70), Fever (OR=3.05), cough/cold (OR=2.50), diarrhea (OR=2.83), anorexia (OR=3.23) were also associated with the poor nutritional status of the subject. Some other factors i.e. unemployment, low income, low food intake, presence of diseases, social stigma, fasting or less food intake due to lack of money and poor appetite were significantly associated with poor nutrition status of PLHIV.

Conclusions: Nutrition is a fact which influence with many other factors like nutrition knowledge, socio-economic condition, body mechanism, mental condition etc. For longevity of PLHIV and decrease diseases progression, proper nutritional support should be provided through effective nutrition program.

Key words: Risk Factors, Nutritional status, HIV/AIDS, PLHIV.

PO1559

PERCEPTION AND INVOLVEMENT OF WOMEN'S GROUPS IN FOOD MANAGEMENT TOWARDS CREATING A HEALTH TOURISM COMMUNITY

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Background and objectives: The study was conducted at Ban Tha-Gu, Mae Tha District, Lampoon, Northern Thailand. This community is being supported by the Thai government health ministry to develop their skills in able to create and offer health tourism. The community currently practices organic farming and have created food security through practice of sufficiency economy theory. The study focused on four women groups in the community who are involved with food preparation and management in order to assess the acceptance, collaboration and preparation of health food for community health and tourism purposes.

Methods: The study was carried out as a participatory study which included seminars and workshops on healthy food preparation, basic and applied nutrition concepts, food safety handling, and food display and service management.

Results: The women groups did not have basic knowledge of the nutritional values of food whereas most recipes were prepared contained high saturated fat and high sodium content. Women groups were eager to learn how to prepare and manage food for health. They acknowledged that food is important for health and took part in analyzing the problems such as reliance on MSG as the major flavoring in food preparation. Another issue was preparing meals for themselves and tourist based on keeping cost to the minimum without understanding of nutritional value, quality and appropriate quantity. The researchers along with the women groups created standard recipes in order to improve food management and nutritional value.

Conclusions: Standard recipes are currently prepared for home consumption as well as for tourism. A change in the community eating habits is observed which in turn can be used as a promotional factor towards offering the community as a health tourism destination.

Key words: Health tourism community, Food management, Promoting nutritional value, Women group, Collaboration.

PO1560

RELATIONSHIP BETWEEN HAND WASHING WITH SOAP AND STUNTING AMONG CHILDREN <2 YEARS FROM BANGLADESH

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Background and objectives: Hand washing with soap has been shown to reduce diarrhea in low income settings. Frequent enteric infections impact on child growth in such settings, thus good hand washing practices, by reducing diarrhea may impact on child growth. We examine the relationship between hand washing and nutrition status.

Methods: Credible hand washing practice data were collected through 5 hour structured observations for 417 households with at least one child <2 years in rural Bangladesh in 2007. We measured their height and weight. We compared length-for-age z-scores (LAZ) with categorical hand washing variables ranging from no hand washing to washing both hands with soap. We controlled for wealth, parent education, child age and sex using a generalized estimated equation regression model and adjusted for households clustering.

Results: Among the 417 households, 169 of 432 (39%) children <2 were stunted. There were 8, 872 handwashing events observed. Of the 142 events recorded after latrine use, hand washing with soap was detected for 23(16%). Soap was used among 48 of 229 (21%) events of cleaning a child's anus, 5 of 783 (0.6%) during food preparation, 72 of 2, 821 (3%) before eating, and 14 of 1155 (1%) before feeding a child. Nutritional status, indicated by LAZ, was associated with wealth but not with washing both hands with water or soap when controlling for wealth, education, age and sex.

Conclusions: In this cross sectional study no association between nutrition status and hand washing during food-related or fecal-related events. Prospectively exploring an association of observed good hand washing practices on growth when dietary intake data are included is worthy of investigation. Acknowledgements; The UK Department for International Development funded the study

Key words: stunting, hand washing with soap.

PO1561

COMPARISON OF THE NUTRIENT DENSITY OF LUNCHES EATEN BY FRENCH CHILDREN ACCORDING TO MEAL LOCATION: SCHOOL CANTEEN OR HOME

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Background and objectives: School nutrition policies are considered as an appropriate way to promote healthier dietary habits in the paediatric population. In France, two thirds of French children and adolescents eat lunch provided by school canteen at least once weekly. Several guidelines on the composition of school meals have been published since 1999, in order to improve children intakes in lipids, sugar, fibre, vitamin C, calcium and iron. This study investigated whether nutritional intakes at lunch were different at school canteen and at home.

Methods: Data from the second French cross-sectional dietary survey (INCA2), performed in 2006-07 among a representative sample of 3-17 year-old children were used. Dietary intake and meal location were collected with a 7-day food record. A total of 4615 weekday lunches eaten at school canteen or at home by 1068 children attending school during the sur-

vey week were selected. Energy content and nutrient density (macronutrients, vitamins and minerals) were assessed using the French food composition database. Comparisons between school canteen and child's home were performed using a mixed regression linear model with child as random effect. Analyses were stratified according to school type (junior or secondary schools).

Results: Energy intake at lunch was 100 kcal higher at school canteen. For every 100 kcal, school lunches contained more proteins, starch, fibres, poly unsaturated fatty acids and sodium and less total carbohydrates, sugars, saturated fatty acids, calcium and vitamin C. Other results were school-type specific: school lunches contained more lipids and beta-carotene for junior-school children, and less iron, retinol, vitamin E and folate for secondary-school children. The food-groups contributing to these intakes also differed with lunch location.

Conclusions: Nutritional intake at lunch varies with location, suggesting that nutrition policies on school lunches may contribute to improve nutritional intake of children.

Key words: school lunch, nutrient intake, nutrition policies.

PO1562

HEALTHKICK: VALIDATION OF KNOWLEDGE, ATTITUDES AND BEHAVIOUR CONSTRUCTS RELATING TO HEALTHY EATING AND PHYSICAL ACTIVITY IN SOUTH AFRICAN SCHOOL CHILDREN

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Background and objectives: Evidence from North America and Europe has shown that school-based interventions can be effective in changing health behaviour. There is a scarcity of evidence from low and middle income countries. HealthKick is a primary school-based nutrition and physical activity (PA) intervention programme. A key tool used to assess learners healthy eating and physical activity knowledge, attitudes and behaviours (KAB) was developed and validated to be used as a measure of the efficacy of the programme.

Methods: Learners from 16 schools in the Western Cape Province were included in the survey (N=865). The questionnaire was administered in a classroom by trained field workers, in learners' home language. Scores were based on the number of correct answers, and questions were grouped for nutrition and physical activity knowledge, self-efficacy, social support, barriers and behaviour. Multiple correspondence analysis (MCA) was conducted to identify valid constructs under these categories using the Burt matrix approach. The percentage of variability in the first two dimensions of each score was assessed. Questions that contributed very little to the variability were dropped from the model. Additionally, item-analysis was conducted to determine the internal reliability of the constructs.

Results: The final scores for knowledge consisted of 14 questions that contributed 87.7% to the variability; while 7 questions contributed 89.17% to the variability of the social support score and 13 questions captured 90.5% of the variability of the barriers score. Separate nutrition and PA scores were needed for self-efficacy and behaviour. 13 nutrition self-efficacy questions captured 89.6% of variability and 3 PA questions contributed 96.4% to the variability. Similarly, 6 nutrition and 2 PA behaviour questions contributed 77.6% and 100% respectively. Similar results were obtained when item-analysis was used.

Conclusions: MCA has been shown as an effective statistical technique.

Key words: nutrition, physical activity, validation, schoolchildren.

PO1563

LONG-TERM ACCEPTABILITY OF LNS (LIPID-BASED NUTRIENT SUPPLEMENTS) FOR INFANTS IN MALAWI

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Background and objectives: The effectiveness of complementary feeding interventions depend on efficacy and acceptability. This descriptive study aimed to investigate mothers' experiences about providing lipid-based nutrient supplements (LNS) for extended periods to their infants.

Methods: The study is part of an intervention trial which provided LNS for 12 months to 6-18 month old infants in rural Malawi (www.ilins.org). After six months in trial (infant age 12 months), mothers' accounts were collected with in-depth interviews and KAP (knowledge, attitudes, practices) survey and analyzed for emerging themes and frequency of perceptions.

Results: KAP data were available from 1250 and in-depth interviews from 30 participants. Mothers reported having fed LNS to the child on an average of five days during previous week. 77% (95% CI 75 to 80%) of the infants were reported to have consumed LNS on the day preceding the interview, mostly in two feedings. Most mothers reported that their children liked LNS. However, 19% (16 to 21%) indicated some difficulties with feeding LNS. Typically, the child either refused all meals or declined to eat porridge containing LNS. LNS was shared with siblings in 12% (10 to 14%) and with other children in 14% (12-16%) of families. In-depth interviews suggested wider sharing among extended family. Selling or bartering was rare. The interviewed mothers perceived that LNS gave their infants strength and prevented illnesses. Only 9% (8 to 10%) thought that their child had growth problems and poor growth was seldom reported as a reason to consume LNS.

Conclusions: Long-term acceptability of LNS for infants is relatively good in rural Malawi. KAP survey suggests some deviation from recommended ways of feeding the products. In-depth interviews give a more detailed picture of acceptability. Funded by the Bill & Melinda Gates Foundation

Key words: Complementary feeding, LNS products, acceptability, Malawi.

PO1564

LUNCH-MEAL CHOICES; IMPLICATIONS TO HEALTH OF CORPORATE WORKERS COMPARED TO ARTISANS

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Background and objectives: Lunch meals are often eaten away from home. Consumption of food prepared away from home has been associated with increased sodium, fat and calorie intake. Obesity and insulin resistance are also implicated. The variation in socioeconomic status of Corporate Workers and Artisans in Ghana could potentially influence their lunch meal choices. This study aimed at identifying the lunch meal choices of Corporate Workers compared with Artisans in Accra to identify individuals at risk of diet- related morbidity and mortality.

Methods: Study design was cross sectional. Participants were randomly selected from 4 Corporate Institutions and Artisan Worksites in Accra. A food frequency questionnaire was administered to obtain the choice and frequency of lunch meals eaten in a typical week. Daily energy, fibre and macronutrient intake were obtained using a 3-day 24 hour recall. Anthropometric measurements (bmi, waist and hip circumference) as well as total body fat and visceral fat (VF) were also measured. Correlations between anthropometry, body composition and nutrient intake were determined using SPSS version 20.

Results: Corporate workers and Artisans had similar lunch meal choices. BMI, WHR, WC and VF were significantly higher among Corporate Workers ($p = 0.01$; $p < 0.01$; $p < 0.01$ and $p < 0.01$ respectively) compared with Artisans. Calorie contribution of lunch to total daily calorie intake was 42.9% and 46.2% respectively. Convenience was the major reason that influenced lunch meal choices.

Conclusions: Management of Corporate Institutions and Artisan shops need to scale-up their worksite health promotion programs to include provision of canteens where healthy meals would be provided.

Key words: lunch-meal, Artisans, Corporate Workers, Obesity.

PO1565

EVALUATING THE IMPACT OF A SCHOOL-BASED INTERVENTION ON THE DIETARY ADEQUACY OF LEARNERS FROM LOW-INCOME SETTINGS IN SOUTH AFRICA

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Background and objectives: HealthKick was a school-based nutrition intervention programme which took place in low-income primary schools in the Western Cape, South Africa. The intervention was designed to promote the adoption of healthy lifestyle behaviour, with the aim of reducing non-communicable disease (NCD) risk factors in disadvantaged communities. This paper reports on the impact of a "healthy lifestyle" intervention on the dietary adequacy of learners after 18 months of intervention.

Methods: The sample consisted of 8 intervention and 8 control schools. At baseline, 613 primary school learners were selected and 784 at follow-up. The intervention comprised a curriculum component and assistance in creating a healthy school environment. Learner's nutrition knowledge, attitudes, dietary intake and anthropometric measurements (height and

weight) were assessed, and again after 18 months. Dietary adequacy was measured using dietary diversity score as a proxy measure.

Results: While both intervention and control schools showed a significant increase in the percentage of learners achieving an adequate diet, the increase was greater in the intervention schools. The most significant predictors of dietary adequacy at intervention and control schools, at baseline and follow-up were the number of meals eaten by learners and whether they had consumed food from the government school feeding programme. Dietary adequacy appeared to be largely reliant on socio-economic determinants.

Conclusions: Interventions implemented at schools in low income settings need to take into account that schools have many serious immediate priorities which rate higher than education on NCDs.

Key words: Dietary adequacy, healthy lifestyle, nutrition, intervention.

PO1566

PERCEPTIONS OF BODY WEIGHT AND HEALTH RISKS AMONG PRIMARY SCHOOL EDUCATORS IN THE WESTERN CAPE, SOUTH AFRICA.

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Background and objectives: The global problem of overweight and obesity is disturbing judging by the World Health Organization 2008 statistics which estimate that 1.4 billion and 500million adults are overweight and obese. The HealthKick study, a school-based nutrition and physical activity intervention programme in the Western Cape, S.A., showed that educators were at high risk for NCDs because of their high levels of obesity. This study aimed to describe primary school educators' perceptions regarding body weight, related health risks and barriers to weight management.

Methods: A qualitative approach was used to collect data and included focus group discussions, in-depth individual interviews and anthropometric measurements. A total of thirty one male and female educators from four schools participated in the seven focus group discussions and four in-depth interviews. Male and female focus group discussions and in-depth individual interviews were conducted separately. Thematic data analysis was conducted with the use of ATLAS ti 6.1 computer software.

Results: Educator perceptions regarding their own body weight varied slightly from the actual weight. Positive and negative weight loss experiences and feelings regarding their own body weight were expressed. Educators appeared knowledgeable of overweight/obesity and its health risks particularly regarding NCDs. Educators identified barriers relating to the school environment which were of particular interest. These were too little time, a heavy workload and many school responsibilities. A recommendation to prevent these time-related factors from being obstacles in a health and wellness programme, was that a programme should either be incorporated into the school programme or it should be implemented after school or on special/specific days with specific involvement of the Department of Education.

Conclusions: Several factors emerged which could be used beneficially to develop an educator weight management programme in schools.

Key words: Educators, obesity, body weight, health risks.

PO1567

IMPLICATIONS OF FREQUENT LIVER CONSUMPTION AMONG PREGNANT WOMEN FROM A LOW SOCIO-ECONOMIC SOUTH AFRICAN COMMUNITY

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Background and objectives: Excessive intake of vitamin A during pregnancy may lead to teratogenicity; the WHO recommends the consumption of not more than 25000 IU (7576 μgRE) vitamin A per week. Liver is a concentrated source of vitamin A, containing 7800 μgRE/100g, and intake during pregnancy should therefore be limited. This study aimed to determine liver intake and post-partum serum retinol levels in pregnant women from an impoverished South African community where liver is frequently eaten and vitamin A deficiency known to be absent.

Methods: Blood was obtained from 201 post-partum mothers. Information on liver intake during pregnancy was retrospectively obtained by questionnaire.

Results: Liver was eaten by 87.6% of mothers, with 75.1% having eaten liver at least once a month, and 20.9% at least once weekly. Mean serum retinol was 29.3±11.6 μg/dL, with 21.4% having concentrations <20 μg/dL. Elevated CRP concentrations (>8 mg/L) were found in 43.7% of mothers, with a significant negative correlation between serum retinol and CRP (-0.273; p<0.0001). The traditional cut-off value for serum retinol may

not apply to the post-partum period, as serum levels may be influenced by factors other than vitamin A status e.g., the haemodilutional effect of pregnancy, and the acute phase response induced by the birth process, as suggested by the raised CRP.

Conclusions: A concern in this community is the risk of teratogenicity in those women who consume liver once a week or more, and thereby exceeding the WHO recommendation for vitamin A intake during pregnancy. Health authorities in certain countries advise pregnant women to limit liver intake. No such recommendations exist for culturally diverse South Africa, and should be considered, especially for areas where liver is an available and affordable source of meat, and frequently consumed by the poor.

Key words: liver intake; pregnancy; excessive vitamin A intake; teratogenicity risk

PO1568

EFFECTING IMPROVEMENT IN FOOD BEHAVIOUR THROUGH AN EDUCATIONAL INTERVENTION: RESULTS OF AN IN-DEPTH STUDY IN SCHOOL CHILDREN

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Background and Objectives: The study explores the impact of nutrition education based on social cognitive theory on the cognitive performance, biochemical indices and food behaviour of urban school children (6-11 years, n=630) in Bangalore, India.

Methods: The study had a nutrition education intervention to the children and parents of the experiment group and a pre and post-test assessment of nutrition knowledge scores, cognitive performance scores, food behaviour in both experiment and control groups. The data was analysed using appropriate statistical techniques. **Results:** A statistically significant improvement was seen the cognitive performance and food behaviour parameters assessed in the experiment group and an impact of gender was seen in digit backward scores in girls ($p<0.011$). Biochemical indices was assessed in pre and post-test in a sub-sample of the experiment group; a statistically significant improvement in serum ferritin ($p<0.001$) was observed in the post-test. An impact of gender was seen in the post-test food frequency of the experiment group; girls consumed more sprouts ($p<0.006$), green leafy vegetable ($p<0.003$) and boys more eggs ($p<0.007$). The changes in food behaviour indicated lesser families watching television while eating ($p<0.001$), more families encouraging fitness ($p<0.001$) and a better dietary diversity of whole grain, plant proteins, fruits and vegetables in the experiment group. A converse change was observed in the control group, with continued subscription to television while eating and increase in selection of high simple carbohydrate and fat; with poor dietary diversity in the control group. A positive association of plant protein, whole grams, fruits and vegetables was observed with improved cognitive performance in the experiment group.

Conclusions: The study concludes that the nutrition intervention was successful in improving nutrition knowledge, cognitive performance, iron status and food behaviour of children.

Key Words: Nutrition education, children, cognitive performance, food behaviour.

PO1569

WALKING OUTDOORS FOUR TIMES WEEKLY FOR AT LEAST 15 MINUTES IS ASSOCIATED WITH LONGEVITY IN A COHORT OF VERY ELDERLY PEOPLE

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Background and objectives: Age-related decline of immune function and longevity may be partially due to extrinsic factors such as life-style behavior.This study investigated the role of walking outdoors on longevity, controlling for individual and other life-style factors as possible confounders

Methods: A 10-year cohort study was conducted with 152 self-caring and mobile, mean age 80 years, were enrolled in the study. Information on socio-demographic characteristics, clinical and biochemical data, diet, physical activity, smoking, depression status, cognitive status and anthropometrics measurements, were obtained for all participants. Cox proportional-hazards models were used to determine independent predictors of longevity.

Results: During the 10-years of follow-up, 96 (63%) died. Old age, chronic diseases, smoking, depression, CD4/CD8 ratio and coffee consumption were significantly predictors of mortality. Over-all survival was highest for subjects walking at open air for 4 times weekly for at least 15 minutes in compa-

rison to subjects walking less than 4 times weekly (40% versus 22%). After adjusting for confounders, elderly people walking at open air for four times weekly had 40% decreased risk of mortality that individuals who walked less than four times weekly [relative risk (RR) = 0.53; 95 % confidence interval (CI)= 0.32-0.88, p=0.01].

Conclusions: Findings suggest an independent and protective effect of walking on mortality and supports the encouragement of physical activity in advanced age for increasing longevity.

Key words: elderly, longevity, walking, life-style, immunity

PO1572

RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND SLEEP DURATION IN CHILEAN SCHOOL-AGE CHILDREN

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Background and objectives: Sleep and healthy diet are important aspects in growth, maturation and health in scholar age. Inadequate sleep duration is a risk factor for obesity; this issue needs more attention in public health policies related to nutrition, especially during early ages. To establish the relationship between sleep duration, nutritional status and caffeinated beverages consumption patterns in school-age children.

Methods: The study was conducted in 805 school-age children, between 6 to 10 years old from 6 areas of Santiago de Chile. Parents filled out a questionnaire, which considers the sleep duration, physical activity and food intake. Anthropometric measurements were evaluated in school-age children.

Results: 52.6% of school-age children were obese and 46.4% slept the recommended time (>10 hours). Normal weight subjects slept more hours than obese 9.8 ± 0.9 vs 9.6 ± 0.9 ($p<0.05$). Sleep duration during the week was inversely associated to obesity (OR: 3.5, IC 95% 1.3 a 9.2), the beverage intakes during the night were caffeinated soft drinks (52.2 %), coffee and/or tea (32.6%) and 21.2 % caffeine beverages (caffeinated soft drinks, coffee or tea).

Conclusions: Sleep duration in the school-age children sample was less than recommended (>10 hours) specially, in the obese group. The intake of caffeine products in particular, caffeinated soft drinks, was higher during the night in both groups.

Key words: sleep; obesity; children.

PO1573

HEALTH PROMOTING LIFESTYLE OF UNDERGRADUATES AT SELÇUK UNIVERSITY, TURKEY

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Background and objectives: The World Health Organization signifies that the quality of an individual's health and life depends on his/her behavior and lifestyle. Health-risk behaviors are activities that increase a person's vulnerability or susceptibility towards negative health outcomes (1). The aim of this study is to determine the relationships between health promoting lifestyles and demographic characteristics of undergraduates.

Methods: This cross-sectional and descriptive study was conducted with 420 undergraduates at Selçuk University, Konya. The data was collected by using a socio-demographic questionnaire and the Turkish version (2) of Health Promotion Lifestyle Profile (HPLP-II) (3).The HPLP II has 52-item that consist of health responsibility, physical activity, nutrition, interpersonal relations, spiritual growth, and stress management.

Results: The participants were 73% girls; 60% of nursing and 40% of nutrition education undergraduates, one-half of the undergraduates (50%) lived in urban, perceived their economical situation as middle (69%), the education level of mother were primary school (60%) and, the undergraduates were lived in dormitory(80%). Living in rural areas and economically being well were found as significant factors affecting the HPLP ($p<0.05$). Education of mothers and gender of undergraduates were not an important factor for HPLP ($p>0.05$).

Conclusions: The supporting nursing and nutrition education undergraduate programs with subjects and activities about health behaviors and healthy lifestyle could affect HPLP of undergraduates.

Key words: Healthy lifestyle, health promotion, undergraduates.

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PO1574

PROMOTING HEALTHY LIFESTYLES: CULTURAL AND PARTICIPATORY APPROACH

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Background and objectives: Health problems related to lack of enabling environments, strengthening community action, social participation and personal skill development for health promotion from the interplay of social, political, economic, cultural and environmental hinders promoting healthy lifestyles. However they are crucial for community development and thus for improving the quality of life of the population. Being the Colombian state responsible for ensuring fundamental rights since the 1127 Act of 2007, it provides the formulation of healthy public policies aimed at creating a supportive environment that will enable people to lead healthy lives towards improving the quality of life dignity. Taking into account the nurturing behaviors, healthy behaviors and practices from the promotion of a participatory culture, the Industrial University of Santander developed the project 'Promotion of lifestyles and healthy living environments in 100 families of the township of Yarima and sidewalks to Colorados, Rancho Chile and La Ye ', in order to strengthen protective factors to reduce the occurrence of behaviors that influence the health of families.

Methods: The methodology was based on stages such as: recognition of habits and customs, ancestral resizing, learning together and resignifying behaviors to achieve a better quality of life based on approaches from social determinants and Human Rights.

Results: As a result, it was developed a certain group of teaching strategies evidenced in 75% of the studied population.

Conclusions: The promotion of healthy living from a cultural and participatory approach was established as a training strategy aimed at developing processes and activities of individual and collective empowerment, to modify risk behaviors and to adopt healthy lifestyles.

Key words: Quality of life, healthy lifestyles, health determinants.

PO1575

DIAGNOSIS OF NUTRITIONAL AND FOOD STATUS OF THE STOCKS OF COLORADO AND INFLUENCE AREAS AT CAMPO ESCUELA COLORADO PROJECT – PARTICIPATORY ACTION RESEARCH (PAR) PORPUSE FROM UNIVERSIDAD INDUSTRIAL DE SANTANDER - COLOMBIA

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PROMETEO research Group with eleven (11) years of investigative experience, assigned to the Industrial University of Santander (UIS) Bucaramanga - Colombia, in accordance with the policies of University Social Responsibility (USR), has focused on understanding and promote alternatives for change to complex food and nutrition situation of the population living in CAMPO ESCUELA COLORADO and its area of influence (CEC), administrative agreement UIS-ECOPETROL 2006 to 2016, San Vicente de Chucurí, Santander department. Thus PROMETEO aware of the importance of articulating the communities in the research process and in the development of the region, especially women heads of households, from a Participatory Action Research (PAR) made the project 'Promotion of lifestyles and healthy environments". Where the advice of OBUZINGA Corporation, recognized by the local and national context for its experience in conducting studies in food and nutrition problems of rural populations; developed the food security component, empowering seven (7) leaders in the comprehension of the nutritional status of their communities by providing them conceptual and methodological tools for understanding and developing the nutritional profile of villages Los Colorados, Rancho Chile and La Ye, promoting empowerment and community building the Route to Action and management of food and nutrition security of the micro-region, influence area of CAMPO ESCUELA COLORADO project. Finally main risk factors were identified, such as malnutrition both deficit and weight excess in each of the population groups.

Key words: food security, university social responsibility, lifestyles and healthy environments..

PO1576

NUT CONSUMPTION AND DECREASED RISK OF TOTAL MORTALITY IN THE SUN PROJECT

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Background and objectives: Our aim was to assess the association between nut consumption and total mortality in the SUN Project.

Methods: The SUN Project [Seguimiento Universidad de Navarra, University of Navarra Follow-up] is a prospective cohort study, formed by Spanish university graduates. Information is gathered by mailed questionnaires collected biennially. A subsample of 17, 184 participants from the SUN Project was followed-up for 5 years. Nut consumption was collected by self reported data, using a validated 136-item food frequency questionnaire (FFQ) and participants deaths were identified by various means. Information on verall mortality (all-causes death) was collected from permanent contact with participants and their families, postal authorities and the National Death Index. The association between baseline nut consumption and overall mortality was assessed using Cox proportional hazard model during the first five-year period of follow-up. Nut consumption was categorized in two different ways, in a first analysis subjects were divided in quintiles based on baseline nut consumption (measured in g/d) adjusted for total energy intake using the residuals method. In a second analysis subjects were categorized in four groups according to nut consumption (servings/day). Both analyses were adjusted for possible confounding factors.

Results: Participants who consumed nuts twice or more per week had a 58% lower risk of overall mortality than those who never / or almost never consumed nuts (HR: 0.42 95% CI: 0.22-0.82) after adjusting for releavnt confounders.

Conclusions: Nut consumption was significantly associated with reduced risk of death after the first five years of follow-up in the SUN Project.

Key words: nut consumption, total mortality, SUN Project.

PO1577

THE COST OF MEETING DIETARY GUIDELINES IN LOW-INCOME FAMILIES OF BRAZIL

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Background and objectives: A nutritionally balanced and healthy diet consists of fresh foods, grains, pulses and almost always has a high costs, unfeasible to low-income Brazilians. In fact, foods with high quantity of sugar and fat are generally cheaper and yet more accessible.We aimed to analyze the cost of following National Dietary Guidelines for low-income families in Brazil.

Methods: Data from the Brazilian National Household Budget Survey 2008-09 conducted by IBGE were used. Food purchases were recorded during seven consecutive days in 55.970 households. A subset composed only by low-income families (incomeâ‰€US$1.00per capita/day) was used for the analysis. We estimated per capita calorie availability, total expenditure and food prices/1.000kcal aggregated into 8 food groups based on the Guidelines for the Brazilian population. The participation of each food group in total calories was estimated and compared to the recommendations.

Results: Actual acquisitions exceeded the recommendation for pulses, oils/fats, sweets/deserts, meat/eggs, and unreached it for fruits, vegetables, dairy products, cereals. Meeting the recommendations would increase food expenditures in 58.1% (from US$0, 91pc/day to US$1.46pc/day) for an isoenergetic diet of 1, 943kcal (the exact guideline recommendation). The cost /month of the ideal diet according to the Brazilian Dietary Guide should be of US$ 47.7/month for an individual living in a low-income family. Therefore, if the diet recommended was adopted by Brazilian low-income, the percentage to your total income would be compromised 54.2% more than is currently compromised (an increase of US$16.00/month to US$ 46.26/month).

Conclusions: Following diet recommendation would demand a large increase in food expenditure by low-income families. In this sense, meeting current dietary guidelines would necessarily demand an increase in the income of these families or a policy of food prices reduction.

Key words: low-income families, diet recommendation, food expenditures

PO1578

THE ROLE OF DIETARY PATTERNS IN CORONARY ARTERY DISEASE IN URBANISED BLACK SOUTH AFRICANS

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Background and Objectives: To investigate the role of dietary intake as a risk factor in urbanised black South African CAD patients through the analysis of nutrients as well as of food group consumption patterns.

Methods: Dietary habits, including use of ultra-processed foods, of urbanised CAD patients were compared with those of healthy volunteers from an urbanised reference population (PURE). Urban areas in Soweto and North West Province, South Africa. Black CAD patients from Charlotte Maxeke Johannesburg Hospital and Chris Hani Baragwanath Hospital (n=91) and apparently healthy volunteers (n=534) from urban group of South African PURE study population at very low risk of developing CVD.

Results: Although the CAD patients consumed significantly higher protein, SFA and MUFA as percentage of energy, their diet was still considered prudent. In general, they had higher micronutrient intakes than the reference group. Both groups, however, met the DRIs for most micronutrients, except for calcium, vitamin C, magnesium and potassium. The CAD patients, furthermore, consumed more fruit and vegetables, dairy products, total meat products and eggs, as well as more ultra-processed foods than did the reference group.

Conclusions: The CAD patients' diets can be considered prudent, but are still not adequate in micronutrients owing to their low intake of foods such as fruit and vegetables and dairy products. Furthermore, they consumed more ultra-processed foods, providing evidence for a link between food processing and disease. The use of the analysis of food groups, including ultra-processed foods, greatly enhances the interpretation of nutrient data.

Key words: CAD, urbanisation, dietary patterns.

PO1579

UNDERNUTRITION IN COLOMBIAN SCHOOL CHILDREN WITH INTESTINAL PARASITES

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Background and objectives: The undernutrition defined how body mass index (BMI) < 1 standard desviation (SD) according OMS tables in school children with intestinal parasites (IP) is a major cause of morbidity and mortality. Objective: To determine the prevalence of undernutrition by BMI in Colombian school children with IP and associations potential.

Methodology: Prevalence study in 93 rural area school children in Cali, Colombia with IP (Ascaris lumbricoides, hookworms, Trichuris trichiura and Giardia lamblia). Were considered clinical (weight, height), paraclinical (hemoglobin Hb, coprology) and demographics (sex) variables. Statistical analysis included estimating the prevalence of thinness in school children and their corresponding 95%CI, the estimate of other descriptive measures of interest and association analysis by multiple logistic regression.

Results: Mean age 7.3±1.7 years; mean Hb 13.4±0.5 g/dl; mean BMI -0.48±0.67 SD; found a prevalence for undernutrition of 15% and for IP of 69.9%, dominance males and none with anemia (Hb < 11 gr/dl). Undernutrition was associated with IP (OR = 1.1 95%CI 0.27-5.23 p=0.02), and giardiasis (OR = 1.03 95%CI 0.21-4.08 p=0.00). Possible associated factors finally were younger and male sex.

Conclusions: Almost one fifth of Colombian school children with IP presented undernutrition and this was found to be associated with age and sex of the child.

Key words: Undernutrition, Intestinal parasites, School children

PO1580

BODY MASS INDEX IN CHILDREN WITH ATIPIC GASTROESOPHAGEAL REFLUX DISEASE GIVEN BY OTOLARYNGOLOGY

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Background and objectives: The nutritional status of children with gastroesophageal reflux disease (GERD) may be compromised, especially if occur with otolaryngology symptoms. We aimed too identify the nutritional status through the body mass index (BMI) in children with GERD and OLR manifestations.

Methods: We included 32 children with 1 to 12 years 6 months of age (average 5 years 3 months Â± 3 years 1 month), 17 male, diagnosed with GERD by ph monitoring 24-hour ambulatory intraesophageal (pH-24h) and one or more OLR manifestations (12 of recurrent otitis, 11 chronic sinusitis, 4 obstructive apnea and 3 dysphonia), whose mean weight was 19.0Â±7.3 kg (range 10-37), mean length = 109.5Â±20.4 cm (range 75-166) and mean BMI = -0.29Â±1.89 (range -4.95 and 4.51).

Results: 17 children presented malnutrition (6 risk of undernutrition, 3 undernutrition, 2 severely underweight, 2 risk of overweight, 3 overweight and 1 obese) with 0.35 times more likely to be male gender (95%CI 0.06-1.81 x2 = 2.08) without any possible risk factor ($p<0.05$).

Conclusions: The nutritional status of children diagnosed with GERD by pH-24h and OLR manifestations was involved in 53.1%, having more opportunity to be male sex, but without any possible risk factors.

Key words: Undernutrition, Atipic gastroesophageal reflux disease, Otolariyngology symptoms, Children.

PO1581

DEVELOPMENT OF FIRST (FOOD-BASED INTERVENTION AND PSYCHOSOCIAL STIMULATION) CURRICULUM FOR MOTHERS WITH CHILDREN UNDER 2-YEARS IN LOMBOK, INDONESIA

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Background and objectives: The role of mothers has been identified as a primary factor in creating home-environment that supports children's growth and development. Food-based intervention and psychosocial stimulation (FIRST) Program is an educational intervention which was designed to enhance the quality of parenting behavior and optimize their children's nutritional status and development. This study objective is to describe the development of FIRST curriculum for mothers with children aged less than 2 years in East Lombok, West Nusa Tenggara Province, Indonesia. Theory of Plan Behavior (TPB), Social-cognitive Learning Technique, and Ecological Framework were used to develop the curriculum.

Methods: Curriculum development began with in-depth interview, environmental assessment, literature study of child development and feeding practices, conducting linear/goal programming approach to develop complementary feeding recommendation (CFR) to identify key nutrition messages and test the cultural relevance of the food-based intervention and psychosocial stimulation in target audience. Using this data, nutrition and psychologist experts created curriculum and module. Subsequently, the curriculum was tested for its applicability by conducting focus group discussions among mothers and educators.

Results: The curriculum emphasizes the role of mother-child relationship in feeding practices and creating a more stimulating learning environment in their home. Lesson components consist of 6 session that cover knowledge of food groups, cooking, food safety, feeding behavior, and a hands-on approach to improve children verbal, social-emotional, gross and fine motor developments. Mothers found that lessons were very helpful and increase their knowledge. Educators considered the hands-on activities were useful in engaging the mother, and believed the lessons and handouts were appropriate for target audience.

Conclusions: The results suggest that the FIRST curriculum was well accepted by the educators and mothers. Findings demonstrate the potential positive impact of education on feeding-practices and psychosocial stimulation for mothers and their children.

Key words: food-based intervention, psychosocial-stimulation, mother's education

PO1582

EGGS, IODINE AND IRON SUPPLEMENTATION IMPROVE COGNITIVE ABILITY OF ELEMENTARY SCHOOL CHILDREN WHO SUFFER IODINE DEFICIENCY DISORDERS IN INDONESIA

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Background and objectives: Not only do elementary school children who live in iodine deficient areas have lower cognitive abilities than children from iodine sufficient area, but they also suffer from protein deficiency and iron deficiency. Supplementation of egg combined with iodine and iron is considered as an appropriate strategy for combating iodine, protein and iron deficiency in children with iodine deficiency disorders in order to improve their cognitive abilities. This study aimed at investigating the effect of supplementation of egg with iodine and iron on the cognitive ability (IQ score) of elementary school children.

Methods: This is a randomized double-blind controlled trial involving 109 elementary school children aged 8-13 years in endemic iodine deficient District, Kismantoro, in Wonogiri

(Central Java) Indonesia. Subjects were divided into 4 groups which are group A (iodine + iron + eggs); B (iron + eggs); C (iodine + eggs); and D (eggs) and supplementation were given for 16 weeks. Cognitive abilities (IQ score) were examined by using CFIT (culture fair intelligence test) at pre- and post- intervention.

Results: There is a significant difference on cognitive abilities (IQ within group of intervention after 16 weeks of intervention ($p<0.05$). In cognitive abilities, children who received egg alone or in combination with iodine and iron have the highest cognitive abilities compared to the ones who got supplementation of egg with iron. In addition, children who received egg alone or combination with iron and iodine can increase the IQ score by 12 points and 13 points, respectively.

Conclusions: Supplementation with egg alone or in combination with iodine and iron improve the cognitive abilities (IQ score) of primary school children who suffer from iodine deficiency disorders.

Key words: Egg, iodine, iron, cognitive ability, children, iodine deficiency disorders.

PO1583

URBAN AGRICULTURE AS A STIMULUS TO URBAN PLANNING IN DEVELOPING CITIES FOR SUSTAINABLE FOOD AND NUTRITION SECURITY

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Background and objectives: This paper presents the findings of a three year British Council/Development for International Development sponsor project in Ibadan, Nigeria. The broad study objective is to support Millennium Development Goals (MDG 1); poverty and hunger reduction and environmental preservation (MDG 7), and HEI capacity building.

Methods: Quantitative and qualitative survey, workshops and seminal were used to identify ways in which urban planning (UP) can support urban agriculture (UA) to improve sustainable urban livelihoods and food production and set intervention in motion. Advocacy and lobbying was also used to raise awareness and informs decision makers and planners of the different aspects of urban agriculture, which entails a broad range of activities.

Results: The initial survey shows that despite urban agriculture known strategic livelihood benefits, many still perceived it to be detrimental to public health and urban environments. Thus, urban planning seldom supports it and frequently seeks to eliminate it. In interviews with urban households, about 53.8% of the respondents were aware of what urban agriculture meant while 46.2 % were not. Reason for respondents engagement in urban agriclutre include to 'clear the environment' (30.8 %), 'feed the household' (38.5 %) and for 'economic reasons' (38.5 %). UA still remains economicaly unimportant and an illegal practice; yet to be integrated in agricultural policies or urban planning. Final survey and workshop evaluation report analysis shows that support of urban agriculture could act as a relevant intervention point for urban planners in pursuing directly the MDG 1 and 7 for especially the urban poor people.

Conclusions: UA can be an innovation to UP in developing cities to enhance adequate access to sufficient, safe and nutritious food for healthy life as well as being a strategy to right based approach to food and nutrition security.

Key words: Urban, Agriculture, Planning, Food security.

PO1584

ENERGY AND MACRONUTRIENTS INTAKE IN BRAZIL: RESULTS OF THE FIRST NATIONWIDE INDIVIDUAL DIETARY SURVEY

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Background and objectives: Dietary patterns in Brazil have undergone intense changes; nevertheless, until recently the country had no information on food consumption at individual level. The first nationwide individual dietary survey was carried out in subsample of 2008-2009 Household Budget Survey. The objectives were to characterize energy and macronutrient consumption and to compare with general dietary guidelines.

Methods: The analysis included a countrywide representative sample of individuals 10 years old and more, except pregnant and lactating women (n=32, 749 individuals). Energy and nutrient intake was estimated from means of two non-consecutive food records (deattenuated by the Multiple Source Method). Mean and 95% confidence interval of energy and macronutrients intake were estimated for age-gender strata, geographical regions, and per capita monthly family income quartiles. Statistical analyses considered the complex sampling design.

Results: Men presented higher mean energy intake than women (2126 vs. 1721 kcal; $p<0.01$), but women reported higher contribution of added sugar to total energy intake than

men (13.8 vs. 12.5%; p<0.01). Compared to adults (1.26) and elderly (1.19), adolescents presented higher energy-dense diet (1.33). Although mean total fat contribution to total energy intake (27%) was according to recommended limits, the lipids profile was unfavorable: there was high consumption of saturated fat (9.2% of total energy intake) and reduced intake of beneficial fats - polyunsaturated fat mean contribution to energy intake was about 6% and omega-6/omega-3 ratio was equal 8. Moreover, mean fiber intake was under the recommend limits (20g). The diet of individuals in the highest quartile of family income was characterized by high contribution of added sugar (14%) and saturated fat to total energy consumption (10%).

Conclusions: Overall characteristics of Brazilian dietary intake are compatible with the increased prevalence of obesity and non-transmissible chronic diseases that have been observed in Brazil.

Key words: energy intake, macronutrients intake, dietary guidelines

PO1585

CLUSTERING OF RISK FACTORS RELATED TO LIFESTYLE AMONG ADOLESCENTS FROM CUIABÁ, CENTRAL-WESTERN BRAZIL

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Background and objectives: Lifestyle and dietary habits are modifiable risk factors commonly associated with non-communicable chronic diseases (NCCD). The aggregation of these factors is frequent among adolescents. This study aimed to estimate the prevalence and clustering of five NCCD risk factors among adolescents from the Brazilian Central-Western region.

Methods: Cross-sectional, school-based study (n=1.139; age=14-19 years old), in Cuiabá, Brazil. The occurrence of smoking, sedentary lifestyle, inadequate fruit-and-vegetables consumption, irregular habits of breakfast consumption, and unsatisfactory meals consumption pattern was investigated by means of a structured questionnaire. The meals consumption pattern was evaluated from scoring points assigned to the frequency of main meals consumption (daily=0; 3-6 times/week=1; 1-2 times/week=2; never=3 points). Scores > 3 indicated unsatisfactory meals consumption pattern. The intake of fruit-and-vegetables <400g/day was considered inadequate. The chi-square test was used to assess the association between variables. Multivariate logistic regression models were applied to estimate the chance of aggregation of risk factors.

Results: Prevalence of inadequate fruit-and-vegetables consumption was 32%. Smoking was more frequent among boys than among girls (9 vs. 4%, p<0.01). Unsatisfactory meals pattern (66 vs. 53%), irregular consumption of breakfast (59 vs. 45%), and physical inactivity (32 vs. 9%) were more frequent among girls than among boys (p<0.01). Cigarette smoking was associated with greater chance of inadequate fruit-and-vegetables consumption (OR=1.8, 95%CI=1.1, 3.0) and unsatisfactory meals pattern (OR=2.4, 95%CI=1.4, 4.3). There was higher chance of inadequate fruit-and-vegetables consumption among sedentary adolescents (OR=2.4, 95%CI=1.9, 3.8) and among those who were insufficiently active (OR=1.5, 95%CI=1.1, 2.0). There was greater chance of skipping breakfast (OR=1.5, 95%CI=1.1, 2.1) among sedentary adolescents.

Conclusions: There was high prevalence and aggregation of risk factors among the studied adolescents, indicating high vulnerability to the development of NCCD. Physical inactivity seems to be a marker of other risk behavior among adolescents.

Key words: Adolescent; lifestyle; meals pattern.

PO1586

SODA CONSUMPTION AMONG ADOLESCENTS FROM PUBLIC AND PRIVATE SCHOOLS, RIO DE JANEIRO, BRAZIL

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Background and objectives: Soda consumption is often associated with weight gain and seems to favor the development of metabolic disorders. In Brazil, high levels of soda consumption are frequently observed in adolescents.This study aimed to describe soda consumption and its association with social and demographic characteristics in adolescents.

Methods: Cross-sectional study analyzing data from the baseline survey of the Longitudinal Study on Nutritional Assessment of Adolescents (ELANA). In 2010, the survey examined 805 elementary and 1, 015 high school students (10 to 19 years old) of selected public and private schools in the metropolitan region of Rio de Janeiro. Data on soda consumption were collected with a self-administered food frequency questionnaire. Soft drink consumption was classified as high (at least five times per week) or moderate (up to four times per week). The association between variables was assessed by estimating the odds ratio and 95% confidence interval.

Results: Fifty percent of the adolescents reported to have sodas at least five times per week. For elementary school stu-

dents, the chance of high consumption of soda among those from public schools was twice as much as those from private schools (OR = 2.1, 95% CI = 1.5, 2.8). The same was observed for high school adolescents: compared to private school students, those from public schools presented greater chance of high consumption of sodas (OR = 1.6, 95% CI = 1.3, 2.1). No differences were observed between students of elementary and high school according to the frequency of consumption of sodas.

Conclusions: Higher soda consumption was observed in adolescents from public schools than among those from private schools, regardless of grade level.

Key words: sugar sweetened beverages, adolescent, socioeconomic factors, odds ratio

PO1587

AWAY FROM HOME EATING AND SKIPPING MEALS AND DIETARY SALT AND OIL INTAKES OF ADULTS IN BEIJING, CHINA

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Background and objectives: Away from home eating and skipping meals may impact intakes of salt and oil.

Methods: A subsample of 954 adults aged 18 years old and older from the China Health and Nutrition was used. Dietary intake data were determined by three consecutive 24-hour recalls and food weighing method. Multivariate logistic regression was used to determine the impacts of meal patterns on salt and oil intake.

Results: Of the 954 participants, 6.7% skipped breakfast, 1.9% skipped lunch, and 1.3% skipped dinner. Participants had 24.5% of breakfasts, 20.1% of lunches, and 6.2% of dinners eaten away from home. Average salt consumption was 8.9 grams/day (g/d) and 89.8% of participants consumed > 6 g/d of salt. Average oil intake was 33.8 g/d and 56.4% participants consumed > 25 g/d of oil. Adjusted by age, education, gender, and income, adults who ate away from home were more likely to have high salt intake (OR=1.50, 95% CI: 1.09-2.07) and high oil intake (OR=1.56, 95% CI: 1.13-2.14). Skipping meals did not have significant impacts on salt and oil intake.

Conclusions: Skipping meals may have no effect on dietary salt or oil intake, but away from home eating significantly increased salt and oil intake.

Key words: Away from home eating, meal patterns, dietary salt intake, dietary oil intake.

PO1588

EFFECTS OF DIETARY RESTRICTION ABOVE PHYSICAL ACTIVITY

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Background and objectives: A balanced diet and physical activity are conditions for a healthy life. However, when these conditions are excessive or deficient people manifest diseases related to feeding behavior. Therefore is important determinate the conditions to establish an adequate interaction between activity and feeding. The aim of this study was to identify the effects on activity in situations of ad libitum feeding and poor feeding in animal models.

Methods: Nine females albino rats of six months age at the start of the study were exposed during 30 days an condition ad libitum feeding and 60 minutes to activity wheel. Later the rats were assigned to three groups consisting of three rats each and were exposed to dietary restriction and 60 minutes to wheel running for 30 days. Group 1 dietary restriction was to the 90%; Group 2 dietary restriction was to the 70% and Group 3 dietary restriction was to the 50%.The body weight, activity, food consumption and water were measured daily.

Results: The results showed a positive correlation between dietary restriction and activity level, to low food restriction reduced activity at higher food restriction increased activity.
Conclusions: These findings corroborate that activity is determined by the consumption of food.

Key words: feeding, activity, health.

PO1589

CHINESE DIET BALANCE INDEX AND DIETARY QUALITY AMONG ADULTS IN BEIJING, CHINA

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Background and objectives: To evaluate the overall diet quality of adults in Beijing.

Methods: A subsample of 1, 053 adults aged 18 years old and older who had completed three 24-hour dietary recalls in

the China Health and Nutrition Survey in Beijing. Diet quality was evaluated by using Chinese Diet Balance Index (DBI) scoring and evaluating system. Diet Quality Distance (DQD) was calculated to reflect the dietary quality. Multivariate linear regression models were used to identify factors characterizing imbalance intake.

Results: Dietary imbalance existed in a large proportion of the residents in Beijing. 40.1% adult were in moderate or severe deficit of food intake, while 29.0% in moderate or severe surplus of food intake. Intakes of milk, soybean, vegetables, and fruits did not reach the Recommended Daily Allowances. Intake of cereal, oil, and salt exceeded the recommended levels. Smoking, low income level, and low physical activity level were associated with dietary imbalance.

Conclusions: Dietary imbalance is common in Beijing. Residents consume more oil and salt and less milk, vegetables and fruits than recommended levels.

Key words: Chinese Diet Balance Index, dietary quality.

PO1590

TRENDS AND PATTERNS OF HEALTH BEHAVIORS IN LIAONING, CHINA, 1991-2006

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Background and objectives: To analyze trends and patterns of physical activity and soft drinks consumption in Liaoning, China.

Methods: Data on1, 039 adults aged 18 years old and older from 480 households participated in the China Health and Nutrition Survey were used. A multistage stratified cluster random scheme was used to draw the sample in Liaoning. Soft drinks consumption data were collected by using food frequency questionnaire and three consecutive 24-hour recalls. Detailed physical activities were self-reported in different categories.

Results: From 1991 to 2006, regular physical activity increased from 6.3% to 16.5% (p-trends < 0.0001) among adults but decreased from 46.5% to 32.1% in children and adolescents (p trends=0.011). Screen time increased from 13.0 to 20.5 hours per week among adults (p-trends = 0.021) and from 9.5 to 13.0 hours per week among children and adolescents (p-trends < 0.0001). Soft drinks consumption did not change over time among adults but significantly increased among children and adolescents from 2000 to 2006. The proportion of alcohol drinkers and smokers decreased while amount of drinking or smoking increased significantly from 1991 to 2006 (p-trends < 0.0001).

Conclusions: Physical activities are increasing but still low among adults and are decreasing quickly among children and adolescents. Soft drinks consumption is increasing rapidly among children.

Key words: Physical activity, soft drink consumption, children and adolescents, lifestyle.

PO1591

NUTRITION TRANSITION IN JIANGSU, CHINA, 1989-2009

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Background and objectives: To study the secular trends of dietary pattern among residents in Jiangsu Province, China.

Methods: A multistage stratified cluster random scheme was used to draw the sample in Jiangsu for the China Health and Nutrition Survey cohort. Dietary intake data were determined by three consecutive 24-hour recalls and food weighing method. Blood pressure and anthropometric data were measured with standard protocols.

Results: Cereal consumption decreased significantly, while animal food consumption, dairy product consumption, energy from fat increased rapidly. Calcium intake was increasing but still much lower than the recommended intake level. Prevalence of overweight and obesity (BMI>24) increased from 9.4% in 1989 to 41.1% in 2009 among men. Prevalence of hypertension increased from 7.8% in 1989 to 37.6% in 2009 among men and from 4.8% to 30.8% among women during the same time period.

Conclusions: People in Jiangsu province are experiencing a quick nutrition transition toward high fat diet. Overweight, obesity, and hypertension are increasing tremendously.

Key words: nutrition transition, calcium, overweight and obesity

PO1592

AWAY FROM HOME EATING IN HUNAN, CHINA, 1989-2009

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Background and Objectives: To explore the patterns and changes of away from home eating (AFHE) in Hunan, China.

Methods: A multistage random cluster sampling method was used to draw the sample for the China Health and Nutrition Survey in Hunan. A subsample of 1, 300 adults aged 18 years old and older was used in this study. Dietary data were collected by using 3 consecutive 24-hour recalls in combination with weighing methods. Away from home eating was defined as food prepared at restaurants and food stalls.

Results: AFHE increased from 0.1% in 1989 to 9.9% in 2009 in Hunan province. It increased faster in urban areas than in rural areas. In 2009, 16.8% of urban residents and 6.0% of rural residents ate away from home. AFHE slightly increased before 2000 and increased quickly thereafter. AFHE breakfast increased from below 5.0% in 2000 to 21.0% in 2009, lunch from 1.9% to 7.7%, and dinner from 1.6% to 3.7% during the same time period. AFHE significantly increased sodium intake and fat intake in this study, even though they were underestimated. As a result, overweight and obesity, hypertension, and other nutrition-related diseases increased rapidly in past 20 years.

Conclusions: Away from home eating is increasing quickly in Hunan province, particularly in urban areas. More studies are needed to observe and study the detrimental effects of away from home eating.

Key words: away from home eating, overweight and obesity, hypertension.

PO1593

AN INTERVENTION STUDY ON REDUCING ANIMAL FOOD INTAKE AND INCREASING PHYSICAL ACTIVITY

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Background and objectives: To develop strategies to prevent and control overweight and obesity at community level.

Methods: Two urban neighborhoods and two rural villages with similar economic status and transportation were randomly selected and assigned to intervention and control groups. Intervention protocols were developed based on Chinese dietary Pagoda. Dietary data, physical activity, and blood samples were collected at baseline and at the end of 1-year follow-up. Multivariate linear regression and variance analysis were used to compare the differences between baseline and follow-up and between intervention group and control group.

Results: At baseline, animal food intake, physical activity, and BMI were not different between intervention group and control group. At the end of the study, animal food intake decreased in both groups. It was significantly lower in invention group than in control group. Physical activity increased in the intervention group and was significantly higher than in the control group. BMI and blood cholesterol were significantly lower in the intervention group than in the control group.

Conclusions: Promoting physical activity and reducing animal food consumption may be practical in terms of preventing and controlling overweight and obesity at community level.

Key words: Animal food, physical activity, intervention, overweight, obesity.

PO1594

EFFICACY OF DIFFERENT FORTIFIED GRUELS ON THE RECOVERY FROM MODERATE ACUTE MALNUTRITION IN BURKINABE 6-23-MONTH-OLD CHILDREN

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Background and objectives: Moderate acute malnutrition (MAM) is still a public health problem in developing countries and research is needed to define optimal fortified foods for its management. This study aimed at comparing the efficacy of the regular consumption of 3 fortified complementary foods on recovery from MAM in Burkinabe children.

Methods: The study was conducted in 11 rural health centers in Fada n'Gourma district in Burkina Faso. 330 children aged 6 to 24 months, affected by MAM (-3< WLZ <-2) were randomly assigned to 3 groups receiving gruels prepared from one of the three following locally processed fortified flours: the two first (Energy density = 150 kcal/100g) were formulated according to specific recommendations for MAM (Golden, 2009), one with 8% dried milk (MAM-FFM), the second without milk (MAM-FF), and the third (ED = 100 kcal/100g) was the Misola (MIS) flour formulated according to recommendations for healthy children (Lutter and Dewey, 2003). Each child consumed two meals of experimental gruels per day for 12 weeks.

Results: The energy intakes from gruels were significantly higher ($p<0.001$) in MAM-FFM and MAM-FF groups (47.5 ±26.0 and 45.6 ±26.4 kcal/kg BW/day, respectively) than in MIS group (38.1 ±19.6 kcal/kgBW/day). The weight gain from baseline was greater in children from MAM-FFM and MAM-FF groups than in the MIS group (mean ±SD = 1.09 ±0.80, 1.18 ±0.83, 0.92 ±0.67 kg, respectively, $p<0.01$). Recovery from MAM (WLZ>-2.0 or MUAC>12.5cm) was higher in MAM-FF

and MAM-FFM groups compared to the MIS group (70% and 60% vs 50%), but only the difference between MAM-FF and MIS was significant ($p<0.01$).

Conclusions: MAM-FF and MAM-FFM seem to be more effective than MIS. When considering product costs, MAM-FF is cheaper than MAM-FFM. Both flours can be easily produced locally.

Acknowledgments: WFP funded the study.

Key words: wasting; processed cereal-based flour; complementary food

PO1595

INTERVENTION IN RURAL SCHOOL TO PROMOTE HEALTHY LIFESTYLES

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Background and objectives: The prevalence of malnutrition due to overweight that affects child population, plus the high levels of sedentary behavior characteristic of the Chilean population, has focused the attention of the authorities in creating and implementing programs to promote healthy lifestyles. The aim of this study was to implement an educational intervention to promote healthy eating habits and physical activity encouragement for the prevention of overweight and obesity.

Methods: The educational program called "Healthy Eating + Physical Activity: Play, eat and have fun healthy", was carried out on a total population of 94 students in first through fifth year of primary school belonging to the basic F-372 of Pumanque, VI Region, Chile. The sessions planning was focused on age and maturity of the students using participative, creative and ludic methods, to acquire meaningful learning; in order to gain useful tools for their daily life. The program designed included 8 educational sessions.

Results: The malnutrition due to overweight reaches 45, 7% of the sample (Risk of obesity: 22, 3%; Obesity: 23, 4%). The range of age of the sample varies between 6 and 10. Obesity decreased by 2.1% after the educational program. There was a decrease of 10.6% of students who ate breakfast twice. The prevalence of schoolchildren who took a snack from home, and also bought another at school decreased by 12.8%. First grade was the level that obtained the highest average difference in the final assessment tool, increasing by 6.71 points score.

Conclusions: An intervention based on an educational program of healthy eating habits and regular physical activity could contribute to improving the nutritional status and lifestyles in children belonging to rural schools, projected as a useful tool in favor of the decrease rates of overweight that affect the child population in Chile.

Key words: intervention study; lifestyle; nutrition; children.

PO1596

LIFESTYLE AND DIETARY FACTORS ASSOCIATED WITH THE EVOLUTION OF CARDIOMETABOLIC RISK OVER FOUR YEARS IN WEST-AFRICAN ADULTS: THE BENIN STUDY

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Background and objectives: Several studies reported that the metabolic syndrome (MetS) does not give a proper measure of cardiometabolic risk (CMR) profile in Blacks. We therefore examined the Framingham risk score (FRS) along with the MetS to assess in adults from Benin changes in CMR and the effects of diet and lifestyles.

Methods: The four-year longitudinal study included initially 541 apparently healthy subjects aged 25-60 years and randomly selected in the largest city, a small town and rural areas. Along with CMR factors, socioeconomic, diet and lifestyle data were collected in individual interviews. A food score based on consumption frequency of four "sentinel" foods groups (meat and poultry, dairy, eggs and vegetables) was developed. Lifestyle included physical activity, alcohol and tobacco use. Complete data at last follow-up was available in 416 subjects.

Results: Among the subjects with four-year follow-up data (n=416), 13.5% were at risk at baseline, showing MetS or FRS>10%. The incidence of MetS and FRS> 10% during follow-up was 8.2% and 5%, respectively. CMR deteriorated in 21% of subjects. The combination of MetS and the FRS depicted more at-risk subjects than the use of either tool alone. Diet and lifestyle mediated location and income effects on CMR evolution. Low "sentinel food" scores (foods that may reflect the protective effect of the diet against CMR): meat, poultry, milk and milk products, eggs and vegetables; and inactivity increased the likelihood of CMR deterioration: RR = 5.6 (CI 95%: 1.9-16.4) and RR = 6.3 (CI 95%: 3.0-13.4), respectively.

Conclusions: Combining MetS and FRS might be appropriate for surveillance purposes in order to better capture CMR and inform preventive measures. The results of the present study call for urgent measures to reduce CMR deterioration focusing on more active lifestyle and dietary inadequacies.

Key words: Cardiometabolic risk, diet, sub-Saharan Africa.

PO1597

RAPID ASSESSMENTS ON REFERRAL LINKAGE BETWEEN OTP AND TFU IN OROMIA REGION, ETHIOPIA

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Background and objectives: The JICA project has supported to strength the linkage between Health Post(HP) and Health Center(HC) for the management of severe acute malnourished children(SUM) in Oromia Region, Etiopia, since September 2008 for a period of five years.

Methods: A rapid referral assessment: a cross sectional study design including records review and interviews with caretakers and health providers, was conducted in March 2012 to gather programmatic information on referral care processes at the community and facility levels in a timely and cost-effective way for the purpose of program design.

Results: Coverage of Outpatient Therapeutic Program(OTP) training among health providers at HPs and HCs was high (98%) and majority of HPs (98%) had OTP services. According to the report obtained during the last 12 months, overall cure rates (91-93%) and default rate (3-4%) of OTP services satisfied the SPHERE standards. However, only 25% of the established Therapeutic Feeding Unit (TFU)/Stabilized Center(SC) were functioning. Contrary to perception held by the service providers (82%), the actual compliance rate for referrals was low (27%). The most common responses of the non-compliance among caretakers were difficulty to get permission of husband (48%). Although almost all of the referral cases were given referral slips, they did not necessarily help prioritization of the patients at the referral site. In addition, feed back slips were never received at HPs from referral sites. Although OTP service was performed efficiently, establishment and operation of TFU/SC had several constrains that need further support for rehabilitations. There were large rooms for improvement in terms of communications for referral linkage.

Conclusions: The information on the referral status between HP and HC should be shared regularly in a structural way. BCC activities at community levels should include urgent needs of SAM children with medical complications at TFU/SC.

Key words: SUM, OTP, TFU, Referral-Linkage

PO1598

WHOLE-GRAIN AND FIBER INTAKE AND COLORECTAL CANCER; NEW RESULTS FROM THE HELGA AND EPIC COHORTS

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Background and objectives: Recently, World Cancer Research Fund stated that intake of dietary fiber is convincingly related to lower risk of colorectal cancer. When looking into sources of dietary fiber, cereals emerged to be the food group showing the strongest association. The content of dietary fiber constitutes one of the main differences between refined grains and whole grains. The association seen with cereal fiber may consequently partly be assigned as evidence for whole grains. None of the published cohort studies on wholegrain intake and colorectal cancer have been able to evaluate the potential different effects of the main cereals: wheat, rye and oats. Undetailed baseline information about whole-grain intake makes studies of associations to disease a challenge in most existing cohorts, using a biomarker to estimate whole-grain intake can overcome this problem.

Methods: In this presentation associations between dietary fiber and whole-grain intake and incidence of colorectal cancer, by use of detailed questionnaire information in a Nordic cohort (HELGA) and by use of the biomarker alkylresorcinols in a European cohort (EPIC) will be shown.

Results: In the HELGA cohort intake of dietary fiber, especially from cereal sources, and whole grains was found associated with lower colorectal cancer incidence. The strongest association was seen for whole grain wheat, with non-significant associations for oats or rye. In the EPIC cohort, whole-grain intake was measured by plasma levels of the phenolic lipids alkylresorcinols that is a validated biomarker for whole-grain wheat and rye intake. Plasma levels of alkylresorcinols were not found related to overall colorectal cancer, but lower incidence of distal colon cancer was seen among those with highest levels.

Conclusions: These studies confirm that whole grains may play a role in colorectal cancer prevention. The results are, however, preliminary and must be interpreted as such.

Key words: Whole grains, Dietary fiber, Alkylresorcinols, Colorectal cancer, Epidemiology.

PO1599

CREATING AND CALIBRATING MODELS OF FOOD-BORNE EPIDEMICS

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Background and objectives: The paper discusses models of food-borne epidemics and the numerical procedure for finding parameters of these models. These models include activities of sanitary inspection teams.

Methods: We consider two types of models. In the first approach we model decisions, events and human activities as workflow. In the second approach we apply Forrester's approach (for modeling business processes) to create differential equations describing epidemics. In this approach we start with the casual loop diagram which depicts the main variables which should be used in the model of epidemic and the relationships between them. Based on the diagram the process equations are built.

Results: Having a model of the epidemic its parameters are found by solving an optimal control problem described by ordinary differential equations. The objective functional of the problem measures the discrepancy between real data and trajectories resulting from the model. The problem is solved by using an approach based on adjoint equations. At each iteration of the numerical procedure system and the corresponding adjoint equations are integrated. The unique feature of the procedure is that initial conditions for model equations are allowed to be model parameters. The procedure is implemented with the help of highly efficient procedures: for integrating differential equations – SUNDIALS package; for performing optimization steps – IPOPT package and for applying automatic differentiation - ADOL-C package.

Conclusions: Using these packages guarantees that: system equations are accurately integrated; optimization steps are performed by the method which refers to second order information of functions describing the model; the user does not have to provide the jacobian of the model equations. As an example a model of E-cola epidemic is considered. The work reported in the paper was partially supported by The National Centre for Research and Development partially by grant PBS1/A7/6/2012.

Key words: foot-borne epidemic, business processes, sanitary inspection.

PO1600

THE METHOD FOR FINDING OPTIMAL SANITARY INSPECTORS SCHEDULES

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Processes of different types of disease epidemics are connected with activities of several professional groups. The present work is related to modeling processes associated with sanitary inspectors work. Food-borne diseases caused by different pathogens are very common disorders. Sometimes such a disease gives rise to an epidemic. In that situation patients are examined by medical personnel. Medical doctors are obligated to register the type of disease and report about it to District State Sanitary Inspectorate (SDSI). Then tests are performed in order to recognize a specific pathogen causing the disease. After finding by sanitary inspectors what and where patients were eating they should organize several controls in the potential origins of spread of the epidemic. Thus SDSI have to determine not only the schedules of interviews, but also schedule of activities which aim at finding potential origins of the spread of the epidemic. Generally two types of sanitary inspectors teams are created: some of them carry out interviews; the others look for potential origins of an epidemic. It is assumed that sanitary inspectors must reach the patients wherever they are. Interview duration is a random variable with its mean value equal to a few hours. We also assume that looking for potential origins of spread of the epidemic lasts longer. These time estimates follow from the fact that inspectors must reach patients or a potential origin of spread of the epidemic. In this paper we show how to find optimal schedules for sanitary inspectors who have to do interviews with individual patients and inspect various potential origins of spread of the epidemic. The work reported in the paper was partially supported by The National Centre for Research and Development under grant PBS1/A7/6/2012.

Key words: foot-borne disease, optimal schedule, sanitary inspectors

PO1602

IMPACT EVALUATION OF THE NUTRITIONAL SUPPORT PROGRAM (PAL BY ITS SPANISH ACRONYM) ON FOOD DIVERSITY AND CONSUMPTION OF IRON-RICH OR IRON-FORTIFIED FOODS IN 6-23 MONTH-OLD CHILDREN

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Background and objectives: Micronutrient deficiencies in the first two years of life have adverse health effects. Part of the cause is complementary feeding (CF) of low nutritional quality and poor CF practices. In order to prevent malnutrition in the most vulnerable individuals, the Mexican state has implemented the Nutritional Support Program, which is directed towards small communities with fewer services and includes conditional distribution of food or monetary transfers and education. The impact of PAL was evaluated in minimum dietary diversity and consumption of iron-rich or iron-fortified foods indicators.

Methods: A longitudinal sample of 168 communities was analyzed using the double-difference method with fixed and random effects at the community level. Baseline values for children aged 6-23 months of (n=664 children, 591 households) were compared with values for children aged 6-23 months who live in the same communities after 18 months from the start of the intervention (n=478, 368 homes).

Results: PAL, in its 'provisions with special education' modality, increased the prevalence of consumption of iron-rich foods by 31 percentage points (PP), ($p<0.01$) and by 25 PP ($p<0.01$) for minimum dietary diversity in children aged 6-23 months when compared to the control group.

Conclusions: Social programs based on conditioned provision of foods that are fortified with iron and multiple micronutrients contribute to improving Complementary Feeding practices.

Key words: nutrition, foods, children.

PO1603

DIETARY TRANS FATTY ACIDS INTAKE AND ITS RELATION TO LIPOPROTEIN (A) LEVEL IN A SAMPLE OF ADULTS IN WEST JAVA, INDONESIA

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Background and objectives: In Indonesia, cardiovascular disease (CVD) as a public health problem had become the single major cause of death. One cause of high death rates is lifestyle, especially diet. Diets high in fat, saturated fatty acids and trans fatty acids may increase lipoprotein (a). The purpose of this study was to determine the mean intake of trans fatty acid and its relation to lipoprotein (a) concentration in a sample of Indonesian adults.

Methods: A cross-sectional study was conducted on a total of 156 adult male and female aged 30-55 years living in rural areas (Bogor) and urban areas (Depok) in West Java, Indonesia.

Results: The results showed the mean intake of trans fatty acid was 0.37% calories (rural 0.36% and urban 0.38% calories). The main source of trans fatty acid among the subjects was fried foods, followed by ruminant products and margarine/HVO products. Deep-frying cooking is one of the most common cooking methods in Indonesia. The proportion of Lp (a) 'not normal' in the subjects was 29% (rural 28.6% and urban 30.0%). There was no significant association between Lp (a) level in urban and rural areas ($p>0.05$). There was a statistically significant association between trans fatty acid intake and levels of lipoprotein (a) ($p<0.05$).

Conclusions: Further studies are recommended to determine the intake of trans fatty acids and its relation to other lipoproteins.

Key words: trans fatty acid, lipoprotein (a), urban, rural.

PO1604

PROTEIN DENSITY, BODY WEIGHT, ECONOMIC STATUS AND MOTHERS HEIGHT ARE RISK FACTORS OF STUNTING AMONG INDONESIAN YOUNG CHILDREN

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Background and objectives: Stunted is a major under-nutrition problem in developing countries; and it might be related to the quality of the children's diet, such as protein density. We

aimed to analyze protein density, economic status, birth weight and mothers height in relation to the stunting status of young children (YC) in Indonesia.

Methods: An electronic data file of the National Basic Health Survey consists of 3 095 cleaned records of young children 0-23 months was use and analyzed in this study. The variables used include socio-demography, economic status, food intake, children's body weight, body length and born weight, and mothers height. The data were processed using the WHO AnthroPlus 2007, Excel 2007 and SPSS 16.0 for windows. Logistic regression was applied to analyze the associations based on odd ratios.

Results: Children consumed low protein density diet are more likely suffered from stunting than children consumed high protein density diet (OR=1.32). Underweight children (-2 Z-score) are more likely suffered from stunting (OR=3.07) than other children. Children with low family economic status is more likely suffered from stunting (OR=1.26) than children from middle-high family economic status. Moreover, children born less then 2 500 g is more likely suffered from stunting (OR=1.81) than children born with body with more than and equal to 2 500 g. Children with mothers height <145 cm is more likely suffered from stunting (OR=1.68) than children with mothers height > 145 cm.

Conclusions: Stunting among Indonesian young children status is negatively associated with protein density, body weight, birth weight, economic status and mothers height. The prevention of stunting of the young children should be done by improving the food quality, especially protein and micronutrients rich foods, and increasing the income of the families.

Key words: stunting, birth-weight, protein density.

PO1605

COMMUNITY AND PROGRAM PERFORMANCE IN THE SUPPORT OF BREASTFEEDING PRACTICES IN PASEBAN VILLAGE, PERI URBAN, CENTRAL JAKARTA

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Background and objectives: Mother's knowledge and attitude may not be a clue for successful breastfeeding (BF) practices. BF practice is multi complex behavior that needs support from the environment, in order to facilitate the improvement of breastfeeding practices. Community in this study described as all channels and contacts to mothers that can be a prospective source influence to promote optimal breastfeeding practice. Exposure of negative or positive information about breastfeeding practice should be known to identify whether the positive information can be reinforced and negative information should be changed. The purpose of the study is to determine the community and the existing BF program that supports the BF practice.

Methods: This study investigated, through a structured interview, in- depth interview with twelve mothers and three cadres, the determinants of such BF practices and sources of information was involved. In-depth interview with mothers focused on questions about what, why, how BF information and programs were influenced the BF practice.

Results: BF practice had associated with exposure to channels of information from friends, family, and neighbor, and peer and family influences (P< 0.05). BF program through lactation counseling in Posyandu (integrated health post) was coming from stakeholders. Low of mother's participation in the BF program due to they had felt not satisfied with the cadres service. Cadres had low self efficacy to give counseling about lactation to mothers.

Conclusions: Strengthen the cadres capacity with training counseling skill about BF are needed and family empowerment in knowledge and attitude to BF practice through family nutrition education are essential.

Key words: breastfeeding information, promotion, support.

PO1606

NUTRITIONAL CARE IN BRAZILIAN PUBLIC HEALTH SYSTEM: DEVELOPMENT OF AN INSTRUMENT TO ASSESS ACTIONS IN PRIMARY HEALTH CARE

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Background and Objectives: Primary Health Care is a privileged scenario to develop Nutrition Policies. This paper describes the formulation of an Instrument to assess nutrition actions in Primary Health Care in the municipality of Santos, SP, Brazil, from the perspective of managers of Primary Health Care Units PHCU).

Methods: Through a cross-sectional design, qualitative and quantitative data were collected. Managers from the whole of 28 PHCU of the municipality were interviewed. For the cons-

truction of this instrument, three steps were fulfilled: Study of the National Food and Nutrition Policy and the protocols from Ministry of Health, emphasizing: management of nutritional care and food and nutrition surveillance, aiming to identify the actions of healthy nutrition promotion (HNP). Review of scientific literature, to identify categories used in analyzes of the actions of HNP in Primary Health Care. Construction of categories collating those identified in the literature with official documents.

Results: The questionnaire consists of 133 open and closed questions to evaluate: the quality of nutritional care; the character of the actions (individual or collective); case discussion meetings and interdisciplinary teamwork. There are 10 blocks of issues including: general data, infrastructure, team composition and working process, food and nutrition surveillance and management of nutritional care, in the following topics: obesity, diabetes and hypertension, prenatal and postpartum, children and elderly. To validate the instrument, a pretest was carried out and it was necessary to reduce the number of questions and the time duration of the interview, by 50%.

Conclusions: As the results point to the improvement of internal consistency of the instrument, according to expertizes, the instrument proved to be useful to support the evaluation of nutritional care in Primary Health Care, to plan and redirect actions of healthy nutrition promotion.

Key words: Primary Health Care. Nutrition, Public Health. Nutrition Programs and Policies.

PO1607

INTERACTION OF PHYSICAL ACTIVITY AND NUTRITION STATUS OF CHILDREN OF PUBLIC AND PRIVATE SCHOOLS IN MEXICO

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Background and objectives: One of the problems affecting population nowadays in Mexico, is the increased amount of young generation with overweight and obesity among of school children. The quality of nutrition and nutrition status in them, shows the presence of the risk factors which can be in connection with the unbalanced diet of the most vulnerable period of school children grow. An adequate diet combined with physical activity is crucial for a future healthy life style and to prevent diseases, such as overweight and obesity. The aim of this study is to evaluate food quality and intake of an administrated 7 day dietary habitual record and physical activity at the same period of time of children aged 6 to 10.

Methods: Nutritional quality was assessed at the level of nutrients and food groups, and expressed as energy percent (E%) and macronutrients from milk, milk products, eggs, cereals, vegetables, fruits, poultry, meat, fish, sweets and tidbits were used as nutrient indicators of nutritional status. Results and

Conclusions: The main characteristics of school children nutritional status, are unbalance of meal composition, low intake of milk and milk products, fruit and vegetables, are high in sweets, snacks and fast food. Inadequate rhythm of exercise therefore, correct nutrition and physical activity promotion with prevent disorders in obesity of children in grow age and promote a good health and future well-being.

Key words: children nutrition, physical activity, overweight, obesity.

PO1608

GENETICALLY REDUCED PHYTATE STAPLE CEREAL GRAINS TO INCREASE IRON AND ZINC INTAKE IN SUB-SAHARAN AFRICA – THE CASE OF SORGHUM

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Background and objectives: Iron and zinc deficiencies are highly prevalent in rural sub-Saharan Africa. Phytate in staple cereal grains such as sorghum chelates essential minerals, reducing the bioavailability of non-haem iron and zinc. While the value of traditional lactic acid fermentation in reducing the phytate content of sorghum foods has long been recognised, genetic modification (GM) is currently being used to develop sorghum lines with lower phytate contents. We evaluated the effect of reducing sorghum phytate content through traditional fermentation and GM on iron and zinc availabilities in porridges using three different assay procedures: in vitro dialysability, Caco-2 cell uptake assays and in vivo suckling rat pup model.

Methods: Two sets of GM low phytate non-tannin (30-40% and 80-90% reductions), a set of tannin-containing sorghum varieties (30-40% reductions), and their respective null controls were processed into thick unfermented and fermented porridges.

Results: The fermentation increased the iron and zinc availabilities in the non-tannin sorghums. The inhibitory effect of the tannins on mineral availability seemed to prevent any

increase in in vitro iron and zinc bioaccessibilities regardless of the level of phytate reduction. The 30-40% GM phytate reduction did not result in increased iron and zinc availability. However, the additive effect of 30-40% GM phytate reduction in combination with phytate reduction through fermentation as well as the 80-90% GM phytate reduction caused substantial increases in iron and zinc availabilities. Both the magnitude of phytate reduction and the final phytate content affect iron and zinc availabilities.

Conclusions: It is recommended that non-tannin GM sorghum with a phytate reduction above 85% and phytate content below 200 mg/100 g wholegrain flour would be most appropriate to be subjected to a human bioavailability study to evaluate the efficacy of the biofortification by determining the biological impact on iron and zinc status under controlled conditions.

Key words: Iron, Zinc, Phytate, Sorghum.

PO1609

LOW CALORIE- AND CALORIC-SWEETENED PRODUCTS: DIETARY QUALITY AND DIETARY PATTERNS OF U.S. HOUSEHOLD CONSUMERS FROM 2000-2010

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Background and Objectives: The U.S. food supply is currently facing rapid changes such as the increased use of caloric-sweeteners (CS) combined with low-calorie sweeteners (LCS) in newly reformulated products. Using a novel identification approach that uses ingredient lists of each food/beverage, we have reported important increasing trends in products containing LCS and both LCS&CS. This study explored the dietary quality and patterns of U.S. consumers of products containing LCS and CS from 2000-10.

Methods: We analyzed food/beverage purchases from the Homescan longitudinal dataset 2000-10 (n=140, 352 households; 408, 458 individuals); and dietary intake from the National Health and Nutrition Examination Surveys (NHANES) 2003-10 (n=34, 391). Because soda-type beverages were the main sources of LCS and CS, to investigate dietary quality/patterns we defined these consumer profiles: LCS-soda consumers; CS-soda; LCS&CS-soda; non-consumers. Multivariable linear/longitudinal random-effects models were used to investigate the associations between each consumer profile and total energy/macronutrients in each dataset separately. Factor analysis and applied factor scores were used to derive longitudinal dietary patterns to investigate the association between each profile and the different patterns that emerged.

Results: Compared to non-consumers and LCS-soda consumers, CS- and LCS&CS-soda consumers had significantly higher total daily energy and % carbohydrates and % sugars. LCS-soda consumers had significantly higher % kcal from snacks, whereas CS- and LCS&CS-soda consumers had significantly higher % kcal from fast-foods and desserts. Compared to non-consumers, consumers of LCS-, CS- and LCS&CS-soda were significantly more likely to follow a Western dietary pattern, but significantly less likely to follow a Prudent dietary pattern.

Conclusions: As LCS- beverages appear to be displacing those with CS over the last 10 years, this study shows that LCS-, CS- and LCS&CS-soda consumers are still more likely to follow an unhealthier dietary pattern than those with no consumption of soda-type beverages.

Key words: low-calorie sweetener, caloric-sweetener, dietary patterns, dietary quality, soda.

PO1610

PROFILE OF THE PUBLIC HEALTH NUTRITION WORKFORCE IN FIVE HIGH BURDEN STUNTING COUNTRIES: CONSTRAINING AND ENABLING FACTORS

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Background and objectives: A skilled, motivated, and competent workforce is the backbone of any private or public service delivery system. Most countries with the highest burden of stunting have a severe shortage of human resources and are unable to deliver quality, basic nutrition or health services. A profile analysis of the nutrition workforce is underway in five high burden stunting countries. The objective of the analysis is to outline which frontline workers are tasked with implementing the high-impact nutrition interventions defined in the Lancet Series on Maternal and Child Undernutrition (2008). The analysis looks at the types of providers across health, agriculture and other sectors as well as the size of the nutrition workforce and their skill-mix in working at national and subnational levels.

Methods: Five countries across different regions were selected to provide a wide range in geographic location as well as to understand the various contexts of workforce development. The SPRING project developed a web-based database that will be used to collect, analyze and report the data and map trends and patterns across countries.

Results: Initial findings suggest that a wide range of health providers, community workers and agriculture extension workers are involved in delivering high-impact nutrition services in the five countries. However, much is not known about skill-mix, the attributes and the competencies of these workers. One reason is the scarcity of such data at the country level. Another reason is the lack of clarity and guidelines on the types of activities that are classified as "public health nutrition" by health, agriculture and community development workers.

Conclusions: System strengthening, in particular workforce development represents a key element to address in nutrition programming as it allows countries to provide evidence-based systematic approaches with sufficient numbers of skilled workers with high competencies to serve communities with diverse nutrition needs.

Key words: public health, nutrition, stunting.

PO1611

SUPPLEMENTATION WITH LOW-DOSE, LIPID-BASED NUTRIENT SUPPLEMENTS INCREASES IRON RESERVES AND HEMOGLOBIN, BUT NOT VITAMIN A STATUS, OF YOUNG BURKINABE CHILDREN

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Background and objectives: Lipid-based nutrient supplements (LNS) can enhance the micronutrient content of local complementary foods, but there is little information on their impact on young children's micronutrient status.

Methods: In a partially masked, placebo-controlled, randomized trial, communities were assigned to immediate (II) or delayed intervention (DI). 2469 eligible II children were randomized to receive 20g LNS/d with varying contents of zinc, same contents of iron (6mg/d) and vitamin A (400ìg/d), and treatment of malaria and diarrhea from 9-18 months of age. DI Children (n=797) did not receive LNS or other treatment. At 9 and 18 mo, hemoglobin (Hb) was evaluated in all children from capillary blood. Venous blood was collected in a subgroup (n=597) for assessment of plasma ferritin (pF), soluble transferrin receptor (sTfR) and retinol-binding protein (RBP). C-reactive protein and alpha-1 acid glycoprotein were measured to adjust pF, sTfR and RBP for inflammation.

Results: At baseline, pF, sTfR, Hb and RBP did not differ among groups. Geometric mean (95%CI) pF was 26.8±22.2ìg/L in all groups combined; and 23% were iron depleted (pF<12ìg/L); at 18 mo, pF increased in II, but decreased in DI (P<0.001). Mean sTfR was 17.4±9.1mg/L at 9 mo and 87% had tissue iron depletion (sTfR>8.3mg/L). sTfR decreased more in II than DI (P<0.001). Mean baseline Hb was 8.9±1.5g/dL, and >90% were anemic (Hb<11.0g/dL). At 18 mo change in Hb was greater in II than DI (+0.80 vs -0.02g/dL, P<0.001), but 79% of II were still anemic. Mean RBP was 1.0±0.3ìmol/L at 9 mo, and 30% of children had values <0.83ìmol/L. RBP did not change in any group at 18 mo.

Conclusions: LNS along with malaria and diarrhea treatments improved the children's iron status and hemoglobin, but not vitamin A status.

Key words: LNS, hemoglobin, iron, vitamin A. Funded by the Bill & Melinda Gates Foundation.

PO1613

MATERNAL ACTIONS AND PROBLEMS IN MANAGING THE CHILD'S WEIGHT AND THEIR ASSOCIATION WITH THE MATERNAL PERCEPTION OF THE CHILD'S WEIGHT IN MEXICAN DYADS

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Background and objectives:: Associate actions and problems in managing child's weight with the mother's perception of child's weight (MPCW) in pairs (mother-child 2 to 17 years of age) who reside in 5 States in north eastern Mexico.

Methods: 2840 pairs participated. Mothers answered: What have you done in managing your child's weight? What has made it difficult for you in managing your child's weight? I believe that my child is…Weight and height of the child were measured.

Results: Mothers of Overweight (OW)-Obese (OB) children do not carry out actions 50.2% (n = 150) & 21.3% (n =81) (÷2 = 171.788, p <.001), do not have problems to control it,

79.6% (n = 238) & 60.1% (n = 229), ÷2 = 58.11, p <.001 and do not have an adequate perception of the child's weight.

Conclusions: Actions and problems in managing weight of OW-OB children are associated with MPCW.

Key words: body weight, weight perception, obesity, overweight, mother-child relations.

PO1614

IMPACT OF NUTRITION EDUCATION INTERVENTION ON APPROPRIATE FOOD SELECTION OF RURAL MOTHERS IN EHA-AMUFU, ISI-UZO L.G.A I

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Background and objectives: Inadequate feeding practices, including poor knowledge of appropriate food for infants and cultural practices contribute to the high prevalence of malnutrition among infants and young children in developing countries. This study compared the impact of nutrition education intervention on food selection practices of mothers/caregivers.

Methods: Sixty (60) mother/caregiver child pairs were purposefully chosen. The selected mother/caregiver child pairs were randomly assigned (by balloting) to three treatment groups: one control and two intervention groups. The nutrition education program was carried out for a total of six (6) weeks. Children in the control and interventions groups were dewormed and given vitamin A at the beginning, for ethical reasons and to isolate the other elements of intervention from the effects that may be due to deworming and low serum vitamin A. The two intervention groups attended classes for four weeks. One received intensive education only while the other received intensive education with additional cooking demonstration. Data obtained were analyzed using descriptive statistics. Comparison between control and intervention groups was done using Student t-test.

Results: It revealed that the increase in scores of mothers/caregivers after intervention on selection of energy-giving foods for the control and intervention groups were (20% vs 40% and 40%) (p=0.072) and body-building foods (20% vs 20% and 40%) (p=0.193). There was a significant (P<0.05) increase in scores of mothers/caregivers on selection of protective foods: calcium-rich foods (p=0.031), iron-rich foods (p=0.022), vitamin A rich foods (p=0.011), zinc rich foods (p=0.012) and iodine-rich foods (p=0.021).

Conclusions: Based on the findings, nutrition education intervention improved mothers' selection ability of appropriate foods for their children.

Key words: Impact, nutrition education package, food selection, rural mothers, Eha-Amufu.

PO1615

DEVELOPMENT OF NUTRITION EDUCATION PACKAGE ON CHILD CARE AND FEEDING PRACTICES FOR RURAL WOMEN IN ENUGU STATE, NIGERIA: A POSITIVE DEVIANT APPROACH

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Background and objectives: The burden of nutrition related disease is greatest among the vulnerable and disadvantaged groups including rural women. The study describes the development of 12-lesson based nutrition education package for rural women in Enugu State.

Methods: The study involved 91 mothers in a community of Eha-Amufu, Enugu State. Mothers were classified as Positive Deviants (PDs) and Non Positive Deviants (NPDs) based on the nutritional status of their infants. Structured questionnaire was used to collect information. Summary findings from the Positive Deviant Inquiry (PDI) were used to develop the package. Data was analysed using descriptive statistics.

Results: More than half of the respondents (78.7%) and 21.3% were classified as NPDs and PDs respectively. The PDs had better feeding, caring and health-seeking practices than the NPDs. The nutrition education package developed had the following lessons: Growth monitoring, Malnutrition, Food Selection Techniques, Body building foods, Energy-giving foods, Protective foods, Infant nutrition, Management of childhood diarrhea, Immunization, Hygiene and Sanitation, Family Planning and Feeding during illness.

Conclusions: This developed package can be used in communities during intervention programmes on child-care and feeding practices.

Key words: nutrition education package, child care, feeding, rural women, Enugu

PO1616

CAPACITY DEVELOPMENT (CD) IN NUTRITION IN CENTRAL AND EASTERN EUROPE (CEE)

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Background and objectives: The Network for CD in Nutrition in CEE (NCDNCEE) (http://www.agrowebcee.net/ncdn/) established in 2005 with the general objective to stimulate relevant CD in CEE countries. NCDNCEE has joined several EC funded projects, including EuroFIR (www.eurofir.org), EURRECA (www.eurreca.org) and EuroFIR–Nexus.

Methods: NCDNCEE meetings were arranged for identifying specific challenges and training needs; developments tools and implementing workshops; establish collaboration for collection recommendations and nutrition grey literature; identification on dietary methodology; Food Composition Data Base (FCDB) status and training needs inventory.

Results: Much of the results are published in scientific journals; cross-cutting themes were academic training, workshops, networking, and types of methodology in nutritional research and sharing of experiences. CD workshops (2005-2013) included collection and use of grey literature for nutritional status evaluation in CEE; overview of micronutrient recommendations; media communication training; FCDB workshops; identification and prioritization of nutrition education needs. Nutritional tools creation and presentation: (NutriRecQuest) web tool -micronutrient recommendations; web based application Food Composition Data Management (FCDM) for creating a FCDB; DIETASSES for nutritional assessment and planning diet. EuroFIR-Nexus and NCDNCEE initiated a Balkan food platform to foster regional FCDB development using web- based software FCDM; Memorandum of Understanding signed with several CEE countries. The need for additional tailor-made training on nutrition identified. A follow-up of NCDNCEE launched as CAPNUTRA.

Conclusions: An impressive amount of CD activities was achieved in each country, guided by the plans, frameworks, leadership and the implementation of CD. CD had an essential role in stimulating research and is useful for harmonization relevant research in CEE. The network was a tool to foster regional involvement and development of education and research.

Key words: capacity development, nutrition, cee countries, nutrition policy Acknowledgements Supported by FP7 project EuroFIR-Nexus; Ministry of Education and Science Republic of Serbia project 41030; NCDNCEE; FAO REU Budapest, Hungary

PO1617

PUBLIC PRIVATE SECTOR PARTNERSHIP ON SUPPORTING THE SCALING UP NUTRITION (SUN) MOVEMENT: PROPOSE MODEL FOR INDONESIA

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Background and objectives: United Nations led, multistakeholder movement the Scaling Up Nutrition (SUN) launched in 2010 globally, was translated into a 1000 days movement (1000 Hari Pertama Kehidupan) in Indonesia, launched in 2012. The private sector engagement, a less utilized resource in the national context, would improve the effectiveness of existing nutrition program by enhancing partner collaboration, as well as bringing in specific expertise, innovative approaches and technologies.

Methods: A review of private public partnership programs was conducted to evaluate its contribution toward increasing nutrient intakes, improving nutritional status, water and sanitation, increasing knowledge, and community empowerment.

Results: The three main areas of private sector engagement proposed are: provision of nutritional products, facilitate the improvement of water and sanitation facility, and provision of educational materials. The following activities could be pursued: provision of macro and multiple-micronutrient supplementation, provision of height measurement tables and monitoring cards, improvement of transport facility to the health centers, facilitate the improvement of monitoring and information system, and providing fund for training and socialization. Activities can be channeled through the current existing government program at the household or community level. All programs should follow the three positioning principles of mutual benefit, equity, and transparency.

Conclusions: Public private partnership will bring the much needed extra efforts in combating the double burden of malnutrition present in Indonesia.

Key words: Scaling Up Nutrition, public private partnership, private sector, nutrition, Indonesia.

PO1618

WASHING THE FOODSTUFFS OF SEEDS, PROMOTING THE HEALTH LEVEL, A PROPOSAL FOR LEGISLATION OF NATIONAL STANDARD OF FOOD SAFETY

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Background and objectives: As the bad situation of pollution in the foodstuffs of seeds in and outside of China is more and more serious and critical. There is not any concrete regulation or national process standard of food safety to eliminate or reduce the pollution in the foodstuffs of seeds round the world. The children are much too easy to be harmed by polluted food. It is imperative to eliminate the danger pollution factors in the foodstuffs of seeds for promoting people¡¯ health, including the children health, around the world before the pollution factors are eat and harm the human-being.

Methods: Summarize the bad situation of pollution in the foodstuffs of seeds around the world.

Results: Washing the foodstuffs of seeds to eliminate the danger pollution factors in the foodstuffs of seeds, promoting the health level, and a proposal for legislation of national standard of food safety was created.

Conclusions: The proposal for washing the foodstuffs of seeds, promoting the health level, a legislation of national standard of food safety was suggested to promote health food and health people around the world. Which the new breakthrough can promote the children health greatly if the proposal was accepted by China and world.

Key words: Proposal; legislation; National standard of food safety; Foodstuffs of seeds; Health promotion.

PO1619

FAMILY FEEDING PRACTICES IN 0-4 CHILDREN WITH PREVENTABLE PATHOLOGIES BACKGROUND

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Background and objectives: Abstract Feeding is a cultural activity and it is present in the actions of the individual in the social and family area. Thus, it is possible to speak of a health/sickness/feeding process. Among the child pathologies, diarrhea, undernourishment and anemia were chosen since they are preventable and prevalent and because prevention and attention consists, mainly, in providing adequate feeding, considering the family and environmental situation. We aimed to characterize the feeding practices of mothers, both exclusive breast-feeding and timely complementary feeding.

Methods: Exploratory, descriptive, cross sectional during 2010-2011 with casual sampling. The participants were 23 families with children up to 4 years old with background of diarrhea, undernourishment and anemia. Semi-structured surveys were used, interviews and focus group. Socio-demographic variables were evaluated, related to: child health, exclusive breast-feeding practices and timely complimentary feeding. Excel and SPSS were applied, differences verified, chi square coefficient, t student, confidence level 95%.

Results: Sixty-one percent of muclear families: 81% receive feeding plans; 47, 8% of children received exclusive breast-feeding; 52, 2% received other liquids from the age of 2 months; 47, 8% received solid food before 6 months of age; 83% are controlled monthly; 78% of mothers are housewives, do not work outside the home; 95% of mothers do not study; 92% have tap water and sewer; 40% live overcrowded; mothers admitted rare experience in culinary practices.

Conclusions: Mothers admitted the environment was adverse. Feeding practices relate to life conditions. Mothers always see the doctor and say they respect indications, but this does not stop repeated episodes. They assign a particular sense to being “housewives” without the preparation of meals being a part of it. It would be necessary to strengthen the promotion policies of good feeding and nutritional practices.

Key words: feeding practices, diarrhea, undernourishment and anemia, promotion policies.

PO1620

EFFECT OF A FORTIFIED OIL AND FLOUR PROGRAM IN COTE D'IVOIRE ON MICRONUTRIENT STATUS OF PRE-SCHOOL CHILDREN AND WOMEN

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Background and objectives: Anemia and micronutrient deficiencies are widespread in sub-Saharan Africa but the impact of food fortification on addressing such deficiencies on a program scale is still debated. We aimed to estimate the iron and vitamin A status of pre-school age children (pre-SAC) and women of reproductive age (WRA), and folate status in WRA in households consuming fortified oil and wheat. Design: The survey was cross-sectional. Twenty-six clusters each were selected independently by a two-stage process in an urban and rural area; total of 52 clusters. Data on demographics, socioeconomic status and access to fortified foods were collected at households. Hemoglobin, retinol binding protein (RBP), ferritin, soluble transferrin receptors (sTfR), folate, sub-clinical inflammation and Plasmodium spp. infection were determined among pre-SAC and WRA.

Results: In pre-SAC vitamin A deficiency (VAD) was prevalent (15% with RBP < 0.7µmol/L) but for each 1 mg RE/kg oil consumed, RBP increased by 0.37 ìmol/L (p=0.03). The relationship was stronger in those 24-59 months (RBP increased by 0.58 µmol/L; p =0.004). In WRA, there was no significant VAD in the population (0.7%). Anemia was found in 92.2% of rural and 56.3% of urban pre-SAC (p<0.001). Pre-SAC with access to adequately fortified flour had hemoglobin concentrations 15.7g/L higher than those without (p<0.001); significance remained after correction for Plasmodium parasites (p<0.001). Hemoglobin levels increased by +0.238 g/L per mg/kg increase in iron fortification levels (p<0.001). Seventy-eight percent of rural and 45% of urban women were anemic. Only minor positive effects were found in association with folic acid fortification of wheat flour, because adequacy of folic acid flour fortification was poor.

Conclusions: Micronutrient status was better in pre-SAC accessing fortified vegetable oil with vitamin A and wheat flour with iron and folic acid, provided through the national fortification program.

Key words: fortification, hemoglobin, vitamin A, folate.

PO1621

PERCEPTIONS OF CHILDHOOD MALNUTRITION AND HEALTH SEEKING BEHAVIOUR IN RURAL BIHAR, INDIA: A QUALITATIVE STUDY

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Background and objectives: Community perceptions of health and illness, and how traditional and allopathic medical providers are viewed, determine how effectively medical non-governmental organisations such as Medecins Sans Frontieres (MSF) can provide care. Since February 2009, MSF has implemented a community-based nutritional programme in Biraul Block - an area in Darbhanga, in the rural state of Bihar, east India. Dharbhanga is one of the most disadvantaged of Bihar's 38 districts. The programme has admitted more than 12, 000 children, but has a relatively high defaulter rate of 35%. We undertook a qualitative study to assess perceptions and the understanding of childhood malnutrition, and associated health-seeking behaviour, in Biraul Block.

Methods: In 2010, 58 qualitative semi-structured and narrative interviews dealing with malnutrition were undertaken with families of both malnourished children and nonmalnourished children (mothers, fathers, in-laws), and healthcare workers (traditional healers, traditional health practitioners, midwives, hospital nurses, doctors). 150 people were interviewed in individual and group discussions.

Results: Malnutrition did not tend to be viewed as a disease, meaning that people were unlikely to consult health workers if a child was 'only skinny'. Traditional beliefs tended to inform understanding of disease. People regularly consulted Hindu and Muslim priests or other non-allopathic traditional health practitioners who were easier to access than conventional health facilities. Findings did not differ between families of children with and without malnutrition. Senior family members and village elders had significant influence over the parents of the malnourished child in terms of decisions to seek treatment and type and location of treatment sought.

Conclusions: Health education programmes are needed to inform people about malnutrition in this context, and improve awareness that it is a disease that can be treated. Programmes

must engage individuals and communities, including traditional healers, so they can develop a holistic approach within existing social structures.

Key words: Malnutrition, perceptions, health-seeking-behaviour.

PO1623

NUTRITIONAL STATUS OF WOMEN OF REPRODUCTIVE AGE AND PREGNANT AND LACTATING WOMEN (PLW) IN BIRAUL BLOCK, DARBHANGA DISTRICT, BIHAR, INDIA.

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Background and objectives: Since 2009 MSF´s CMAM programme in Darbhanga district has admitted over 12000 children<5yrs. Given the strong correlation between maternal and child nutritional status, a needs assessment was undertaken to investigate the nutritional status of women of reproductive age (19-49 years), including pregnant and lactating women (PLW), in Biraul block (population 300, 000).

Methods: Two-stage cluster sampling was used to select populations from the smallest sampling unit (tolas) within Biraul Block. Women of reproductive age (19-49 years) living in the selected households were included in the assessment. Information was collected through structured questionnaires by a team of enumerators previously trained on anthropometry and field practices. Nutritional status was determined using MUAC and a cut-off of <220mm indicating malnutrition.

Results: The overall prevalence of acute malnutrition defined as MUAC<220mm in women 19-49 years(n=341) was 17.0%(58/341). Stratified by PLW status, the prevalence was 23%(7/31) among pregnant women, 17.5%(25/143) in lactating woman and 16.3%(28/172) in non-PLW. A diet diversity score calculated using the FAO Individual Diet Diversity Score (IDDS, 2007) demonstrated a mean score of 7.1 (out of 14 food groups). No significant difference in score was detected between PLW (7.1±1.8) and non-PLW(7.2±1.8, p=0.7457), or malnourished(7.0±1.7) and non-malnourished women(7.1±1.7, p=0.5575). A significant difference (p<0.005) was found between castes, with those belonging to Scheduled Castes being lower(6.5±1.5) than those of higher castes(8.1±1.7).

Conclusions: The 17% prevalence acute malnutrition among women of reproductive age was found lower than shown in the government Bihar state National Family Health Survey-3 of 45% based on a BMI<18.5kg/m2. Using a lower MUAC cut-off <210mm resulted in lower overall prevalence (5.9%), with significantly lower prevalence among pregnant women (3.6%) but not lactating women(6.3%) or non-PLW(5.8%). This suggests that<220mm is more sensitive in detecting malnutrition in pregnant women. Further studies with larger sample sizes and outcome investigation are needed.

Key words: Mid-Upper-Arm-Circumference (MUAC), Pregnant&Lactating women (PLW).

PO1624

EFFECT OF CHANGING ADMISSION CRITERIA FROM W/H<-3 AND/OR MUAC<110MM TO EXCLUSIVELY MUAC<115MM ON CMAM PROGRAMME INDICATORS IN BIHAR, INDIA

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Background and objectives::Between 2009-2010 MSFs CMAM programme in Bihar admitted children between 6-59 months with a W/H z-score of <-3SD and/or MUAC of<110mm, and discharged once achieving W/H>-2SD and MUAC>110mm (known henceforth as criteria A). To facilitate wider screening coverage and simplicity, the admission criteria was changed in 2010 to exclusively MUAC<115mm and discharge criteria to MUAC>120mm (known henceforth as criteria B).

Methods: All data was collected as part of routine operations on an excel based database which was retrospectively cleaned and analysed for epidemiological characteristics and programme indicators for both time periods. Oedematous children(0.5%, n=57)were excluded from this analysis.

Results:3647 and 6484 children were admitted and exited under criterion A and B respectively. 57.7% and 66.9% of admissions were female under criterion A and B respectively. When stratified by age ranges 6-12months, 12 to<24months, 24 to <36months and >=36 months:21.1%, 54.1%, 15.5% and 9.3% compared to 30.4%, 53%, 11.7% and 5% were admitted under criterion A and B respectively. Mean W/H at admission (-3.3±0.8 for both) and discharge (-1.5+/- 0.7 vs -1.5+/- 0.8) were similar for both criterion. Although there was minimal change in average MUAC gain between criterion (14.2mm +/- 7.4 vs 14mm +/- 6.3), the Average Weight Gain (g/kg/day) appeared significantly higher in criteria B (5.2 vs 4.8, p<0.005). Similarly, the average Length Of Stay in the programme prior to cure (days) was lower in criteria B (49 vs 57.6, p<0.005). In-programme mortality remained similar in both (0.7% vs 0.6%).

Conclusions:MUAC<115mm as an admission criteria appears to be more sensitive towards children <24 months (particularly between 6-12 months) and females when compared to W/H<-3SD and/or MUAC<110mm in this context. The

change in criteria appeared to have no effect on average W/H by z-score on admission or discharge, nor on in-programme mortality. Introducing the new criterion may have contributed to increased AWG and decreased LOS.

Key words:MUAC, CMAM, malnutrition, SAM, W/H.

PO1625

EFFECT OF W/H Z-SCORE ON DEMOGRAPHIC, ANTHROPOMETRIC AND PROGRAMME INDICATORS OF SEVERE ACUTE MALNOURISHED(SAM) CHILDREN ADMITTED WITH MUAC<115MM IN COMMUNITY-MANAGEMENT-OF-ACUTE-MALNUTRITION (CMAM) PROGRAMME IN BIHAR, INDIA

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Background and objectives:: Between July 2010 and December 2012 MSFs CMAM programme, treating children with Severe Acute Malnutrition (SAM) in Bihar, India, admitted children with exclusively MUAC<115mm and discharged with MUAC >120mm. This abstract compares characteristics and outcomes of children within this cohort who had W/H Z-scores <-3SD and W/H Z-scores >-3SD.

Methods: All data was collected as part of routine operations on an Excel based database which was retrospectively cleaned and analysed for epidemiological characteristics and programme indicators. Oedematous children (0.5%, n=36) were excluded from this analysis.

Results: 6484 children were admitted with MUAC <115mm, of which 63.2% had a Z-Score <-3SD and 36.8% >-3SD. 60.3% and 78.4% of admissions were female comparing <-3SD and >-3SD respectively. When stratified by age ranges 6-12 months, 12 to <24 months, 24 to <36 months and >=36 months: 27.7%, 52.4%, 13.9% and 6% compared to 34.8%, 54%, 7.9% and 3.2% contrasting Z-score<-3SD and Z-score >-3SD respectively. Mean Z-scores were -3.8+/-0.6 and -2.4+/-0.5 at admission and -1.8+/- 0.8 and -1.2+/- 0.7 at discharge comparing <-3SD and >-3SD respectively. In-programme mortality was higher in those children with Z-score <-3SD (0.9% vs 0.2%, p<0.005; Risk Ratio 5.1, CI 1.8-14.3). AWG and LOS was slightly worse in children with Z-scores<-3SD, however average MUAC gain was significantly higher at 15.1mm vs 12mm (all p<0.0005).

Conclusions: In children admitted using the sole criteria of MUAC <115mm, interestingly there appears to be a significantly higher proportion of females and children <24 months in those with W/H Z score >-3SD. In-programme mortality appears to be higher in those with W/H Z score <-3SD, however other programme response indicators appear to be relatively unchanged.

Key words: MUAC, CMAM, malnutrition, SAM, W/H

PO1626

SCALING UP NUTRITION IN TANZANIA: ACHIEVEMENTS, CHALLENGES AND WAY FORWARD

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Background and objectives: The Government of Tanzania believes that freedom from malnutrition is a moral imperative and a basic human right. Good nutrition is essential for enhancing immunity and hence reducing morbidity and mortality. Furthermore, good nutrition contributes to increased educability, productivity, household and national income. Because of its belief, Tanzania has committed itself to scaling up nutrition within the country.

Methods: Reviewed of different country reports on progress towards scaling up nutrition in Tanzania.

Results: Tanzania has developed a National Nutrition Strategy and its Implementation Plan that state its priorities for the period of five years from 2011 to ensure that its people are properly nourished. A National Food Fortification Alliance has been established and is building a Private Public Partnership in food fortification to advance the fortification agenda in the country. A High Level National Steering Committee for Nutrition which includes senior representatives from the Government, Development Partners, Private Sector and Civil Society has been established and similar committees are being established at sub-national level. Nutritionist to plan and coordinate nutrition activities have been recruited to all regions of the country. Other nutrition interventions including promotion of breastfeeding, control of iodine deficiency disorders, twice yearly vitamin A supplementation have been promising. Challenges including inadequate linkages with programs and projects between various sectors that could provide synergistic services to address the underlying causes of malnutrition and limited financial resources for nutrition activities do exist.

Conclusions: Tanzania needs enhanced capacity, resource mobilization, commitment of decision makers and a multisector multi-stakeholder structure in place and functioning to coordinate the national, regional and districts response to improve nutrition. Documentation of lessons learned and positive partnerships between government and CSOs and the private sector with regards to nutrition is also crucial.

Key words: Tanzania, scaling up nutrition.

PO1627

IS THE BODY WEIGHT LOSS PREDICTED BY THE NEGATIVE ENERGY BALANCE PRESCRIBED?

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Background and objectives: Teixeira et al. (1) stated that the ability to lose a significant amount of weight is dependent on the level of caloric restriction. The aim of this study was to evaluate if the real body weight (BW) loss is similar to predicted in a six-month diet intervention.

Methods: Forty people, with BMI 25-34.9 kg•m-2, aged from 18 to 50 years, participated in the study during 6 months. All participants followed a 25-30% calorie restriction diet. The predicted BW loss was calculated assuming that a kilogram of body mass is equal to 7770 calories (2). A paired Student's t test was used to compare the predicted and the real BW loss. Probability level for statistical significance was set at α=0.05.

Results: If we converted the calorie restriction during the six-month intervention into body mass, the mean body weight loss should have been -17.01±4.78 kg. However, the real BW loss was significantly lower (-8.47±5.06 kg) than expected (t39=9.109; p<0.001), being this difference of 8.54±5.63.

Conclusions: The real BW loss is lower than expected by the level of caloric restriction. This should be taken into account in tailoring intervention advice.

Key Words: Caloric restriction, body weight loss.

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PO1628

BASAL METABOLIC RATE: VALIDATION OF A POPULATION-SPECIFIC EQUATION FOR BRAZILIANS

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Background and objectives: Estimation of energy requirements depends on reliable values of basal metabolic rate (BMR). Internationally recommended BMR prediction equations (Schofield - SCHO) have been shown to be inadequate for groups of Brazilians. The purpose of this study was to validate population-based sex-specific equations to estimate BMR developed for the Brazilian adult population (BRA) against measured BMR in a sample of adults (age≥20 years) living in Niterói, Rio de Janeiro (RJ), Brazil.

Methods: A total of 172 subjects (109 women) participated in the study. BMR was measured in a controlled environment early in the morning with the subject having fasted for 10-12 hours. Body mass (BM), stature (S) and percent body fat (%BF) by DXA were obtained following the BMR measurements. BMR was estimated with the SCHO and BRA equations (kcal/day): 8.95(BM)+8.87(S)–0.70(Age)–814.3 (Women) and 9.99(BM)+7.14(S)–2.79(Age)–450.5 (Men).

Results: Average (± SD) age was 38.3 (16.9) years (range 20.0-97.0y). Women were older, heavier, shorter, and had higher %BF than men but similar BMI (24.4±4.8 and 24.6±3.3kg/m2 for women and men, respectively). Measured BMR (1151.7±164.8 and 1478.2±189.1 kcal/day) was significantly lower than estimated by SCHO (1352.8±129.8 and 1756.7±176.2 kcal/day) but not different from BMR estimated by BRA equations (1154.4±130.5 and 1452.2±153.8 kcal/day, representing 1.0±9.2 and -1.0±10.1%). Individual accuracy was greater for BRA (73.4% of women and 60.3% of men had predicted values within ± 10% of measured BMR) than SCHO (22.0 and 15.9%).

Conclusions: The data indicate that the FAO/WHO internationally recommended predictive equations are not appropriate for Brazilian adults living in Niterói. It is suggested that the newly developed equations be used in the Brazilian population.

Key words: Basal metabolism, Brazil, Validation studies.

PO1629

DIETARY INTERVENTION IMPROVES HEALTH AND NUTRITIONAL STATUS OF HOSPITALIZED CHILDREN WITH PROTEIN ENERGY MALNUTRITION

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Background and objectives: Protein energy malnutrition (PEM) is common in young children in developing countries and consider as a major public health problem. This study aimed to improve the nutritional status of infants and children with PEM.

Methods: A sample of 40 Infants and young children with PEM and who admitted Shebin El-Kom University Hospital for treatment were enrolled in the study. The children were classified into four equal groups; 1st control group (CG) in whom children were received the regular hospital meals without any modification; 2nd modified diet group(MDG) in whom chil-

dren fed the modified diet from admission till leaving; 3rd double protein group (DPG) in whom children fed the hospital meals with multiple amount of protein from admission till leaving; 4th formula group(FG) in whom children fed the hospital meals besides high protein formula. Each group received the menu for at least 14 consecutive days.

Results: The results showed that the served hospital for treatment of PEM was very low in energy, iron, vitamin C, vitamin A. The results showed that dietary intervention resulted in significant increase in body weight among CG and DPG groups. On the other hand the dietary intervention caused significant improvement of other blood parameters.

Conclusions: Modifying hospital diet can be improve health and nutritional status of children with PEM.

Key words: PEM, Malnutrition, Children, Infants, Protein

PO1630

DETERMINANTS OF OVERWEIGHT AMONG INDONESIAN TEENAGE FEMALES

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Background and objectives: Prevalence of overweight has increased globally, and be a serious public health concern because of it is associated with chronic diseases such as diabetes and cardiovascular diseases. However, very limited information available on its determinants factors among Indonesian teenage females (ITF). Objective: To analyze the prevalence of overweight and its determinants especially in the context of social economic and food factors among ITF.

Methods: The electronic files data of the Riskesdas 2010 – a national health survey consisted about 11.000 ITF aged 13–18 years were analyzed. Overweight subject was identified by BMI/age (WHO, 2007). The suspected determinants factors encompass age, fathers and mothers educational levels, family income levels, fathers and mothers occupations, fruit and vegetable intake, energy adequacy, percentage of energy intake from sugary sweetened beverages, percentage of energy intake from carbohydrate, fat and protein. A logistic regression model was applied to analyze the determinants of the overweight.

Results: The prevalence of overweight among ITF was 10.2% which is relatively low; it was higher in the younger age and higher family. The result of the logistic analysis showed that the determinants of the overweight were age (OR for aged 13-15=0.755; CI: 0.642 – 0.887), female education level (OR for basic education=0.769; CI: 0.653 – 0.904), and family income level (OR for high income=1.487; CI: 1.272 – 1.739). None of the food factors considered as determinants in this study, possibly because of the low prevalence of overweight and the weaknesses of the 24 hr food recall method to be used in the regression/correlation analysis.

Conclusions: The prevalence of overweight among ITF is low; and the determinants factors of it are age, education and family income levels, which need to be considered in preventing overweight among ITF.

Key words: Indonesian females, overweight determinants, overweight female

PO1631

EFFICACY OF IRON FORTIFIED RICE IN VIETNAM

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Background and objectives: Rice as a stable food is consumed daily by almost of Vietnamese population could be a food vehicle for fortification program. The study evaluated the efficacy of iron fortified rice (IFR) in improving iron status of reproductive age women (RAW).

Methods: It was a randomized, double-masked study of 244 women, in two groups. A meal based on IFR (SunActive® FeP80) was served 6 days/week with 15mg premix per 150g rice-Iron fortified group (FG) or 0.75mg Fe/day and no added iron-Control group (CG). Concentrations of hemoglobin (Hb, g/l), serum ferritin (SF, mcg/l), transferrin receptor (rTfR, mg/l) were measured at baseline (T0), 3 mo. (T3) and 6 mo. (T6). After intervention, in FG, concentrations of Hb, SF were significant higher Hb0: 123.5±10.8; Hb6: 125.9 ± 8.9 ($p=0.009$); SF0: 32.0±35.2; SF6: 43.7±53.1 ($p<0.001$); TfR were lower: 6.3±2.2; 5.1±1.6 ($p<0.001$); prevalance of anemia decresed from 30.3% to 17.6%; prevalence of iron deficiency from 40.7% to 24.4%. In CG, Hb0: 125.6±13.8; Hb6: 126.2 ± 11.7 ($p=0.7$); SF0: 36.2±27.2; SF6: 38.7±31.0 ($p=0.1$); TfR0: 6.2±3.7; TfR6: 5.3±2.4 ($p<0.001$); prevalance of anemia changed from 29.5% to 27.1%; of iron deficiency was 21.3%.

Conclusions: Regular consumption of IFR during 6 mo. significantly reduced the prevalence of iron deficiency anemia in RAW. Fortified rice is a potential strategy for control of Iron deficiency anemia in Vietnam.

Key words: anemia, fortification, rice, Vietnam

PO1632

COMPETENCY REQUIREMENTS OF PUBLIC HEALTH NUTRITIONISTS: STABILITY OF CONSENSUS OVER A DECADE

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Competency standards provide the architecture for workforce development and serve to inform workforce preparation, continuing professional development and quality assurance via registration and credentialing systems. Developing consensus on competency requirements for the developing global public health nutrition workforce is therefore an important strategic initiative. This study aimed to compare consensus derived from 3 international Delphi studies conducted regarding the essential competencies required for effective public health nutrition practice. Three modified Delphi studies were conducted in 2003, 2009 and 2012 involving 3 rounds of questionnaires administered amongst panels (n=24, 52 and 44 respectively) including public health nutrition leaders from government, academic and professional jurisdictions. The emphasis of the consensus development process was identification and prioritization of essential competency requirements for the future public health nutrition workforce. In each Delphi study, ratings and open-ended responses to over 180 separate competency elements derived from the white and grey literature were categorised into 14 competency areas including enabling knowledge, analytical, nutrition science, public health systems, food and nutrition systems, communication, management, leadership, nutrition education, nutrition assessment, nutrition monitoring and surveillance, capacity building, intervention management and professional competency categories. This comparative study demonstrates that there is strong international agreement about the competency requirements for public health nutrition and this consensus has been very stable over the last decade. Essential competency units identified have been used to develop competency standards for public health nutrition by the World Public Health Nutrition Association, which form the basis for its practitioner certification system.

Key words: Competency, public health nutrition, consensus

PO1633

KNOWLEDGE AND PRACTICES OF COMMUNITY HEALTH AGENTS: HEALTHY EATING AND WALKING IN PREGNANCY

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Background and objectives: The Community Health Agents (CHA) find themselves in an good position to encourage the development of healthy lifestyles. Pregnant women are particularly vulnerable to these influences, whether to receive frequent home visits by the CHA during the prenatal period, or in order to his willingness to change. Objective: identifying knowledge and practices related to healthy eating (HE) and walking (WA) in pregnancy of CHA working in primary health care in Botucatu/SP/Brazil.

Methods: Cross-sectional study. All CHA have answered questionnaire on recommendations and guidelines given in home visits about HE and WA during pregnancy. Descriptive statistical analyzes have been performed using SPSS.

Results: The 50 CHA were on average 34.2±8.1 years old, and most had never attended training on HE (96.1%) or physical activity (92.2%) in pregnancy. Most of the CHA reported they don't always/very often approach the topic HE on his home visits to pregnant women: 97% said they don't talk about fruits and vegetables, 27.5% haven't mentioned the consumption of beans and 40% the consumption of soft drinks and biscuits. Concerning the amount of daily servings, 44% were unaware of the recommendation of fruit, 56% vegetables, 72% beans and almost 7% biscuits and soft drinks. Concerning the subject WA prenatal, 33.3% of ACS always/very often stimulated the pregnant woman to perform WA. Concerning the knowledge on WA recommendations, only 5.9% knew the recommendation for the 1st pregnancy trimester, 3.9% for the 2nd and 2% for the 3rd.

Conclusions: The subjects WA and HE, although quite important in defining the mother/son health outcomes, are not addressed at all home visits to pregnant women. Moreover, there are significant gaps in their knowledge regarding current recommendations for pregnant women about these behaviors, justifying interventions focusing on training these professionals.

Key words: Community health agent, healthy eating during pregnancy, walking during pregnancy.

PO1634

DEVELOPMENT OF FOOD PYRAMID FOR VEGETARIAN IN INDONESIA

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In Indonesia, number of vegetarians is increasing from year to year along with the increasing awareness of health. Vegetarian diet is believed as one of the alternative healthy diet for the people of Indonesia. However lack of information about healthy and balance diet for vegetarian can make them prone to the deficiency or excess of nutrients. Therefore, a food pyramid for vegetarian needs to be develop to give them guideline about healthy and balance vegetarian diet. This study was a prototyping research and used cross-sectional design with both quantitative and qualitative approaches. Data were collected from literature review and interview to vegetarians male and female from various age groups (children, adolescent, adult and elderly) using a structured questionnaire. The number of sample in this study was 160 vegetarians obtained with non-probability sampling method using consecutive sampling technique. Information that collected from subjects was type of food consumption using Food Frequency Questionnaire, then categorized in to food group, analyzed nutrient content using Nutrisurvey and counted based on Indonesian recommended dietary allowance to determine the portion. After these steps, development food pyramid for vegetarian was done by buying all food that consumed and made photos. Pilot test of food pyramid was done among vegetarian people in Centre of Education and Training Buddha, Maitreyawira, West Jakarta and getting input from expert such as academics and dietitian. The output from this study was Food Pyramid for two types of vegetarian, i.e vegan and lacto-ovo vegetarian. We hope that these Food Pyramids could be a guidelines for vegetarians in Indonesia in regard of choosing and consuming healthy and balance food.

Key words: food pyramid, vegetarian, vegan, lacto-ovo vegetarian

PO1635

THE EFFECT OF TRAINING DELIVERY METHOD ON THE COMPETENCIES OF COMMUNITY HEALTH WORKERS IN COMMUNICATING SAFE COMPLEMENTARY FEEDING

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Introduction and objectives Caregivers need support to sustain appropriate young child feeding practices from Community Health Workers (CHW). Limited and ineffective training may impact CHWs' performance particularly in nutrition counseling. Therefore, it is necessary to assess the effect of training which has developed through a systematic and scientific approach to their competencies. The study aimed to assess the effect of training method delivery on CHWs' competencies in communicating safe complementary feeding to caregivers of 6-24 months children. Methods The study was conducted in Bekasi, Indonesia. It used a non-equivalent pre-post test control group design. Both groups obtained 6 topics on communicating safe complementary feeding. The intervention group (n=70) received the materials in a 3-day training consisted of 24 hours learning session using adult learning approach. The comparison group (n=68) received the material in a half day seminar session. Results Cognitive competency (C). The "application competency" of CHWs who received training was significantly higher than those who attended seminar. Affective competency (A). The "responding competency" of CHWs who received training was significantly higher than those who attended seminar. Psychomotor competency (P). The "set competencies" of CHWs who received training was significantly higher, and they have potential to be psychomotor-competent 9.1 times more than who attended the seminar. Composite competency (30% C+30% A+40% P). The proportion of CHW who were competent in composite competency in the training group was significantly higher than the counterpart (74.3% vs 36.8). and they have potential to be composite-competent 6.9 times more than who attended the seminar. Conclusions Training can improve the CHWs' competencies in communicating safe complementary feeding. A half day seminar could improve the lower level of cognitive competencies but fail to improve the affective and psychomotor competencies. Acknowledgement is delivered to The Nestle Foundation.

PO1636

TELEVISION VIEWING: IMPACT ON BODY MASS INDEX AND FOOD INTAKE AMONG SCHOOL CHILDREN IN MALAYSIA

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Background and objectives: This cross-sectional study was conducted to determine the relationship between duration of television viewing and body mass index (BMI), energy and nutrient intake.

Methods: A total of 180 Malay school children from five primary schools in Wilayah Persekutuan Kuala Lumpur as urban area and Daerah Hulu Langat in Selangor as rural area participated in this study. The children consisted of 73 boys and 107 girls, aged 10 to 12 years old. The anthropometric data including body weight, height, BMI and waist circumference were measured using standard measurement. Data on television viewing habit was collected using questionnaire developed specifically for this study whereas data on energy and nutrient intake were collected using 2 days 24 hour dietary recall.

Results: This study found higher prevalence of overweight/obesity among urban children (42.2%) compared to rural children (34.4%). Prevalence of underweight was slightly higher among rural children (6.7%) compared to urban children (5.6%). During weekend and weekdays, most of the children in urban area watched television > 2 hours per day, 56.7% and 46.5% respectively. Besides, most of the children in rural area watched television < 2 hours per day during weekend (58.4%) and weekdays (77.4%). Both energy and protein intake were higher ($p<0.05$) among girls in urban compared to rural area. For boys, the protein intake was higher ($p<0.05$) in urban, as compared to rural area. This study found positive correlation between duration of television viewing and BMI during weekend ($r=0.212$, $p<0.05$) and weekdays ($r=0.201$, $p<0.05$). However, this study found no significant correlation between energy and macronutrient intake with duration of television viewing among children.

Conclusions: This study showed that duration of television viewing has affected body mass index but not the energy and macronutrient intake of school children in Malaysia.

Key words: Television, BMI, school children, food intake

PO1637

DIFFERENCES ON WHO INDICATORS FOR ASSESSING INFANT AND CHILDREN FEEDING PRACTICES ON PUBLIC AND PRIVATE HEALTH CENTERS IN ROSARIO, ARGENTINA

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Background and objectives: The World Health Organization (WHO) and partners have released new and updated indicators for assessing infant and young children feeding practices for use in population based surveys. The indicators reflect current recommendations for proper infant and young children feeding and provide important new information on feeding practices in children 6 to 23 months of age. The aim of this study was to assess infant and young children feeding practices based on the new indicators from WHO, in a public and a private health center of Rosario, Argentina.

Methods: A cross-sectional study was carried out and evaluated 400 mothers and children from a public and a private health center of downtown Rosario. Analysis is based on 391 children (191 public and 199 private) less than 24 months. To assess the indicators a general questionnaire was administered and a 24h recall. Differences were evaluated by Chi-square test.

Results: Early breastfeeding initiation was 83, 3 vs 83, 9% (NS) at public and private health center respectively; exclusive breastfeeding under 6 months was 79, 1 vs 43, 8% ($P<0.001$); continued breastfeeding at 1 year was 29, 4 vs 36, 8% (NS); introduction of solid, semi-solid, or soft foods was 71, 4 vs 100% ($P<0.01$); minimum dietary diversity was 45, 3 vs 70, 9% ($P<0.001$); minimum meal frequency was 74, 5 vs 98, 1% ($P<0.001$); minimum acceptable diet was 41, 5 vs 70, 9% ($P<0.001$); and consumption of iron-rich or iron-fortified foods was 66, 0 vs 94, 2% ($P<0.001$).

Conclusions: In the public health center outcomes in complementary feeding indicators were worse, this may be related to the lower socioeconomic status of the population attending this centers. There were indicators different from breastfeeding in public and private sector involved with the primary care of children in Argentina and that should motivate the ways of education and promotion in both sectors.

Key words: indicators, breastfeeding, feeding practices

PO1638

URBAN AGRICULTURE AS STRATEGY TO PROMOTE FOOD AND NUTRITION SECURITY.

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Background and objectives: Urban Agriculture (UA) developed through agroecological approach contributes to generating productive and ecological cities, by respecting social and cultural diversity. It is, therefore, an important strategy to sustainable development and to promote food and nutrition security. This work evaluates the role of UA activities developed in Primary Care Units as promoters of food and nutrition security among participants.

Methods: Qualitative study carried out in the city of Embu das Artes (Sao Paulo/Brazil), through workshops of Systematization of Experiences with participants of an UA project. The workshops were analyzed according to thematic content analysis.

Results: The discourses were organized based on Brazil's definition of food and nutrition security, from the new National Food and Nutrition Policy, according to the following categories: improvement of conditions to food access (growing vegetables and fruits for own consumption; local sale; community donation); food quality (organic production and consumption; greater food variety), environmental sustainability (use of household waste to produce organic fertilizer); healthy eating practices that respect cultural diversity (rediscover the ancestors food growing methods; social exchanges; community meals prepared with produce from the garden; development of culinary skills); production of knowledge (knowledge exchange within the community; understanding healthy eating benefits). Other important ideas have been identified, but they were not categorized for not fitting directly into the definition of food security and nutrition. Thus, we found that participants of the UA activities felt encouraged to develop home gardens in their homes. We also found a conscious awakening of the participants to self-perceived feeding and to perception of feeding in a broaden social and environmental context.

Conclusions: The practice of Urban Agriculture with an agroecological approach is a powerful strategy to promote food and nutrition security, as it implicates on food, health, environment and social development.

Key words: Urban Agriculture; Food and Nutrition Security.

PO1639

MALNUTRITION STATUS AND INFLUENCING FACTORS IN LEFT-BEHIND CHILDREN WITH MIGRANT WORKER MOTHER IN POOR AREAS IN CHINA

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Background and objectives: Poor rural left-behind children, a vulnerable population that emerged with the economic and social transition in China, will exist for a long time. The study was to explore the malnutrition status and influencing factors in left-behind children with migrant worker mother in poor areas of 13 provinces£®

Methods: Survey data was from the program of Public Health Emergency Response and Operation Mechanism-Establish the monitoring and information system on nutrition and health and related risk factors in 0-5 children in 2009 which funded by China CDC. Multistage stratified random cluster sampling method used in the national survey was performed. The contents of the investigation included questionnaire survey, anthropometric measurement, biochemical tests and dietary survey. The subjects of the study were 2161 children no more than 18 months in the survey. Z-scores were calculated according to WHO growth standards (2006). Data processing and multiple factors analysis were finished by non condition logistic regression in software SAS 9.12.

Results: There were 9.3% children whose mother were migrant workers in the target population. The prevalence of stunting and underweight in left-behind children was 15.5% and 6.0%. Excluding other influencing factors, the results suggested that low birth weight (OR=2.543; 95%CI=1.481-4.365); minority nationality (OR=1.661; 95%CI=1.274-2.165); mother is migrant worker (OR=1.602; 95%CI=1.085-2.367), the nearest medical institution at a distance of ≤ 1 km (OR=1.308; 95%CI=1.008-1.696), and unsanitary toilet (OR=1.311; 95%CI=1.017-1.689) are the most important independent factors among 0-18 months young children.

Conclusions: Malnutrition in left-behind children with migrant worker mother in poor areas should not be ignored. Enhance the monitoring and adopt comprehensive improvement are useful to improve the growth of children.

Key words: left-behind children, malnutrition, influence factors.

PO1640

COMPARISON OF PREVENTIVE AND THERAPEUTIC ZINC SUPPLEMENTATION PROGRAM EFFECTS ON DIARRHEA AND FEBRILE ILLNESSES AMONG YOUNG CHILDREN: A RANDOMIZED TRIAL

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Background and objectives: WHO/UNICEF recommend including zinc supplementation in the treatment of diarrhea. We hypothesized that in an area with high risk of zinc deficiency, daily or intermittent preventive zinc supplementation might provide greater reduction of diarrhea morbidity than just therapeutic zinc, while also possibly decreasing morbidity from febrile illnesses.

Methods: 6, 246 rural Burkinabe children 6-30 mo old were randomly assigned to one of 4 treatment groups for 16, 32 or 48 wks: 7 mg zinc/d and ORS+placebo for diarrhea (daily supplementation); 10 mg zinc/d for 10d/16wks followed by daily placebo and ORS+placebo for diarrhea (intermittent supplementation); daily placebo and ORS+20mg zinc/d for 10d for diarrhea (therapeutic supplementation); or no daily supplementation and ORS for diarrhea (control). Morbidity surveillance was performed through weekly home visits; free community-based treatment was provided for uncomplicated diarrhea (>3 liquid/semi-liquid stools/d), confirmed fever (axillary temperature>=38oC) and malaria (reported or confirmed fever (RCF) and positive rapid diagnosis test). Any group-wise differences in baseline characteristics were accounted for in logistic regression analyses. Group codes are still masked.

Results: Reported adherence to daily supplementation (97+/-5%) did not differ by group. Overall, diarrhea (0.5%), RCF (1.2%) and malaria (0.3%) incidence were low. Diarrhea incidence decreased progressively during the three 16-wk rounds (OR=0.86 for round 3 vs round 1, p=0.009), while RCF (OR=1.44; p<0.0001) and malaria (OR=4.13; p<0.0001) incidence increased. All supplemented groups had moderately lower diarrhea (OR=0.83-0.87; p=0.0009-0.003) and RCF (OR=0.77-0.80; p<0.0001) but not malaria (p=0.36) incidence than the control group. Treatment groups effects differed across rounds of supplementation for diarrhea (p=0.10 for the interaction).

Conclusions: Zinc supplementation reduced diarrhea and RCF in this population. The effects of different supplement delivery strategies may vary according to the duration of the supplementation program. Supported by: Thrasher Research Fund and Canadian International Development Agency.

Key words: diarrhea, fever, malaria, zinc supplementation

PO1641

FOOD SECUTIRY AMONG HOUSEHOLDS WITH NO DRINKING WATER AND ELECTRICITY.COMUNA 3 CASE.MEDELLÍN-COLOMBIA. 2011

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Background and objectives: The lack of drinking water and electricity has worsened in the last decades in Medellin, especially in the poorest areas where displaced families whose basic needs are not fulfilled have come to try to make a living in the outskirts of the city, places where both water and electricity supply is weak thus affecting the quality of life. Objective:Describe the food security and nutrition status among households with no access to drinking water and electricity.

Methods: Cross-sectional study involving 250 households and 541 subjects selected by convenience sampling. A descriptive analysis was performed, the OR with P = 0.05 test was used to estimate the association between malnutrition and socioeconomic characteristics, odds ratio results and multiple correspondence analysis were used to establish households' socioeconomic and feeding profiles.

Results: 92, 7% of households showed food insecurity, 15, 5% showed malnutrition duality, i.e., obesity among adults while children are malnourished. A food insecurity profile household was found where changes in the diet are made due to lack of money to buy food; they live in inadequate conditions. Malnourishment among children was associated to overcrowding, income, and type of house.

Conclusions: The major problem found was stunting among under 18-year-old subjects, most showing some type of malnutrition; one in six households showed malnourishment among some of the children and overweight among adults. Basic groceries these households shop for supply mostly carbohydrates and have a low nutritional density.

Key words: Households, malnutrition, food insecurity, drinking water and electricity.

PO1642

CONTRIBUTION TO THE STUDY OF TOXICOLOGICAL AND NUTRITIONAL EDIBLE OILS HEATED: IMPACT ON HEALTH

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Background and objectives: In this study we try to focus on the evidence that the wrong use of oil in food cooking should lead to health problems. High temperatures associated with repeated use of the same oil would lead to the breakdown of some fatty acids forming numerous toxic polymer compounds and peroxides.

Methods: 54 male rats (Albino Wistar) were fed with a diet containing 10 % of sunflower oil. The control group was fed by ordinary oil (OO); the second lot was fed by continuously heated oil (CHO) for 10 hours at 220 C° and the last lot was fed by frying oil (FO). The animals were killed by decapitation, respectively after three, five and seven weeks from the beginning of the diet.

Results: The chemical dosages demonstrated great ratios of polymer, polar and peroxide compounds in heated oil for 10 hours at 220 C° (CHO) and frying oil (FO). The biochemical studies have shown a significant decrease in hepatic glutathione (GSH) ratio in CHO and FO lots in comparing the control group (OO). A combined significant increase in glutathione peroxidase (GPx) and glutathione reductase (GR) activities appears also along the time of diet in CHO and FO groups compared to control.

Conclusions: The high temperatures associated with repeated use of the same oil lead to the production of high contents of dangerous compounds: free oxygen radicals, polymer compounds, peroxides etc. The combined relationship between the decreased glutathione ratio and the increased GPx and GR activities in rats feed on CHO and FO confirms the participation of glutathione redox system in the detoxifying reactions of continuously accumulated toxic peroxides.

Key words: Glutathione, glutathione peroxidase, glutathione reductase, peroxides, heated oils.

PO1643

EFFECT OF INCREASING VOLUNTARY FOLIC ACID FORTIFICATION ON DIETARY FOLATE INTAKES AND ADEQUACY IN REPRODUCTIVE AGE NEW ZEALAND WOMEN

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Background and objectives: Mandatory fortification of breads with folic acid in New Zealand was put on hold for 3 years in 2009. In the interim, bread manufacturers were requested to adopt greater voluntary fortification and agreed to add folic acid to approximately one third of their bread range. We sought to evaluate the potential impact of increased voluntary fortification of bread and the proposed mandatory fortification programme on folate intake adequacy of reproductive age women.

Methods: This study used baseline dietary data from 125 healthy non-pregnant New Zealand women (18-40 years) enrolled in folate intervention trial conducted in 2008. Three-day weighed food records were used to collect dietary data, and folate intakes [folic acid, natural food folate and dietary folate equivalents (DFEs)] were determined based on the following 3 fortification scenarios: i) voluntary fortification of bread as of 2008 (6 breads); ii) increased voluntary fortification of bread as of 2011 (34 breads), and iii) mandatory fortification of all breads. Estimates of participants' usual intakes adjusted for within-person variability were generated for each scenario, and the prevalence of folate inadequacy was calculated using the EAR cut-point method.

Results: Usual median folate intake of participants in 2008 was 362 μg DFE/d. Adoption of greater voluntary bread fortification lead to a significant albeit marginal increase in folate intakes (394 μg DFE/d), and a decline in inadequacy from 37% to 29%. Simulated mandatory fortification resulted in an increase of 89 μg folic acid/d, which substantially shifted the distribution of overall folate intakes, and produced a marked reduction in the prevalence of inadequacy to 5%.

Conclusions: Our results show that increased voluntary bread fortification efforts are far inferior to mandatory fortification as a reliable public health intervention.

Key words: folate intake adequacy, folic acid fortification, reproductive-age women.

PO1644

AN EVALUATION OF ANTHROPOMETRIC MEASUREMENTS, KNOWLEDGE, ATTITUDE, AND PRACTICES SCORES OF DIET AND NUTRITION AT DIFFERENT TYPE WORKSITES IN TAIWAN

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Background and objectives: For a workplace health promotion programme to be effective, it should address their needs before intervention. This study was undertaken to evaluate whether the anthropometric measurements, knowledge, attitude, and practices (KAP) scores regarding diet and nutrition have differences among different type worksites.

Methods: Eight workplaces from Taiwan East, South, North and Middle area were selected. Body weight and waist circumference (WC) were measured, and a pre-tested KAP questionnaire comprising of 51 questions (knowledge 15, attitude 10, and practice 26) was administered to those employees. One-Way ANOVA and Duncan's multiple range tests were used for statistics.

Results: Two high-tech companies, four government agencies and two operating factories with total of 840 subjects, 376 males and 455 females completed the KAP questionnaire and related measurements. Data indicated that KAP scores varied among 3 different type workplaces significantly ($p<0.0001$ for both K and P scores and $p<0.01$ for A score), and also between male and female employees ($p<0.0001$ for P score and $p<0.05$ for both K and A scores). Operating factories has the lowest K and A score, and both high-tech companies and operating factories have lower P score than government agencies. After age and sex weighted, employees in high-tech companies have the highest WC although their BMI and total body fat are similar to the other workplaces employees ($p<0.05$).

Conclusions: This study demonstrated that diet and nutrition knowledge is limit in certain type workplaces like operating factories, and for the other type workplace like high-tech companies, to set up a supportive environment may be the most important.

Key words: KAP scores, workplace, body weight, waist circumference.

PO1645

THE POTENTIAL FOR NUTRITION-ORIENTED VALUE CHAIN ANALYSES TO INFORM DIET-RELATED CHRONIC DISEASE PREVENTION: AN AUSTRALIAN PERSPECTIVE

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Background and objectives: Nutrition-oriented value chain analysis involves mapping the processes, actors, and value-adding activities involved in specific agri-food chains, analysing actor relations, power, and governance dynamics, and identifying the implications for nutrition. The approach offers significant potential for identifying leverage points within agri-food systems to integrate nutrition goals, and therefore as an upstream approach to reducing the global malnutrition burden, including the rapidly growing burden of diet-related chronic diseases. To-date, nutrition-oriented value chain studies have focused on relatively short food chains within rural communities, and have been minimally applied to long, processed food chains crossing international borders.

Methods: A nutrition-oriented global value chain framework was applied to a case-study of Australia's canned deciduous fruit supply. The case study encompassed both domestically-supplied and imported canned and packaged deciduous fruit products retailed through Australia's two major supermarket chains. Data from semi-structured interviews conducted with fifty-five key informants in Australia and South Africa, including primary production, processing, retail and government sector representatives, were analysed using thematic coding together with secondary data from industry and government sources.

Results: The analyses identified increasing concentration and tighter vertical coordination of the canned deciduous fruit value chain, increased international competition, an increasingly dominant role of retailer private labels, shifting government priorities, and changing consumer demands for processed fruit products. These dynamics have converged to drive processor and retailer sourcing, product development, and marketing strategies. The nutrition implications are not straightforward. While there has been some healthier product formulation, there has been growing emphasis on the promotion of convenience products, snacking, and expanding eating occasions, with greater potential for over-consumption.

Conclusions: Processed foods are a major component of Australian diets. Value chain analyses can contribute important insights into the multiple, inter-related forces shaping processed food chains, food environments and diets.

Key words: Processed foods, chains, chronic diseases

PO1646

NUTRITIONAL STATUS OF CHILDREN 6-59 MONTHS BY SOCIO-ECONOMIC GROUPS IN THE PHILIPPINES: POLICY IMPLICATIONS

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Background and objectives: The Food and Nutrition Research Institute conducts every 5 years National Nutrition Surveys to determine the nutritional status of different population groups and related factors like socio-economic index. This study aims to determine the association of socio-economic index and nutritional status of children.

Methods: The study used the data from the 2008 National Nutrition Survey. Nutritional status of children were determined using WHO-Child Growth Standards while the household's economic status was measured using wealth index. Multivariate statistical analysis was used to determine the wealth index of the household using easily measured variables such as household amenities, characteristics of housing unit and household head characteristics. Wealth index were then grouped into quintilesto associate to the nutritional status of children.

Results: Nutritional status of the children differs by wealth quintile. Prevalence of underweight and underheight decreases as the wealth quintile increases, while the prevalence of overweight increases as the wealth quintile increases. Prevalence of underweight among 6-59moschildren at the 1st and 5th quintile were 32% and 7.2% respectively while underheight were 51% and 12.7%, respectively. Overweight were 1.8% and 10.3% among the 1st and 5th quintile, respectively.

Conclusions: Children at the lower socio-economic status had higher prevalenceof underweight and underheightthan that of thehigher socio-economic status. Prevalence of overweight was higher among children in higher socio-economic groupsthan those in the lowerstratum. Program policies on improving nutritional status of the poor must be coupled with poverty alleviation programs for better sustainability. Intensive programs in improving lifestyle practices among the rich people must be installed.

Key words: wealth index, underweight, underheight, overweight.

PO1647

INVERSE ASSOCIATION BETWEEN SOY PRODUCTS CONSUMPTION AND INSULIN RESISTANCE IN JAPANESE ADULTS.

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Background and objectives:: To examine the association between soy food consumption and insulin resistance among Japanese population.

Methods: This cross-sectional study included 409 men and 145 women, with age of 35–69 y, living in Tokushima prefecture, in Japan, during 2005–2010. The authors obtained information about life style characteristics including soy food intake and self-reported medical history using a structural self-administered questionnaire, and fasting blood samples. The prevalence of insulin resistance at baseline was calculated. Insulin resistance was evaluated using the index which is the homeostasis model assessment of insulin resistance (HOMA-IR). In HOMA-IR, the person with insulin resistance was defined as person with HOMA-IR>=2.5. The level of insulin resistance was also compared among the groups with regard to differences in soy product intake. Multiple logistic regression models were used for analyzing the association between soy product intake and prevalence rate of insulin resistance.

Results: Total unsweetened soy product and total soy product intake showed significant inverse dose-response relationships with insulin resistance, after adjustments for potential confounders. Soy product intake had inverse association with insulin resistance in Japanese adults, significantly. Furthermore, this association was shown only among Japanese population with BMI<25kg/m2.

Conclusions: The present findings suggest that total unsweetened soy product and total soy product intake was associated with reduced risk of insulin resistance. The results also support the idea that soy product, especially total unsweetened and non-fried soy product, reduced risk of type 2 diabetes through improving insulin resistance among subjects with BMI<25kg/m2.

Key words: Insulin resistance, Soy product intake, Medical checkup, a cross-sectional study.

PO1648

MONITORING CORPORATE INFLUENCE: AN ASSESSMENT OF THE POLICIES AND ACTIONS OF PRIVATE SECTOR ORGANISATIONS WITH RESPECT TO FOOD ENVIRONMENTS

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Background and objectives: Private sector organisations play a critical role in shaping food environments; however, their actions are not currently systematically monitored. This paper proposes a monitoring framework and reports results of an assessment of the extent to which the policies and actions of private sector organisations are affecting food environments and influencing obesity prevention efforts. The framework has been developed by the International Network for Food and Obesity/NCD Research, Monitoring and Action Support (INFORMAS) that is setting benchmarks for creating healthy food environments.

Methods: The corporate accountability literature and previous studies that have monitored food companies were reviewed, and a step-based approach to monitoring private sector policies and actions proposed. Using the proposed approach, pilot study data was collected and analysed for a selection of large food companies in Australia and New Zealand.

Results: 'Minimal' monitoring activities assess the extent to which the publically-available, nutrition-related policies of selected private sector organisations in each country compare to current good practice. 'Expanded' monitoring activities assess nutrition-related actions (including nutrient composition of products, and marketing and labelling activities) of private sector organisations. 'Optimal' monitoring activities assess other commercial activities that influence food policy and action, such as political lobbying and sponsorships. Results from the 'minimal' step for Australia and New Zealand show that many of the largest food companies either do not have nutrition policies or they are not publically-disclosed. Where they exist, company policies are typically weak and are unlikely to improve public health.

Conclusions: It is imperative that private sector organisations are held to account for their role in influencing food environments and contributing to obesity prevention. A structured, standardised approach to monitoring will enable international benchmarking and comparisons of private sector policies and actions.

Key words: obesity, food environment, monitoring, private sector.

PO1649

SODIUM LEVELS IN PRIVATE LABEL FOODS COMPARED TO NATIONAL BRANDED PRODUCTS IN AUSTRALIA

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Background and objectives: Reducing sodium levels in processed foods is proposed to reduce the risk of cardiovascular disease. An increasing proportion of Australian processed foods are private label products manufactued for grocery retailers. We compared average sodium levels of private label and national branded foods.

Methods: Sodium data for packaged foods in five Australian supermarkets were collected from product labels in 2008 and 2011. The change in mean sodium content between years was calculated for private label and national branded products and compared. Analyses were done overall and for 10 food categories.

Results: Data were available for 7016 products in 2008 and 7641 in 2011. 23% and 27% were private label products in each year, respectively. The overall mean sodium content for private label products was not significantly different between 2008 and 2011 (405mg/100g vs. 381mg/100g; p=0.15) but rose for national brands (492mg/100g vs. 567.17mg/100g; p<0.001) (p=0.001 for difference between private label and branded products). In 2011 the mean sodium content of private label products was 186mg/100g (p<0.001) lower. That year, private label products had significantly lower sodium levels for 4 of the 10 categories studied (bread and bakery, cereals, fish products, sauces and spreads; all p<0.010) and national branded products for two (meat products, edible oils and emulsions; both p=<0.02). There were no significant differences for convenience foods, snackfoods, fruit and vegetables, or dairy.

Conclusions: Overall, private label are less salty than national branded products. How the grocery retailers have achieved lower salt levels in their products, or why it has been achieved for some food categories and not others is unclear. It is, however, unlikely to be chance and working with the retailers may provide an opportunity to improve the quality of the Australian food supply.

Key words: Private label, national brands, sodium.

PO1650

WEIGHT CONTROL ATTEMPTS IN UNDERWEIGHT KOREAN ADULTS: KOREA NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY, 2007-2010

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Background and objectives: Underweight refers to the weight range in which the health risk can increase, since the weight is lower than the healthy weight. Negative attitude towards obesity and socio-cultural preference for thinness could induce even underweight persons to attempt weight control. This study was conducted to investigate factors related to weight control attempts in underweight Korean adults.

Methods: This was a cross-sectional study on 690 underweight adults aged 25-69 years using data from the Korea National Health and Nutrition Examination Survey, 2007-2010. Body shape perception, weight control attempts during the past one year, various health behaviors, history of chronic diseases and socioeconomic status were surveyed.

Results: Underweight women had a higher rate of weight control attempts than underweight men (25.4% vs. 8.1%; P<0.001). Among underweight men, subjects with the highest physical activity level (OR: 8.03), subjects with physician diagnosed history of chronic diseases (OR: 6.76) and subjects with other jobs (OR: 9.42 with reference to manual workers) had a higher likelihood of weight control attempts. Among underweight women, subjects who did not perceive themselves as thin (OR: 4.95), subjects with the highest household income level (OR: 2.16) and unmarried subjects (OR: 1.99) had a higher likelihood of weight control attempts.

Conclusions: This study shows that numbers of underweight Korean adults have ever tried to control weight, especially women. Seeing that there are gender differences in factors related to weight control attempts in underweight adults, gender should be considered in helping underweight adults to maintain a healthy weight.

Key words: underweight, body shape, weight control, Korea National Health and Nutrition Examination Survey, socioeconomic status.

PO1651

THREE YEAR-OLD HEAD START PRESCHOOLERS LEARNED AND SHARED POSITIVE BEHAVIORS WITH THEIR CAREGIVERS AT SCHOOL AND AT HOME

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Background and objectives:: In contribution to childhood obesity prevention strategies, this project focused on preschoolers and their caregivers. The objectives are to: Implement teaching strategies easy to be remembered by the preschoolers; assess the influence of storytelling and songs on the consumption overtime of fruits and vegetables among the preschoolers in school and home environment.

Methods: A 2-year longitudinal study at Head Start, Princess Anne, Maryland, involved: 102 three-year old preschoolers, 6 classrooms, 17 children per classroom, 6 teachers, 1cafeteria staff, 50 parents, food demonstrations, and gardening activities. Cooperative Extension educators taught, each semester, the Eagle Books Series stories (4books) published by the Center for Disease Control. Three menu cycles were offered per year. Three, five, and four F&V items were introduced in the lunch menu respectively in cycle 1, 2, and 3; each item was repeated twice. The plate method helped to measure the F&V consumption. Qualitative data, pre and post survey, descriptive statistics, one way ANOVA (SPSS.20), and content analysis were used for data collection and analysis.

Results: Approximately 90% of preschoolers improved their knowledge in nutrition and gardening. F&V consumption percentage is calculated as the average consumption of each food over its initial weight. The top five are: Strawberries 72%, Clementine 67%, Spinach 62%, Cucumber 62%, and Broccoli 58%. One-way ANOVA and POSTHOC analysis at ALPHA (0.05) indicated an average consumption increased for Spinach, clementine, and broccoli by respectively 20, 30, and 28%. At least there was one significant difference between two classrooms per F&V item. Qualitative analysis indicated two main patterns: "Sharing messages"; and "Initiating positive behavior changes."

Conclusions: The preschoolers' preferences, consumption, and ability to identify F&V increased through storytelling and songs. An impact on their caregivers' F&V consumption was observed. A larger sample size is needed to confirm the results.

Key Words: Preschoolers, caregivers, nutrition, behavior.

PO1652

NUTRITION EDUCATION PROGRAM TO PROMOTE HEALTHY DIETARY HABITS AMONG ELEMENTARY STUDENTS.

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Background and Objectives: In order to investigate nutrition education programs to promote healthy dietary habits among early elementary school students, we aimed to determine sequence effects on learning, i.e., the influence of switching the order of lecture- and activity-based sessions within a program on students' comprehension and practice of the learning content.

Methods: The study was conducted with 61 second-grade elementary school students (32 boys and 29 girls) at schools Y and T (33 and 28 students, respectively). The students at school Y were first given lecture- and then activity-based sessions with the program theme 'Eat vegetables at breakfast, ' while those at school T were given in the reverse order. These students filled out questionnaires before and after the program regarding their eating practice and feedback about the program, and the responses were analyzed for sequence effects.

Results: 1. In school Y, in which the students were first given a lecture-based session, the number of students who reported 'having more than three vegetables they disliked' increased after the program ($p<0.05$). 2. In school T, in which the students were first given an activity-based session, the number of students who reported 'having eaten foods from the 'Red Food Group, ' including protein-rich foods such as meat, fish, and eggs ' increased after the program ($p<0.05$). 3. In school T, the students reported a significantly greater 'number of vegetables ever eaten at home' after the program ($p<0.05$), suggesting that greater familiarity with the names of vegetables through the food experience may lead to an increase in the number of vegetables reported.

Conclusions: These results suggest that elementary school students' interest and motivation can be greatly enhanced when they are given an activity-based session first, as well as their participation in the subsequent lecture-based session.

Key words: Nutrition Education Programs, Sequence, Elementary School Students.

PO1653

INFANT AND YOUNG CHILD NUTRITION IN BANGLADESH: COUNTRY SITUATION ANALYSIS

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Background and objectives: Bangladesh has nearly succeeded in achieving the Millennium Development Goal particularly in reducing child mortality but improvement in overall child nutritional status has been slow over the years, it is increasingly facing challenges of population growth, climate change impacts, vulnerability of price shocks and persistent poverty, food insecurity and malnutrition. The objective is to discuss the background of practices, achievements and way forward of Infant Young Child Nutrition in the community of Bangladesh.

Methods: This study is obtained through reviewing the available primary source documents.

Results: Bangladesh Demographic & Health Survey 2011 data represents that, 41 % of children under five are stunted and 36% were underweight. Age-specific data on stunting, underweight and wasting show a significant increase in the first 2 years of age, with little change thereafter. Anemia peaks at 6-11 months of age, demonstrating the importance of first 2 years age window for interventions. The prevalence of under nutrition amongst extreme poor household is higher; about 23% of children and close to 50% is wasted and stunted. There has been an apparent increase in exclusive breastfeeding, from 43 % in 2007 to 64 % in 2011. However the problems of complementary feeding remain. Around 40% of children are receiving an adequately diverse diet and consuming iron-rich foods in their complementary foods. Overall, 21 % of children age 6-23 months is fed appropriately according to recommended 3 IYCF Practices. In a proactive response to the situation, the Government of Bangladesh made nutrition as a priority for The Health, Population and Nutrition Sector Development Programme.

Conclusions: There is still significant room for acceleration in programming to improve infant and young child nutrition. This includes both increasing and sustaining good breastfeeding practices as well as interventions to improve complementary feeding.

Key words: Stunting, Wasting, underweight, IYCF.

PO1654

HEALTH SECTOR STRATEGY FOR ADDRESSING MATERNAL UNDERNUTRITION IN NEPAL: FROM CAUSAL ANALYSIS TO STRATEGIC APPROACHES

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Background and objectives: Eliminating maternal undernutrition still remains a challenge in Nepal, as many women continue to suffer from chronic energy and micronutrient deficiencies. The efforts till date to address it have been fragmented and focus mainly on micro-nutrient supplementation. The strategies, approaches and programme options for improving the nutritional status of women have not clearly been defined. This paper describes the process through which a comprehensive health sector strategy for addressing maternal undernutrition was developed for the country.

Methods: The Ministry of Health and Population, formulated a core group, comprising of researchers, program managers and experts, under the Nutrition Technical Committee, to review and compile the global and national evidence, lessons learnt and gaps in existing interventions. Detailed contextual causal analysis lead to the identification of strategic approaches, which were unique and relevant to the local context. Stakeholders' ownership was garnered through series of meetings and two national workshops.

Results: A causal analysis explored four dimensions, dietary factors, care and practices, health and environment, and socio-cultural norms. It identified adolescent girls, pregnant and breastfeeding women as priority groups. Factors beyond the purview of health sector were listed under cross cutting issues to be addressed through involvement of other sectors inline with the Multi-sectoral Nutrition Plan of the Government. Based on the above exercise, five major strategic approaches were identified namely, building institutional as well as human resource capacity, integrating maternal nutrition in the existing key health programmes and beyond, including community based approaches, improving communication and strengthening nutrition monitoring and surveillance. The strategy is currently in the process of being endorsed by the government.

Conclusions: This strategy will improve nutritional status and health of adolescent girls, pregnant and breastfeeding women, through accelerating and sustaining reductions in chronic under-nutrition and micronutrient deficiencies.

Key words: Maternal Undernutrition, Causal Analysis, Strategy, Nepal.

PO1655

PREVALENCE AND DETERMINANTS OF METABOLIC SYNDROME AMONG POST MENOPAUSAL WOMEN IN RURAL AREA OF NORTHERN BANGLADESH

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Background and objectives: Postmenopausal period creates special risk for diabetes and cardiovascular diseases due to various physiological, socioeconomic and psychological factors. The present study was aimed to explore the prevalence and determinants of metabolic syndrome (MS) among postmenopausal women in rural area of northern Bangladesh.

Methods: A total of 316 postmenopausal women, amenorrhea for >2 years and non user of HRT were selected from 27 villages of two randomly selected unions of Pirganj sub district.

Results: The overall prevalence of MS was found 7.6%, 41.5% and 26.9% according to WHO, ATP III and IDF. Prevalence of hypertension were 35.1%, 42.7%, 42.7%; diabetes were, 100%, 49.6%, 40.0%; hypertriglyceridemia were 66.7%, 71.0%, 61.2% and low HDL-C were 54.2%, 91.6%, 89.4% using the criteria of WHO, ATP III and IDF. Subjects with MS consumed huge rice (93.5% for 2-3 times/day), low protein (animal source >90%, never/week) and (plant source 50%, 1-2 times/week), low green leafy vegetables and fruits (>40%, 3-6 times/ week). According to WHO, women of 10-15 years since menopause were 4 times and >15 years were 5 times increased the risk of MS {OR (95% CI): 4.070 (1.02– 16.23), p= 0.04 and 5.626 (1.06– 29.85)}. In ATP III criteria, family history of hypertension {OR (95% CI): 0.299 (0.09- 0.91) p= 0.03} were involved in the development of MS though family history of CVD 3 times increased the risk of MS [OR (95% CI): 3.8 (1.3–11.2) p=0.01].

Conclusions: The data indicate an alarmingly high prevalence of metabolic syndrome in rural area of northern Bangladeshi postmenopausal women using the modified ATP III and IDF definition. More than 10 years since menopause onset, family history of CVD and hypertension seem to be the determinants for development of metabolic syndrome among this population.

Key words: Metabolic Syndrome, Postmenopausal women.

PO1656

SEPARATING SATIETY AND SATIATION IN APPETITE CONTROL: EFFECT OF EXERCISE IN OVERWEIGHT AND OBESE ADULTS

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Background and Objectives: Exercise influences mechanisms of appetite control. This study examined the impact of 12 weeks supervised exercise on 2 aspects; meal size (satiation) and the postprandial effects of food (satiety) under high and low energy density conditions.

Methods: Overweight and obese participants matched for BMI, age and sex completed 12 weeks of supervised exercise (EX n=15) or 12 weeks of no exercise (NEX n=15). The exercise program was designed to expend 2500kcal/wk at 70% HRmax. Appetite control was examined using separate validated procedures to assess satiation and satiety. Satiation was assessed using a test meal paradigm with energy density (ED) manipulated using high or low fat meals. Satiety was measured using appetite ratings adjusted for energy intake to calculate the satiety quotient (SQ). Measures were also made of appetite-related peptides (e.g. fasting PYY, GLP-1) and body composition (FM, FFM).

Results: The 12 week program led to significant reductions in body and fat mass (EX, -1.7±2.8 and -2.2±2.7kg) compared with (NEX 0.49±2.4 and 0.06±3.1kg) ($p<0.0001$). There was a significant effect of ED on meal size and total daily energy intake in both groups ($p<0.0001$), but no difference between EX and NEX. Therefore, exercise did not influence satiation. However, there was a significant increase in SQ with EX but not NEX ($p=0.041$). Exercise induced body fat loss was associated with increases in PYY (25.6±12.3 ng/L) ($p=0.025$) and GLP-1 (11.1±5.0 ng/L) ($p=0.05$).

Conclusions: Satiation and satiety are independent components of appetite control. Exercise (but not NEX) increased the SQ indicating upregulation of post-meal satiety signalling. Satiation was strongly determined by the energy density of meals but was not affected by exercise.

Key words: Satiety, Satiation, Appetite control, Exercise, Peptides.

Funding: Biotechnology and Biological Sciences Research Council (BB/G005524/1) and European Union 7th Framework Programme (FP7/2007-2012; 266408).

PO1657

DIET QUALITY, WATER AND TOILETS: WHAT ROLES FOR CHILD UNDERNUTRITION IN INDIA?

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Background and objectives: Infant and young child feeding (IYCF) practices are critical to child nutrition. Emerging evidence is suggesting important roles for water, sanitation and hygiene (WASH) too. Less is known, however on the intersection of these two inputs. We studied the joint effects of IYCF and WASH on child nutrition in India using national data.

Methods: We used data from ~18, 463 children 0-23.9 month old from the 3rd round of India's National Family Health Survey. Outcomes: child height-for-age, weight-for-age, weight-for-height z-scores (HAZ, WAZ and WHZ), stunting, underweight and wasting. Main predictor variables: IYCF indicators (breastfeeding and complementary feeding) and WASH indicators (water source, toilet type, disposal of child stools). Linear and logistic regression analyses were used, accounting for clustering. We tested for interactions between IYCF and WASH variables, adjusting for child, maternal and household characteristics and state and urban/rural residence.

Results: Toilet type (TT), child stool disposal (CSD) and diet diversity (DD) were independently associated with nutritional outcomes; drinking water or breastfeeding were not. The effects of DD and TT indicators are not independent, though; better DD and access to improved toilets together led to better nutritional outcomes. Also, improved DD was protective for HAZ and WAZ where TT was unimproved. However, for some combinations of IYCF-WASH, there is a larger main effect of improved sanitation; for others, IYCF is more strongly associated with nutritional outcomes than the sanitation indicators.

Conclusions: In summary, a positive synergistic effect of better complementary feeding and better toilets is seen for all anthropometric indicators, but not for improved drinking water or better ways of disposing child stools. Additionally, IYCF is protective against poor sanitary conditions for most outcomes. Interventions that address IYCF and sanitation constraints to child growth simultaneously can have greater impact than either alone.

Key words: India, child growth, IYCF, sanitation.

PO1658

ENABLING POLICY ENVIRONMENTS FOR INFANT AND YOUNG CHILD FEEDING AND NUTRITION: THE ROLES OF ACTORS, NETWORKS, NARRATIVES AND DATA

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Background and objectives:: Policy support and advocacy can help to shape the environment for infant and young child feeding in developing countries. Alive & Thrive aims to improve IYCF through community-based behavior change communications, supported by policy advocacy in Bangladesh, Ethiopia, and Vietnam. Using a framework to assess factors contributed to issue ascendance on policy agendas, we assessed the policy environment in 2010 to be able to capture shifts in the policy environment at a later point.

Methods: We gathered data on four enabling factors for issue ascendance on policy agendas: actors, ideas and narratives, policies, and issue characteristics. A participatory stakeholder network-mapping methodology generated data on actor networks and actor power. Stakeholder interviews and document reviews generated data for the other framework domains.

Results: Characteristics of policies and policy environments for IYCF varied across the 3 countries. Actor networks were more complex in Bangladesh, where IYCF has been on the agenda for years, less cohesive in Ethiopia, where attention has been on acute malnutrition and famines, and characterized by clear differences between national and international actors in Vietnam. Data highlighted the poor understanding of IYCF and nutrition among opinion leader, and the role of issues like marketing of breast milk substitutes. The poorer status of all IYCF indicators in Bangladesh and Ethiopia suggested that both breastfeeding and complementary feeding would be amenable to insert into the policy discourse. In Vietnam, indicators were not as poor, except for exclusive breastfeeding.

Conclusions: The framework used demonstrated strong utility for a policy environment assessment and highlighted critical areas in the policy environments to move the IYCF and nutrition agenda forward. The stakeholder network-mapping tool, specifically, illuminated the critical role of individuals, agendas, and network characteristics in enabling movement of the IYCF agenda.

Key words: IYCF policy, enabling environment, Alive & Thrive, Bangladesh, Vietnam, Ethiopia.

PO1659

MENU LABELING IN "OUT-OF-HOME" SECTOR: OPPORTUNITIES, BARRIERS, AND NEEDS WITH RESPECT TO USE OF HEALTH COMMUNICATION IN RESTAURANTS

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Background and objectives: about 30% of the energy intake in the Netherlands is consumed in the "out-of-home" sector. Although commonly used in supermarkets and part of the "out-of-home sector", health logos are not used in traditional restaurants. This study investigates the possibilities of menu labeling (ML) in restaurants as a tool to facilitate a healthy choice.

Methods: 4 restaurants and 90 potential guests participated in 2 qualitative studies. 1)Rogers "Diffusions of Innovations Theory" of (restaurant tenants, chefs and serving personnel) and 2) Rogers "Theory of Planned Behavior"(potential guests) were used for a systematic questionnaire.

Results: the restaurant tenants considered "competitiveness" an opportunity of ML. For chefs "creativity" was an opportunity, and for serving personnel, it was "the easy supply of health information" to guests. Barriers for using ML were "complexity", and the fact that restaurants are often visited for indulgence reasons. The most important needs with respect to ML were: " central coordination" (tenants), "help in recipe calculation" (chefs) and allergen /sustainability information (serving personnel). Restaurant stakeholders indicated a preference for symbols, rather than calorie content. Potential guests indicated that ML would help them to make healthier choices. Their interest, however, depended on the reason for eating out: in a business setting guests were more interested in ML than in a social setting.

Conclusions: The study showed opportunities for menu labeling as a way to facilitate a healthy choice for consumers. "Competitiveness" and "creativity" are possible opportunities for restaurant stakeholders, "complexity" and "indulgence as reason to eat out" potential barriers.

Key words: menu labeling, health communication, out-of-home, restaurants.

PO1660

COMPLEMENTARY AND ALTERNATIVE MEDICINE USE AMONG PEOPLE LIVING WITH HIV AND AIDS (PLWHA) IN LEBANON

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Background and objectives: Although the antiretrovirals have improved the quality of life of HIV/AIDS patients and reduced morbidity and mortality, these drugs are not always accessible and pose significant side effects. Therefore, PLWHA are increasingly seeking alternative and complementary medicine (CAM). Only few reports on CAM use among HIV-infected patients are available in the Middle East and North Africa Region. The objective is to assess the prevalence and determinants of CAM use among PLWHA in Lebanon.

Methods: A cross-sectional survey design was used to carry out face-to-face interviews with 116 HIV infected patients attending various NGO in Lebanon. The questionnaire comprised three sections: the socio-demographic, disease characteristics, and information on CAM use, its types and modes. Data analysis employed descriptive statistics, t-test, and chi-square.

Results: Overall, 46.6% of the participants reported using one or more CAM therapies since diagnosis with HIV/AIDS. CAM users had a higher education level as compared to non-users (68.5% vs 32.3% had a high school/university degree, $P < 0.01$). The most commonly used CAM therapies included vitamins and minerals (61.1%) and herbs/natural products (63.0%). Most of survey participants used CAM as a complementary basis (79.6%). A major proportion of the participants did not report using CAM to a health care professional (44.4%). The main reason for not reporting was that participants did not need the doctor's approval to purchase the CAM (70.6%).

Conclusions: A significant number of HIV patients are using CAM in Lebanon. In addition, an alarming proportion of these patients did not report using CAM to a health care professional. Therefore, efforts should be made to increase awareness of health care professionals on risks of CAM therapies in order to provide proper advices and recommendations to PLWHA.

Key words: HIV, AIDS, complementary and alternative medicine (CAM), Lebanon.

PO1661

NATIONAL SURVEY OF INSTITUTIONALIZES SOCIALLY DEPRIVED CHILDREN AGED 0-3 YERS IN BULGARIA

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Background and objectives: Institutionalization has proven negative impact on all aspects of children's development -intellectual, physical, behavioral and social emotional. Reducing the number of children in orphanage is a priority of theBulgarian government. At the time of this study there were 32 social institutions with a total number of 3550 infants and young children aged 0-36 months. The aim was to identify key nutritional and developmental problems of children aged 0-3 years reared on institutions to support public policies of deinstitutionalization.

Methods: A national survey on a representative sample of 449 children aged 0-36 months distributed across the four age groups 0-6, 6-12, 12-24 and 24-36 months in eight orphanages in Bulgaria was conducted. The sample size was determined based on the expected prevalence of anemia in infants with a relative precision of 5% and confidence level of 95%. The study involved assessment of nutrition and complimentary feeding, anthropometric and psychological measurements, hemoglobin and iodineuria.

Results: The mean Z-scores of H/A, W/A and W/H for all children were -1.31, -0.45 and -1.29 being lower among boys. The prevalence of H/A below 2 Z-scores was 26.1% among boys and 32.4% among girls. The highest level of stunting was found among children 24-36 months both sexes. Significant difference ($p< 0.05$) was observed between mean H/A and W/A z-scores and Development Quotient of the low (<2500 g) and normal birthweight group (>2500 g) persisting until the end of third year. The prevalence of anemia was 32.3% being 52.3% among children 0-6 months. Iodineuria among 3-year old group was 111.5 μg/L.

Conclusions: Although in Bulgaria institutions for children up to three years are under the health authorities there were identified serious nutritional and development problems due to deprivation and inappropriate care and feeding practices.

Key words: infants and young children, institutions, malnutrition, Bulgaria.

PO1662

DRUG – NUTRIENT INTERACTIONS: EFFECT OF FOLIC ACID FORTIFIED DIETS ON THE EFFICACY AND TOXICITY OF METHOTREXATE

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Background and objectives: Mandatory Folic Acid (FA) food fortification can be associated to multiple potential unknown effects. Within them, raising folate status in patients may modify the response to therapy by antifolate drugs used in the treatment of chronic disease. Such is the case for Methotrexate (MTX), a "gold standard" in the treatment of Rheumatoid Arthritis. Hypothesis: Long term exposure to FA fortified diets modifies the efficacy and toxicity associated to low dose MTX treatment. The alterations are mediated by the effect of extra FA on folate metabolism, particularly on dihydrofolate reductase activity (DHFR), and the effect on xenobiotic metabolising enzymes.

Methods: Female Sprague Dawley rats (n=40) were fed either a standard diet (2 mg FA/kg diet) or a supplemented diet (60 mg FA/kg diet). After 4 weeks, animals were injected MTX (0, 2 mg/kg, i.p. every two days) for 8 weeks. Saline was used for controls.

Results: Animals fed a standard diet and treated with MTX exhibited significant weight reduction, reduced intake, inactivity, hair loss and low response to stimuli, as compared to controls. MTX treatment also provoked a significant reduction in haemoglobin and erythrocyte concentrations (86% and 82%) and a 78% reduction in haematrocrit ($p<0.001$ Anova and Tukey tests). Animals treated with MTX but fed a FA supplemented diet did not show apparent adverse effects and reductions in haematological parameters were significantly lower (35%, 25% and 21% reduction in haemoglobin and erythrocyte concentrations, and haematocrit, as compared to controls and other MTX treated animals ($p<0.005$ Anova and Tukey tests)). Preliminary data show no influence of FA supplemented diets or MTX treatment on CYP 450 hepatic concentrations.

Conclusions: Long term exposure to FA supplemented diets reduces anaemia and adverse effects induced by MTX treatment. Acknowledgements: this project is financed by Universidad CEU San Pablo.

Key words: Folic acid, methotrexate, fortification, drug-nutrient interactions.

PO1663

DEVELOPMENT OF NUTRITION EDUCATION PACKAGE ON CHILD CARE AND FEEDING PRACTICES FOR RURAL WOMEN IN ENUGU STATE, NIGERIA: A POSITIVE DEVIANT APPROACH.

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Background and objectives: The burden of nutrition related disease is greatest among the vulnerable and disadvantaged groups including rural women. The study describes the development of 12-lesson based nutrition education package for rural women in Enugu State.

Methods: The study involved 91 mothers in a community of Eha-Amufu, Enugu State. Mothers were classified as Positive Deviants (PDs) and Non Positive Deviants (NPDs) based on the nutritional status of their infants. Structured questionnaire was used to collect information. Summary findings from the Positive Deviant Inquiry (PDI) were used to develop the package. Data was analysed using descriptive statistics.

Results: More than half of the respondents (78.7%) and 21.3% were classified as NPDs and PDs respectively. The PDs had better feeding, caring and health-seeking practices than the NPDs. The nutrition education package developed had the following lessons: Growth monitoring, Malnutrition, Food Selection Techniques, Body building foods, Energy-giving foods, Protective foods, Infant nutrition, Management of childhood diarrhea, Immunization, Hygiene and Sanitation, Family Planning and Feeding during illness.

Conclusions: This developed package can be used in communities during intervention programmes on child-care and feeding practices.

Key words: nutrition education package, child care, feeding, rural women, Enugu.

PO1664

NUTRITIONAL RISKS RELATED TO DIETARY WEIGHT-LOSS PRACTICES

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Background and objectives: Today, the cult of the body is a social reality which pressurises the individual into accepting

aesthetic canons and social norms regarding the body. Moreover, overweight and obesity, which affect respectively 32% and 15% of people over 18 years of age in France, are a major public health problem. Our study enables an assessment of the risks related to dietary weight-loss practices.

Methods: First of all, we estimated the intakes (energy, macro and micronutrients) of the 15 weight-loss diets (WLDs) which are popular in France. Secondly, we conducted a review of the literature to identify the biological effects of possible nutritional imbalances, and the pathophysiological and psychobehavioural consequences of WLDs.

Results: This original work highlights the inadequate nutritional intakes (INI) of certain phases of WLDs when compared with recommended intakes, in particular concerning protein, dietary fibre, calcium and sodium. This INI can lead to different types of risks: High protein diets and sodium overload, in extreme situations, can cause metabolic acidosis result in urinary calcium leak; Very low-calorie diets may induce cardiac arrhythmia with a consequent risk of sudden death ; Low-carbohydrate diets are often associated with transient gastrointestinal disorders, particularly constipation. Moreover, some risks are independent of the type of WLD followed: Weight-loss practices have a detrimental effect on bone integrity; weight regain affects 80% of subjects after one year and increases over time; depression and loss of self-esteem are common psychological consequences of repeated failures in dieting.

Conclusions: Following a WLD is not a trivial act. Adverse short-, medium- or long-term consequences of following these diets should not be neglected, especially since they are unbalanced, associated with severe behavioural eating disorders, and may eventually lead to possibly irreversible weight gain.

Key words: Diets, weight-loss, risk assessment.

PO1665

CARDIORESPIRATORY FITNESS CHANGES AFTER A WEIGHT LOSS PROGRAM: EFFECTS ON HEMOGLOBIN AND HEMATOCRIT VALUES. RESULTS FROM THE PRONAF STUDY

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Background and objectives: Maximal oxygen uptake (VO-2max) is an important indicator of cardiovascular health1. Epidemiological studies have shown a strong relationship with cardiovascular diseases2. The purpose of this study was to evaluate if the change in cardiorespiratory fitness, hemoglobin and hematocrit values depends on the type of exercise developed during a six-month intervention program.

Methods: Two hundred obese and overweight subjects aged 18–50 years were randomly assigned to a strength training group (S), an endurance training group (E), a combined strength + endurance training group (SE) or a diet and physical activity recommendations group (C). The intervention period was 22 weeks (training groups trained 3 times/wk during22 weeks) and 2 weeks for pre and post evaluation tests. All subjects followed a hypocaloric diet (25-30% energy restriction)3.

Results: VO2max, hemoglobin and hematocrit values were not different between groups at baseline ($p>0.05$). At the end of the intervention, it was the SE group the one which showed greater % changes in the VO2max in absolute values (13±15.8%), and relative to the final weight (24.7±17.4%) and the final FFM (13.7±15.6%), compared to the rest of groups ($p<0.05$). The values obtained by SE group are the highest (41.02±8.59 ml/kg/min) compared with S (35.90±8.43 ml/kg/min), E (36.33±7.26 ml/kg/min) and C (36.17±7.28 ml/kg/min) ($p<0.05$) in all cases. However, no changes in hemoglobin and hematocrit values were observed ($p>0.05$).

Conclusions: Our results suggest that the combined strength + endurance intervention is the most suitable to increase the oxygen consumption in a six-month exercise and caloric restriction program. However, the increment was not due to changes in hemoglobin or hematocrit values.

Key Words: Oxygen uptake, weight loss intervention, obesity, overweight.

PO1666

THE MEDIA AND PUBLIC'S REACTION TO SCIENTIFIC EVIDENCE: A BREASTFEEDING CASE STUDY

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Background and objectives: When new scientific evidence is published, it is important that the public is made aware of these findings and recommendations. This usually involves the media as a translator to put the scientific evidence into layman's language. The accuracy of this translation is vital as demonstrated during the MMR vaccine and swine flu scares. This study aimed to investigate the media's translation of a review of the evidence of the effects of exclusive breastfeeding for six months (Fewtrell et al., 2011) in the British Medical Journal and to explore the reaction of the lay public.

Methods: A search was conducted to identify and quantify online television and newspaper reports, magazine articles and blogs/forum postings that discussed the Fewtrell article in the UK, over a three month period after publication of the journal.

The identified media were analysed qualitatively by identifying common themes.

Results: Seven online newspaper articles, four television channel website reports, six online forums and one online magazine blog were identified and investigated to establish themes. Seven common themes were identified relating to the media's interpretation of the evidence and the lay public's reaction. These included sensationalism, misinterpretation and contravention of codes from the media. Demonisation of industry was a theme for both the media and the public, whereas the mistrust of science, wanting to disproving evidence using personal stories and concerns about the implication of their own practice when following recommendations, were themes highlighted in the public discussion forums.

Conclusions: This case study highlights the vital role that the media plays in correctly translating scientific literature into layman's terms. If this does not happen as in this case, it is the trust in science that is questioned by the public, not the reliability of the journalists.

Key words: Media, Breastfeeding, Lay public, Online, UK.

PO1667

FAMILY FARMING AND THE QUALITY MENU OF THE NATIONAL SCHOOL NUTRITION PROGRAM (PNAE) IN BRAZIL

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Background and Objectives: The nutrition transition, which Brazil passed, was influenced by several factors, increasing demand for fast foods. Industrialization led to the development of agriculture, breaking with traditional methods of cultivation. National policies, such as the National School Nutrition Program (PNAE), appear as possible to assist in addressing the issues related to food production and consumption. The objective is analyze the relationship between the acquisition of the family farming food genre and the quality of the menu provided by PNAE, according to the methodology Award Efficient Public Manager of School Meals 2012 of Action Fome Zero.

Methods: This was a descriptive study, performed by database manager of the Award Efficient Public Manager of School Meals 2012.

Results: The South stands out in number of actions aimed inducement the Family Farming, with 7.1% having the maximum number of actions. The Northeast had the lowest prevalence for all these actions, with only 1.1%. Despite the greater incentive of family farming, the southern was the region with the highest prevalence of low grades (5.5%) and the South East was the region with top grades of the menu, but with a prevalence of 1.8% of actions family farming, indicating no direct relationship between acquisition of the family farming food genre with the quality of the menu offered to students.

Conclusions: There was no relationship between the amount of actions for the inducement of family farming with the quality of the menu offered to students, because even in regions such as the South, the quality of the menu was not better, compared to other regions of Brazil. This fact reveals the need for guidelines that point what foods should be purchased of Family Farming.

Key words: Food consumption. Food production. School feeding.

PO1668

LEVERAGING A NUTRIENT SUPPLEMENT TRIAL TO IMPROVE HANDWASHING BEHAVIOR

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Background and objectives: A conducive environment helps to establish new habits. Handwashing with soap is a difficult habit to develop in settings where soap and water is not conveniently available. We investigated the uptake of handwashing behavior as part of a lipid-based nutrient supplement (LNS) pilot trial.

Methods: Households (N=120) from a low income rural setting in Bangladesh, having at least one child aged 6-21 months, received LNS and handwashing promotion, which included handwashing stations, a device that provided soap and water together. Self reported LNS feeding practices and handwashing behavior were measured using surveys. We used spot checks to measure the proxy handwashing indicator- availability of soap and water at handwashing stations near kitchens. To examine the uptake of handwashing behavior, we calculated the relative difference (RD, 95%CI) from baseline to six months follow-up.

Results: Among caregivers, 78% reported feeding LNS using fingers, 5% mixed LNS with food, and 17% fed it directly from sachets. Caregiver's reported handwashing before feeding increased from 10% to 97% (RD=87%; CI:81, 93). Availability of soap and water at the handwashing stations near kitchens increased from 1% to 83% (RD=82%; CI:75, 90). Caregivers who fed LNS with fingers were more likely to have observed soap and water at handwashing stations near kitchens (88%) than caregivers who mixed LNS with food or fed directly from sachets (68%, RD=20%; CI:0, 41).

Conclusions: Using hands to feed infants is common in Bangladesh. An intervention promoting handwashing with soap during child feeding was effective in improving handwashing, as indicated by soap and water presence near kitchens. Feeding of LNS in the presence of a handwashing station can provide cues to support the development of a handwashing habit.

Key words: nutrient supplement, handwashing.

Acknowledgement: Study participants.

PO1669

ENGAGING THE MEDIA FOR EFFECTIVE NUTRITION EDUCATION

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Background and objectives: Although the mass media is effective for nutrition education, little nutrition-related issues appear in the Ghanaian media. This study was undertaken to determine the extent to which the Daily Graphic, Ghana's official and most widely circulated newspaper, paid attention to nutrition issues within a two-year period: 2006 to 2007.

Methods: The composite week sampling technique was used to select 144 editions out of a universe of 625 from 2006 to 2007 for content analysis. Straight news stories, features (including columns), editorials and letters to the editor were analysed for the coverage of nutrition issues. Coding was done for variables such as prominence, source, category and framing of nutrition stories.

Results: The Daily Graphic gave some attention to nutrition issues although coverage was not extensive. Out of 10, 624 stories in the editions sampled only thirty-three (0.31%) were nutrition related. Also, even though the Daily Graphic gave appreciable prominence in terms of space, headline sizes and accompanied photographs to the stories it published, the nutrition stories were unfavourably placed, as no nutrition story appeared on the front page and centre spread of the editions sampled. Straight news stories dominated; with relatively few in-depth feature stories. The largest story source came from invited events/programmes where mostly public servants or experts spoke. None of the stories came from a pressure/advocacy group.

Conclusions: To make impact on nutrition, professionals and nutrition educators should play more advocacy roles in engaging the media for nutrition education, as even brief episodes of news coverage can influence the public's health-related behavior.

Key words: Media, nutrition coverage, Ghana.

PO1670

USING THE MEDIA IN NUTRITION EDUCATION IN GHANA-THE CHALLENGES AND OPPORTUNITIES

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Background and objectives: The mass media is a vibrant medium for delivering nutrition education messages and has several advantages over other channels. However, little nutrition-related issues appear in the Ghanaian media. Given the growing prevalence of obesity and diet-related chronic diseases, concurrent with the continued high burden of malnutrition in Ghana, there is need for nutrition professionals to play a more active role in educating the general public on nutrition issues. I aim to share journalistic experiences on challenges and opportunities to effective nutrition communication through the mass media and highlight efforts to increase visibility of nutrition in the mass media in Ghana.

Methods: Literature review of the scientific and grey literature on topics related to nutrition education and the media in Ghana. This was supplemented with journalistic field notes and observations from interactions with nutrition professionals from 2005 to date.

Results: In 2009 only 0.31% of the news items in the largest state-owned newspaper were nutrition related. More recently it was found that only two of the 38 radio stations in the capital, Accra, carry nutrition programmes. Factors contributing to lack of media attention to nutrition include: nutrition professionals not being proactive in involving the media and shying away from media attention; journalists' preference to report on sensational stories and journalists often having difficulty understanding and translating nutrition information into meaningful news items.

Conclusions: Given growing public interest in diet/nutrition issues, there is need to address challenges faced by nutrition professionals and journalists in disseminating nutrition information through the mass media to enhance media coverage of nutrition issues.

Key words: Media, nutrition coverage, Ghana.

PO1672

SPORT AND PHYSICAL ACTIVITY MODIFICATION AND ITS RELATIONSHIP WITH RISK FACTORS IN A COHORT OF UNIVERSITY STUDENTS

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Background and objectives: Increased physical inactivity in regards to age is associated with health problems in the population. Unfortunately, global data regarding cardiovascular risk factors in the young are limited. Therefore the objective of this study was to analyze the change in the practice of sport and physical activity and its relationship with risk factors in students who entered the first year of high school (2007) and admission to Medicine College (2010).

Methods: The Universidad Nacional Autónoma de México applies the comprehensive survey of health to all their students. We analyzed the sport and physical activity, body mass index, smoking and alcohol consumption in the cohort of students who entered school in 2007 and three years later, when entering Medicine College.

Results: A total of 593 students (180 men) participated with a mean age at onset of 15.1 years old. The prevalence of physical inactivity in 2007 was 38.3% and increased to 39.9% in 2010. The results show that men are more physically active than women ($p < 0.05$). The change in BMI mean in men was from 22.3 to 23.4 ($p < 0.01$) and in women from 22.1 to 22.8 ($p < 0.01$). Overweight prevalence in sedentary men increased, and obesity decreased, contrary to what occurred in sedentary women in which overweight decreased but obesity increased. In the sedentary population, smoking increased in 4.9% and 36.7% in alcohol consumption. There was a 23% decrease of medical students who ran and 21.7% in soccer.

Conclusions: The change in sport and physical activity in a cohort of young people shows important changes in a short follow-up time; therefore, it is necessary in addition to their follow up, to promote health programs in this population.

Key words: Physical inactivity, BMI, University students.

PO1673

CHANGES IN RISK PROFILE FOR CHRONIC DISEASES IN UNIVERSITY STUDENTS FROM THE UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO

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Background and objectives: During the term, university students modify their eating and physical activity habits, with differences in risk conducts. The present study has as objective to contrast the behavior of some risk factors for chronic diseases in students from the Universidad Nacional Autónoma de México (UNAM), in high school and medical students.

Methods: To recognize the risk profile of students a survey on integral health values in high school (2007) and medical students (2010). Previous health problems were taken in consideration, as well as the intake of alcohol, smoking, overweight, obesity, and familial health problems.

Results: In total 593 students participated, 69.9% were women. Age range in high school was of 13 to 37 years. 97.3 % coursed high school in three years and the rest in four. 1.54 referred high blood pressure during high school, and 1.69 in medical students, 11.5% was considered as obese. The highest difference in BMI was in high school between 14 and 16 years of age. In three years, consumption of alcohol increased in 32% and smoking in 11.5%. During the periods, hypertension in relatives went from 24.1% to 30.4%, obesity from 27.6% to 31.3%, smoking from 24.5% to 24.9%, and type 2 diabetes mellitus from 12.8% to 16.2%, $p<0.01$.

Conclusions: Changes in risk factors those regarding the student population and those regarding their relatives during the study term, point out towards a higher risk for chronic diseases; it is vital to reduce these, acting upon the young may reduce future health damages.

Key words: Risk profile, Chronic diseases, Students.

PO1674

COMMUNITY-BASED MANAGEMENT OF SEVERE-ACUTE MALNUTRITION IN CHILDREN IN NON-EMERGENCY CONTEXT: EVIDENCE FROM A RETROSPECTIVE STUDY IN GHANA

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Background and objectives:: In 2007, the WHO recommended that community-based (CB) strategies were a more appropriate alternative to previous clinical programmes for treating children with severe-acute malnutrition. Evidence from the literature suggests that CB programmes have been implemented in many emergency situations and have proven effective. However in non emergency situations, very little evidence exists to inform integration and scale-up of programmes. This study analysed longitudinal data from Ghana to measure the outcome of CB programmes to treat severe-acute malnutrition in children under five years of age in a non-emergency, routine primary health services context.

Methods: Outcome data were obtained retrospectively through review of children's records. This include mortality, dropouts, recovery status and length of time spent in programme The programmes were implemented in selected rural and urban settings in Ghana. In total, the records of 525 children who benefited from the programme between June 2010 and March 2011 were reviewed. Data from 488 children were included in the final analysis. The main primary outcome (recovery from severe-acute malnutrition) was compared with Sphere standards.

Results: The acceptable recovery rate (Sphere standards) for therapeutic programme effectiveness is 75% or more, with <10% mortality and <15% default rates. The current programme achieved 69.2% recovery (95% CI: 67.0; 75.1), 28% dropout (95% CI: 24.1; 32.1) and 0.8 % mortality (95% CI 0.02; 1.6). Length of stay (Mean ±SD) was 4.8 ± 1.7 weeks (95% CI 4.6; 5.2). Daily weight gain (Mean ±SD) was 3.1 ± 0.9 (95% CI 2.9; 3.3). We found that children's baseline weight and MUAC were strong predictors of weight gain.

Conclusions: The findings suggest that CB programmes can be replicated in non-emergency contex with high recovery success, although dropouts are likely to be high which could affect overall programme impact.

Key words: Children, severe malnutrition, community-based programmes, treatment, non-emergency.

PO1675

HEALTH EFFECTS AFTER A TRAINING PROGRAM OF EXCERCISE IN PREPUBERTAL BOYS

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Background and objectives: The low physical activity (PA) may be a risk factor for cardiovascular disease even in children. The aim of this study was to assess the effect of a moderate intensity regulated PA on cardiorespiratory fitness (CRF) in a group of prepubertal children. Methods 18 healthy prepubertal boys 8-13y from a basketball club were selected. CRF was assessed by the Eurofit battery test, and PA by accelerometry. A training program during 10 months was developed: Anthropometric measurements by bioimpedance, blood pressure and biochemical parameters were measured at the beginning (precompetition), and at the end of the program (optimal CRF for competition).

Results: Comparing basal and final measurements, children decreased body mass index ($p<0.005$), percentage of body fat ($p<0.001$), and blood pressure levels ($p<0.02$ systolic, $p<0.008$ diastolic) and increased percentage of fat-free mass ($p<0.012$). Blood count, renal and liver function, and plasma lipid profile, were normal in all cases in both, basal and at the end of the program. Some children also improved serum iron levels or insulin. Regarding the sedentary habits, no significant differences were observed between baseline and the end of time, showing that 90% of children continued being sedentary. However, there was a significant improvement in oxygen consumption ($p<0.001$) and in the test speed values ($p<0.001$) and in the overall strength, improving their CRF.

Conclusions: The scheduled PA may improve CRF and health in prepuberal children. However, further studies are needed in children of different ages to establish the type of exercise, intensity and duration, which would improves fitness and cardiovascular and metabolic health, and also decrease sedentary habits.

Key words: Training program, exercise, fitness.

PO1676

ASSOCIATION BETWEEN STRESS AND DIETARY BEHAVIOUR AMONG FIRST YEAR UNIVERSITY STUDENTS IN AUSTRALIA

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Background and objectives: Studies have shown that a significant proportion of university students in Australia suffer from stress. Although many studies have reported an association between psychological stress and dietary behaviour, findings remain inconclusive. To date, data on the relationship between stress and dietary behaviour of university students in Australia are scanty. This study was designed to examine the relationship between stress and total dietary intake and food selection patterns among first year undergraduate students in an Australian university.

Methods: A total of 391 (173 males and 215 females) first year students attending Gold Coast Campus of Griffith University participated in this cross sectional study. Data were collected using a self-administered survey consisting of three sections: socio demographic questions, stress measures and a food frequency questionnaire.

Results: About 45% of the participants were found to suffer from some level of stress, with relatively more (54%) females than males (32.4%). In males, level of stress was found to be significantly ($p<0.05$) positively associated with frequency of consumption of cereal (r=0.17), brown bread (r=0.19), chicken (r=0.18), canned fish (r=0.15), protein powder (r=0.22), tea and coffee (r=0.16), wine (r=0.19), spirits (r=0.20) and mixed alcoholic drink (r=0.30). In females, level of stress was significantly ($p<0.05$) positively associated with the frequency of consumption of nuggets (r=0.14), hot chips (r=0.25), chocolate/muesli bar (r=0.16), pure fruit juice (r=0.15), energy drinks (r=0.18) and fizzy drinks (r=0.18), while leafy vegetables (r=-0.15), unsalted nuts (r=-0.17) and unsweetened yogurt (r=-0.16) consumption were negatively associated.

Conclusions: The results show a clear difference in food selection pattern between male and female students under stress condition. This difference could not be explained from the present study. Further research is ongoing using a qualitative approach to understand how stress affects eating behaviour among university students in order to develop appropriate interventions.

Key words: stress, nutrition.

PO1677

SMOKING HABITS IN PARENTS IS ASSOCIATED WITH HIGHER PREVALENCE OF OVERWEIGHT / OBESITY IN THEIR OFFSPRING. ALADINO STUDY

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Background and objectives:: To study the prevalence of overweight/obesity in Spanish schoolchildren, and to analyze the influence of the smoking habits of their parents.

Methods: We studied a representative sample of 7659 6-9-year-old Spanish children (3841 boys and 3818 girls). Weight, height, waist and hip circumference data were taken, and then calculated BMI, waist/hip and waist/height ratios. Overweight and obesity were defined according to the WHO Reference 2007 Growth Standards. Parents reported their smoking habits, and also the food frequency and activity patterns of their children.

Results: The 54.7% of children have non smokers parents (NS) compared to 15.6% with both smoker parents (2S) and 29.8% with only one smoker parent (1S). 2S children have higher BMI (18.3 ± 3.3 kg/m2) than NS children (17.8 ± 2.8 kg/m2, $p<0.05$). 16.4% NS children are obese versus 19.2% in 1S group and 22.8% in 2S ($p<0.05$ in all cases). NS children declared a higher consumption of fruits, vegetables, cheeses, eggs, breakfast cereals and bread, and lower of legumes, soft drinks, milkshakes, snacks, sweets, pastries and ready-to-eat and fast-foods than children with at least one smoker parent ($p<0.05$ in all cases). A higher percentage of NS children participate in extracurricular sports activities, and spend less time watching television.

Conclusions: The smoking habits of parents are associated with a higher prevalence of obesity in their offspring. This could be explained by the worst dietary habits and lifestyle of the children of smokers, especially when both parents are smokers. It is probably that smokers parents were less concerned about health and nutrition issues, and they could be adversely influencing on the health of their offspring.

Key words: Overweight, obesity, schoolchildren, smoker parents.

PO1678

SPANISH SCHOOLCHILDREN WHO SOMETIMES SKIP BREAKFAST HAVE POORER BREAKFAST QUALITY AND POOR DIETARY HABITS IN THE WHOLE DAY. ALADINO STUDY

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Background and objectives:: To study the influence of breakfast frequency on the quality of this meal and on dietary habits in Spanish schoolchildren

Methods: We studied a representative sample of 7659 6-9-year-old Spanish children (3841 boys and 3818 girls). Parents answered a questionnaire about the frequency, quality of their children's breakfast in a typical week, and the place where the children usually have this meal. The results were tabulated and analyzed using SPSS (v.19.0)

Results: 9.5% of schoolchildren usually skip breakfast at least one day in a normal week (NB), considering both parent and children answers. More children between those who eat breakfast every day (B) include in this meal a dairy product (81.4% versus 58.8% in NB), a cereal product (72.5% vs.56.8%) and fresh fruit or natural juice (13.4% vs. 10.2%, $p < 0.05$ in all cases). 50.9% of B children included two basic foods in their breakfast (out of dairy, cereal or fruit) versus 47.2% in NB group ($p < 0.05$), and 40.3% includes only one or none (compared to 48.2% in NB group, $p < 0.05$). The food frequency consumption of fruits, vegetables, dairy products, fish, breakfast cereals and bread is lower in NB children, while is higher for sodas, smoothies, snacks, candy and ready-to eat and fast food ($p < 0.05$ in all cases). Only 8.1% of children who have breakfast at home on schooldays skipped sometimes their breakfast, compared to 20.0% of those who have breakfast at school ($p < 0.001$).

Conclusions: Skipping sometimes breakfast is associated with breakfast of poor quality and with more unbalanced dietary habits. It is still necessary to promote this meal from an early age, and looking for strategies to encourage proper eating habits not only in the family but also in the school.

Key words: breakfast, scholchildren, dietary, habits.

PO1679

UNDERSTANDING SUSTAINABLE DIETS: PAST, PRESENT AND FUTURE EFFORTS TO ADVANCE SUSTAINABLE DIETS

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Background and objectives:: Global dietary patterns have changed dramatically in just one generation, presenting both a boom and a threat to the health and wellbeing of populations everywhere. Today, people are overeating foods that pose the greatest negative impacts for their health and the environment. The confluence of population, economic development, environmental pressures resulting from increased globalization and industrialization reveal an increasingly resource-constrained world where all the predictions point to the need to do more with less and in a "better" way. Sustainable diets present an opportunity to successfully advance commitments to sustainable development and the elimination of poverty, food insecurity and poor health outcomes.

Methods: The study examines three broad determinants of sustainable diets: social-economic, health, and environmental. A descriptive analysis of these areas was delineated and a causal model was established. The study also examined the considerations and tradeoffs for developing and promoting innovative strategies for understanding, measuring and promoting sustainable diets in human health and nutrition.

Results: The major determinants of sustainable diets fall into five categories: Agriculture, Health, Socio-cultural, Environmental, and Socio-Economic. When factors or processes are changed in one category, such changes affect other determinant categories, and in turn the level of "sustainability" of a diet. There are tradeoffs including the consumption of foods that are affordable, culturally appropriate and nutritious, yet harmful to environmental sustainability.

Conclusions: The complex web of the determinants of a sustainable diet make it challenging for policy makers to understand the benefits and considerations for promoting and consuming such diets. To advance such processes, measurement mechanisms must be developed to assess the various determinants and understand the level of sustainability of a diet, and the tradeoffs associated with recommendations to increase the "sustainability" of a particular diet.

Key words: diets, sustainable development, consumer behavior.

PO1680

CARDIOVASCULAR RISK PROFILE AND DIET DIVERSITY IN RURAL ZIMBABWEANS

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Background and objectives:: Cardiovascular diseases (CVD) prevalence is increasing in Sub-Saharan Africa. Diets of limited diversity, usually high in energy and low in micronutrients, have been linked to CVD. However, little information is available on the CVD risk profile of rural populations in Sub-Saharan Africa. This study describes risk factors for CVD including diet diversity (proxy for nutrient adequacy) in rural Zimbabweans.

Methods: Cross-sectional study assessed CVD risk factors, including overweight and obesity, anthropometry-height, weight, skinfolds and waist circumference (WC), blood pressure (BP), low-density lipoprotein (LDL), smoking and dietary intake recorded by 24-hour recall in 163 adults from rural Nkayi, Matabeleland, Zimbabwe.

Results: Results are presented for men (n=55) and women (n=108), mean age (SD) 40.2 (13.2) and 41.6 (12.2) years respectively. Thirty-three percent of rural females were overweight (BMI 25-29.9kg/m2), mean WC was 76.6 (7.2) for men and 77.1 (10.1)cm for women, mean percent body fat was 8.4 (3.7) and 24.0 (9.1) for men and women respectively. Fourteen percent of men and women had BPs above the recommended level (140/90mmHg) and 19% of men and 15% of women had non-fasting-LDL cholesterol >3.0mmol/l. More men (28%) than women (7%) were current smokers. Dietary intake showed limited variety. Isitshwala, (maize meal staple) was the most frequently reported food (1.8 times/person/day), followed by kale/greens (1.1 times/person/day), tea (0.7 times/person/day), rice (0.6 times/person/day) and fried tomatoes (0.2 times/person/day). Cereals dominated the diets of this population; of the ten most frequently reported foods, five were cereals. Meat consumption was limited (0.6 times/ person/ day) and no fruit consumption was reported.

Conclusions: This study described risk factors for CVD in a rural Zimbabwean population, which were lower than the national averages. Limited diet diversity in this population may negatively impact the quality of diets, increasing the risk of CVD.

Key words: Diet diversity, CVD, Sub-Saharan Africa, rural

PO1681

TOOLS FOR ASSESSING NUTRITION ASSESSMENT, COUNSELING AND SUPPORT SERVICES AT THE FACILITY AND COMMUNITY LEVELS

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Background and objectives: International public health systems do not systematically integrate nutrition into existing services. The Nutrition Assessment, Counseling, and Support (NACS) approach is being used to bring together existing nutrition services, protocols and actors to ensure the prevention and treatment of malnutrition among all populations and across the continuum of care. The SPRING Project is strengthening NACS services globally and specifically in Haiti, Nigeria, and Uganda.

Methods: Working with local counterparts, SPRING developed tools and conducted assessments to better understand the capacity of health facilities and communities to deliver NACS services in Uganda and Haiti. With the experiences and findings from these assessments, SPRING set out to develop a refined and streamlined package of tools. Tools from Haiti and Uganda were reviewed and lessons learned were documented. In addition, we methodically reviewed existing tools and consulted with experts in the field on their definitions of nutrition assessment, counseling, and support as well as existing job aids, protocols, and supervisory tools. Based on this information, SPRING prioritized a core set of indicators and revised assessment tools accordingly.

Results: SPRING now has a refined NACS Services Capacity Assessment package including a sample protocol, sampling plan, application for ethical review, and tools for key informant, health worker, and client exit interviews, provider observations, site quality checklists, record reviews, focus group discussions, and mapping of community support services. In addition, the package provides guidance for adapting the tools to specific country contexts.

Conclusions: Momentum for the NACS is growing. Assessing NACS at the facility level is an important first step in sca-

ling up NACS and encouraging facilities to take ownership of nutrition integration. The SPRING package of tools provides users with a streamlined set of tools for doing this.

Key words: assessment, counseling, support, health facility.

PO1682

CARDIOLOGIC FINDINGS, BODY MASS INDEX AND BLOOD PRESSURE IN APPARENTLY HEALTHY ADOLESCENTS

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Background and objectives: Exercise related energy expenditure values used in questionnaires for adolescents are usually extrapolated from adult data, it is thus necessary to obtain measured data in order to analyze physical activity adequately. As part of an initial evaluation for the analysis of energy expenditure with varying types of exercises, we evaluated apparently healthy adolescents for weight status, blood pressure and heart condition.

Methods: Thirty-five apparently healthy adolescents from public schools in Toluca in Mexico, were evaluated by a pediatric cardiologist; weight and stature for BMI, waist circumference (WC) and systolic (SBP) and diastolic (DBP) blood pressure were measured by a trained sports specialist. Analysis was done in SPSS.

Results: Sixteen boys and nineteen girls with a mean age of 12.7±1.1 (range = 11-16). All were apparently healthy and their BMI was 20.3±4.5 (range: 15.7-35.7); SBP was 110±8.8 mmHg (range: 90-130) and DBP was 67.5±8.4 mmHg (range: 55-80). Only 13 showed no cardiologic abnormalities, while the resting 24 had one of the following: sinus arrhythmia, tricuspid regurgitation, hypertension, interatrial communication, pulmonary insufficiency, tachycardia, ventricular extrasystole.

Conclusions: Although not every cardiologic abnormality is life threatening, some may be so, particularly when initiating a physical activity program. We can conclude that a cardiologic evaluation is absolutely necessary in healthy, overweight or obese adolescents before initiating any kind of physical activity intervention, as abnormalities may be under-diagnosed in this age group. These findings are very important, particularly as an increase in physical activity has been recommended at all levels for the general public.

Key words: Adolescents, BMI, physical activity, cardiology.

Acknowledgemens: This project was financed by UAEM.

PO1683

STUNTING AND ENVIRONMENTAL QUALITY AMONG URBAN AND RURAL HOUSEHOLDS IN NIGERIA

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Background and objectives: An important determinant of childhood undernutrition is the quality of the physical environment in which children live. The dynamics of how this relationship plays out in urban as compared to rural communities is the focus of this study.

Methods: Stunting was determined in a sample of 370 under-five children from households in three urban communities (low, medium and high-income), and one rural community in Oyo State, Nigeria. A structured questionnaire and an observation checklist were used to collect data. A composite environmental quality index (EQI) combining four indicators (water, sanitation, housing, waste disposal/drainage) was developed to describe the physical environment of children's households. Using regression analysis, we projected hypothetical scenarios of stunting ahead under three different assumptions of environmental quality.

Results: Overall stunting prevalence was 29.7%; the low-income urban community had the highest prevalence (44.4%) followed by the rural community (30%). EQI was lowest for the rural community (mean = 44.2% ± 11.01), and highest in the low-density urban community (76.5% ± 17.76). There was moderate and negative but highly significant association between the EQI with height-for-age (r = -.437, p =.000). Regression analysis showed that the EQI explained 15.5% of the variability in stunting in the urban, but only 1.8% for the rural children. Mean height-for-age z-scores increased with hypothetical improvements in EQI. For a 10% hypothetical improvement in EQI, mean z-scores increased by 7.3% for urban and 5.1% for rural. A larger increment of 20% in EQI yielded more improvement for urban (44.4%) than for the rural sample (11.7%).

Conclusions: Household environmental improvements have potential in reducing stunting in children in both urban and rural locations.However, thismay play a greater role among urban than rural children possibly due to differentials in the quality of the physical environment and higher population density.

Key words: Stunting, environment, urban, rural.

PO1685

COMBINED EFFECT OF TRADITIONAL AND NON-TRADITIONAL HEALTH BEHAVIORS ON MORTALITY IN SPANISH OLDER ADULTS

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Background and Objectives: Data on the combined impact of lifestyles on mortality in the elderly have generally been collected from highly selected populations and have been limited to traditional health behaviors. In this study, we examined the combined impact of three traditional (smoking, physical activity, and diet) and three non-traditional health behaviors (sleep duration, sedentary time, and social interaction) on mortality among older adults.

Methods: A cohort of 3, 465 individuals, representative of the Spanish population aged 60 years and older, was established in 2000/2001 and followed-up prospectively through 2011. At baseline, the following positive behaviors were self-reported: never smoking or quitting tobacco >15 years, being very/moderately physically active, having a healthy diet score >median in the cohort, sleeping 7-8 h/d, spending <8 h/d in sitting time, and seeing friends daily. Analyses were performed with Cox regression and adjusted for the main confounders.

Results: During an average 9-year follow-up, 1, 244 persons died. Hazard ratios (95% confidence interval) for all-cause mortality among participants with 2, 3, 4, 5, and 6 compared to those with 0-1 positive behaviors were, respectively, 0.63 (0.46-0.85), 0.41 (0.31-0.55), 0.32 (0.24-0.42), 0.26 (0.20-0.35) and 0.20 (0.15-0.28) (P for trend <0.001). The results were similar regardless of age, sex, and health status at baseline. Those with 6 vs. 0-1 positive health behaviors had an all-cause mortality risk equivalent to being 14 years younger. Adding the three non-traditional to the four traditional behaviors improved model fit (likelihood ratio test, P<0.001) and the accuracy of mortality prediction (c-statistic: +0.0031, P=0.040).

Conclusions: Adherence to some traditional and non-traditional health behaviors may substantially reduce mortality risk in older adults.

Key words: aging, elderly, mortality, cohort study, lifestyles. Acknowledgements: This work was funded by grants from the FIS (12/1166), and the 'Plan Nacional sobre Drogas' (06/2010).

PO1686

SELF-REPORTED LEVELS OF PHYSICAL ACTIVITY DURING SCHOOL RECESS IN SPANISH ADOLESCENTS: THE AFINOS STUDY

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Background and Objectives: The morning recess period during school days represents a regular opportunity to accumulate physical activity (PA). However, the contribution of recess to PA guidelines (60 min/day in moderate-to-vigorous PA [MVPA]) in adolescents is unknown.

Methods: This study comprised 1065 Spanish adolescents (550 girls), aged 13 to 17 years. Adolescents completed a validated Recess PA Recall in 2007-2008. Differences in levels of PA during the recess period were analyzed by gender, age group, type of school, school location, immigrant status, weight status, fitness levels and eating snacks during recess.

Results: Adolescent boys spent more time in MVPA (7.7 vs. 6.4 min in MVPA, P=0.009) than girls during the recess period. Also, a higher percentage of adolescent boys than girls spent at least the 40% (35.1 vs. 28.9%, P=0.029) and 50% (32.0 vs. 24.9%, P=0.010) of recess time engaged in MVPA. In boys, only the youngest age group and with the school located in cities were more active than their peers (all P<0.05). In girls, there were no differences in levels of PA during recess by all the descriptive characteristics (all P>0.05).

Conclusions: These findings suggest that recess in Spanish secondary schools may contribute to the daily recommended MVPA for adolescents, but greater efforts must be implemented to increase PA levels among adolescent girls during this school period.

Key words: playgrounds, physical activity, correlates, adolescents.

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PO1687

INFLUENCE OF BODY SHAPE ON THE DIAGNOSIS OF ACUTE MALNUTRITION BY ANTHROPOMETRIC INDICATORS

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Background and objectives: Two anthropometric indicators, Mid Upper Arm Circumference <125 mm (MUAC125) and Weight-for-Height Z-score <-2 (WHZ-2), are widely accepted proxies to identify 6 to 59 months old children suffering from non-oedematous acute malnutrition. Current debate around the validity of these indicators includes the possible influence of the sitting-standing height ratio (SSR) on WHZ diagnosis. Our aim was to test this hypothesis.

Methods: In November 2012, weight, standing and sitting height, and MUAC were measured in all under-5 children (N=3843) of the 2 refugee camps of Kutapalong and Nayapara, Bangladesh. SSR Z-score were computed by strata of 6 months of age within study population. The association between having longer legs for a given height (being in the lower vs. the two upper tertiles of SSRZ) and the diagnosis of acute malnutrition by MUAC125, WHZ-2 and MUAC-for-Age Z-score <-2 (MUACAZ-2) was investigated by multivariate logistic regressions adjusted for sex, age and stunting. The clustering by blocks and camps was accounted for in multilevel modelling.

Results: Only 25% of malnutrition cases by either MUAC125 or WHZ-2 were diagnosed by both indicators. Being aged<24 months and being stunted were factors increasing more strongly the probability of malnutrition diagnosed by MUAC125 than by WHZ-2. Being a female was also a predictor of diagnosis by MUAC125, whereas the opposite was observed for WHZ-2. Having longer legs was associated with an increase in WHZ-2 (OR=2.21; 95%CI: 1.84; 2.65) and MUACAZ-2 (OR=1.68; 95%CI: 1.43; 1.97) but not in MUAC125 (OR=1.19; 95%CI: 0.91; 1.55).

Conclusion: While confirming the hypothesis of an influence of SSR on WHZ diagnosis, our results challenge the idea of a body shape-related bias which would be peculiar to WHZ-2 by displaying a similar relation between SSR and MUACAZ-2.

Key words: Acute malnutrition, diagnosis, body shape.

PO1688

PREVALENCE RISK FACTORS AND PROTECTION FOR CHRONIC DISEASES TRANSMITTED IN NO CAPITAL OF BRAZIL IN 2011

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Background and objectives: This study aimed to determine the prevalence of risk factors and protective for chronic diseases in the capital of Brazil in 2011.

Methods: This was a descriptive study. Secondary data pertaining to Surveillance System Risk and Protective Factors for Chronic Diseases of the Ministry of Health, which made data collection through telephone interviews conducted in 2011. The variables analyzed were the risk factors and protective, presented by variables of lifestyle, dietary intake and presence of injuries to health, stratified by gender and education.

Results: It was found that the highest prevalence of risk factors belonged to men, except for the presence of diabetes and hypertension and those with eight years of schooling or less. Protective factors for the higher prevalence of consumption of fruits and vegetables were among women and the consumption of milk fat and physical activity was higher among men. Regarding schooling, vegetable consumption and physical activity was higher among those who had twelve or more years of study and consumption of milk with full-fat content was higher among those who had nine to 11 years.

Conclusions: We conclude that there are differences in the distributions of factors associated with chronic diseases, it is important to be considered for adoption promotion and health prevention.

Key words: Chronic Disease. Risk Factors. Life Style.

PO1689

CLIMATE VARIABILITY ON CAREGIVER'S MENTAL HEALTH AND CHILD NUTRITIONAL STATUS

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Background and objectives: Current research on the influence of caregiving practices on children's nutrition status

and well-being have often overlooked the importance of the caregivers' mental health, and even when taken into account, seasonal and environmental factors are not considered. Although researchers concur that climate change will have both direct and indirect effects on mental health, no integrative or comprehensive framework to guide research or policy on the impact of climate change on mental health exist. Understanding the psychological impact of climate change on caregivers and its effect on their children's well-being particularly their nutritional status, entails recognizing the complexity of the various environmental stressors on the livelihoods of rural communities; and recognizing mediators and moderators of impacts.

Methods and Results: Based on a current review and synthesis of research evidence from low and middle income countries using the socio-ecological framework, this presentation shows how climate change (acute or traumatic effects of extreme weather events) can affect directly and indirectly the psychological health of caregivers and ultimately affecting the nutritional status of their children. Granting the various methodological challenges identified in reviewed studies, results suggests that seasonal climatic variability are associated with the mental health of caregivers' and with household food insecurity. The mechanisms linking these variables are however not clearly understood. Few studies however, were explicitly designed to test pathways in which climatic stressors such as heat and precipitations impact on caregivers' mental health, caregiving practices and their children's nutritional status.

Conclusions: This presentation concludes by identifying gaps in the literature, implications, and some research priorities. Recognizing clearly how climate change impact on the psychological health of individuals, particularly women and children nutritional status has the potential to lead to more productive mitigation and adaptation activities.

Key words: Climate change, Caregivers, Mental health, Children's Nutritional Status.

PO1690

CAROTENOID CONSUMPTION AMONG BENEFICIARIES OF A CASH TRANSFER PROGRAM IN BRAZIL

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Background and objectives: Bolsa Família Program, maintained by Brazilian government, supported more than 13 million families in poverty in 2012. The target of the cash transfer's Program are persons who are frequently exposed to food insecurity. This study aims to evaluate the diet of this population by analyzing carotenoid consumption, which has been associated with decreased prevalence of chronic diseases.

Methods: The sample, part of the "Pesquisa de Orçamentos Familiares" budget survey, conducted by the Brazilian Institute for Geography and Statistics (Instituto Brasileiro de Geografia e Estatística) in 2008-2009 is composed of 34, 003 persons (10 years old or more) and is representative of all Brazilian states; of both urban and rural areas; and of all socioeconomic status. Food consumption was obtained by the food diary method. To obtain carotenoid composition of foods, it was used reference tables from Brazil and United States. The daily prudent ingestion for carotenoids recommended by the Institute of Medicine were used as reference (beta-carotene: 3, 000 to 6, 000 μg; lycopene: 5, 000 to 10, 000 μg; provitamin A carotenoids: 5, 200 to 6, 000 μg; and total carotenoids: 9, 000 to 18, 000 μg). It were made statistical analysis of the daily carotenoid consumption (grams per person) among beneficiaries and non beneficiaries.

Results: The quantity per person of total carotenoids consumed among beneficiaries (3, 244 μg/day) was less than among non beneficiaries (4, 300 μg/Day). Similar trends were identified for beta-carotene (beneficiaries: 1, 396 μg/day and non beneficiaries: 1, 916 μg/day); lycopene (beneficiaries: 716 μg/day and non beneficiaries: 929 μg/day); and provitamin A carotenoids (beneficiaries: 1, 794 μg/day and non beneficiaries: 2, 452 μg/day).

Conclusions: The ingestion, especially among Program's beneficiaries, is smaller than the recommended and can be partially conditioned by the lack of access to fruits and vegetables.

Key words: carotenoids, cash transfer program, consumption

PO1691

CHILD AND MOTHER NUTRITION SURVEY OF BANGLADESH(CMNS), 2012

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Background and objectives: Child and Mother Nutrition Survey (CMNS) of Bangladesh was carried out in March, 2012. The main objective of this survey was to assess the nutritional status of children aged less than 5 years and their mothers and to examine underlying causes of malnutrition and comparing with the findings of previous surveys.

Methods: The CMNS2012 was carried out among 4112 children aged 0-59 months and their 3521 mothers who were living in 3484 households in 64 districts of Bangladesh.

Results: Using the WHO 2005 MGRS, 34.4% of children aged <5 years were underweight, 41.2% were stunted, 13.4% were wasted and 4.1% were overweight/obese. The prevalence of underweight sharply increased between 18-23 months and in 48-59 months. Children of rural area was significantly more underweight (35.2% vs. 31.7%) and more stunted (42.7% vs. 36.4%) than urban area. The prevalence of underweight, stunting and wasting was inversely associated with the education status of mothers and wealth quintile. Stunting and wasting or overweight were more in children of mothers aged less than or equal to 18 years. Children of housewife mothers were less likely to be wasted than the children of working mothers. The mean weight of the mothers was 48.9 kg, mean height was 150.9 cm, mean MUAC was 258 mm and mean BMI was 21.4 kg/m2. The prevalence of underweight was almost double in rural mothers, while the prevalence of overweight/ obesity was considerably higher in urban areas (35.2% vs. 13.1%). Between 2004 and 2012, prevalence of overweight/ obesity among mothers increased from 15.4% to 26.0.

Conclusions: The findings clearly demonstrate the presence of double burden of malnutrition in Bangladesh. Problems of both under-nutrition and over-nutrition needed to address simultaneously.

Key words: Stunted, Underweight, CED, Overweight/Obesity.

PO1692

RISK FACTORS ANALYSIS FOR MALNUTRITION IN PEOPLE LIVING WITH HIV/AIDS

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Background and objectives: People living with HIV/AIDS (PLHIV) are vulnerable to poor nutrition status because their body's food requirements are increased. Due to lack of knowledge they often become malnourish or become sick with other nutritional deficiency diseases and infections. The objective of the study was to identify risk factors for malnutrition in HIV-AIDS subjects.

Methods: It was a cross-sectional study. To identify the risk factors 85 male and female HIV positive people aged 18 to 50years were interviewed by semi-structured questionnaire from the member of a national NGO Ashar Alo Society and Infectious Diseases Hospital who provide health care service to the PLHIV in Bangladesh.

Results: The study found that Mean (± SD) age of underweight HIV positive subjects was 33 (± 9) years, Mean (± SD) height was 160 (± 8) cm, mean weight was 44 (± 5.6) kg and mean BMI was 17.2 (±1.3) kg/m^2. Study also recognized that study recognized that less calorie intake was highly associated with underweight condition (OR=27.5) and underweight PLHIV intake 25% less calorie than their daily requirement. Less protein intake was also associated with underweight (OR=2.80). Nausea (OR=2.60), Vomiting (OR=2.02), change in smell or taste (OR=2.70), Fever (OR=3.05), cough/cold (OR=2.50), diarrhea (OR=2.83), anorexia (OR=3.23) were also associated with the poor nutritional status of the subjects. Some other factors i.e. unemployment, low income, low food intake, presence of diseases, social stigma, fasting or less food intake due to lack of money and poor appetite significantly associated with nutrition status of underweight PLHIV.

Conclusions: Nutrition is a fact which influence with many other factors like nutrition knowledge, socio-economic condition, body mechanism, mental condition etc. For longevity of PLHIV and decrease diseases progression proper nutritional support must be provided through effective nutrition program.

Key words: Risk Factors, Nutritional status, HIV/AIDS, PLHIV

PO1693

RELATIONSHIP BETWEEN PREFERENCE FOR JAPANESE SOUP STOCK (DASHI) AND DIETARY HABITS IN UNIVERSITY STUDENTS

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Background and objectives: The aim of this study was to investigate a relationship between a preference for Japanese soup stock (Dashi) and dietary habits in university students.

Methods: A sensory evaluation was performed in 323 university students (54 males and 269 females). The subjects tasted five kinds of soup stock made from kelp, dried bonito, mixture of kelp and dried bonito, dried small sardines, and monosodium glutamate. The relationship between the preference for soup stock and dietary habits was assessed with a questionnaire, which asked their dietary habits, frequency of tasting soup stock, and ingredients of soup stock at home in four grades.

Results: In the five kinds of soup stock, the soup stock made from mixture of kelp and dried bonito was the most preferred (3.4±1.2), but the monosodium glutamate soup stock was the least (1.8±1.0). No difference between the sexes was observed. An umami taste, a pleasant aftertaste and a good body were prominent in the soup stock made from mixture of kelp and dried bonito. In contrast, an acid taste was prominent in the dried bonito soup stock, and the dried sardine soup stock had stronger fishy smell compared with the other four. The pleasantness of aftertaste and smell, and the strength of umami taste were desirable factors, but the strengths of bitter taste and acid taste were undesirable ones. The group in which the subjects had soup stock from natural ingredients frequently had tendencies to masticate their food well, to eat boiled vegetables often, to favor Japanese food, and to have confidence in their health.

Conclusions: These findings suggested that the preferential and frequent tasting of soup stock from natural ingredients would impact on a preference for Japanese food, healthy dietary habits and an interest in cooking.

Key words: Japanese soup stock (dashi), sensory evaluation, dietary habits, questionnaire

PO1694

COMMUNITY INTERVENTION TRIAL PROMOTE HEALTHY BEHAVIORS IN FARMERS IN TIANJIN, CHINA

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Background and objectives: To assess a community intervention trial promoting healthier lifestyles in rural Chinese farmers using the stage of change health behavior model.

Methods: A community intervention trial utilized an intervention and control village with farmers as study subjects. The intervention village (n= 549) participated in a stage-specific interventions while the control village (n=557) received general health education messages.Farmers in both villages were initially categorized using the stage of change model and observed for attitudinal and behavior changes over one year. Data collection included dietary habits, physical activity, anthropomorphic measures, and biomarkers at baseline, mid-point, and study termination.

Results: The intervention group demonstrated greater progress in moving from awareness to the action stage in their adoption of healthier behaviors. Total cholesterol, homocysteine, blood pressure and urine sodium decreased while blood and urine folic acid increased in intervention subjects only.

Conclusions: The first documented use of the stage of change model in rural Chinese farmers was successful at increasing healthier eating and physical activity in an infrequently studied population. Given China's escalating burden of chronic diseases, the stage of change model should further be evaluated in promoting healthier behaviors and addressing lifestyle related illness in the world's most populous nation.

Key Words: farmers, nutrition intervention, vegetables, fruit, physical activities

PO1698

DOES SOCIO-ECONOMIC FACTORS DETERMINE THE POSITIVE OUTCOME OF FRUITS AND VEGETABLES CONSUMPTION?

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Background and objectives: It is important to understand the relationship between food consumption and culture among other influential factors, which is the issue of understanding food consumption for health. Fruits and vegetables (FV) are great sources of vitamins, antioxidants, and other componentts with great functional properties. Objectives: The study explores the linkages among age, income, educational level, ethnicity, household size, sex, number of children, religion, marital status and (FV) consumption

Methods: Using a descriptive cross-sectional survey, male and female undergraduates (n=200) aged 16-29 years were randomly selected for the study. Structured interviews and questionnaires suitable to meet research objectives were used to eli-

cit relevant information on socio-economic characteristics of respondents. The data collected were analyzed using SPSS program version 17 and multivariate logistic analysis was used to examine and establish association between variables of interest.

Results: Age has a negative relationship with fruits consumption (p=< 0.05, r= -0.0908). Sex (X2= 21.800, df=2, c= 0.000) and ethnicity (X2 = 18.476, df=2, c=0.05) had significant relationship with fruits consumption. Also, there exists a strong positive and significant relationship (p=0.01, r =0.208**) between the educational level of respondents and vegetables consumption. It also showed that age, increase in number of children and household size influenced vegetables consumption negatively

Conclusions: Social and economic factors to a significant extent influence different levels of (FV) consumption therefore, there is an urgent need to create a sustainable means to promote (FV) consumption, in order to eradicate the preventable deaths attributed to low (FV) consumption worldwide.

Key words: Respondent, socio-economic, consumption, fruits, vegetables.

PO1699

ENERGY DENSITY AND FEEDING FREQUENCY OF COMPLEMENTARY FOODS AFFECTS MEAL-SPECIFIC FOOD CONSUMPTION AND DURATION BY HEALTHY, BREAST FED BANGLADESHI CHILDREN

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Background and objectives: Appropriate complementary feeding of infant and young children is necessary, information is lacking on the effects of dietary energy density (ED) and feeding frequency (FF) of complementary foods on food consumption during individual meals and the amount of caregiver time expended in child feeding. To evaluate the effects of varied ED and FF of complementary foods on food intake and time required for child feeding during individual meals.

Methods: During 9 separate, randomly ordered dietary periods lasting 3-6 days each, we measured self-determined intakes of semi-solid cereal porridges by 18 healthy, breastfed children 8-11 mo of age who were fed coded porridges with EDs of 0.5, 1.0 or 1.5 kcal/g, during 3, 4, or 5 meals/d. Complementary food intake was measured by weighing the feeding bowl before and after every meal.

Results: Children consumed greater amounts of complementary foods per meal when they were receiving diets with lower ED (p = 0.044) and fewer meals per day (p <0.001). Food intake was less during the first meal of the day than the other meals. Greater time was expended per meal when fewer meals were offered. The time expended per meal did not vary by dietary ED, but the children ate the lower ED diets faster (p = 0.019). Food intake velocity was also greater when more meals were offered per day (p = 0.005).

Conclusions: We conclude that the ED and FF of complementary foods affect meal-specific food intake. FF also influences the duration of individual meals, but ED does not. These results provide further evidence of young children's ability to regulate their energy intakes, even during infancy; and they convey information on factors that affect the amount of time that caregivers must devote to child feeding.

Key words: complementary foods, energy density, feeding frequency, meal, breastfed children.

PO1700

LEVELS OF ANEMIA AMONG CHILDREN IN TRIBAL INDIA

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Background and objectives: Despite exceptional economic growth in India, the public health problems status still remains grim. One of the major problems in India, by which the children of India suffer is, Malnutrition. According to National Family Health Survey- III, in 2005-2006, conducted by Ministry of Health and Family Welfare, Government of India, 7 out of every 10 children age 6-59 months in India were anemic.

Methods: To study the levels of anemia among children residing in backward and tribal area, a cross sectional study was done in three blocks of Udaipur district of Rajasthan, a province of India, namely: Salumber, Sarada and Jhadol. The hemoglobin (Hb) level of a sample of 468 U-5 children was measured and recorded. The data was entered and analyzed using SPSS 16.0. The anemia level has been analyzed using WHO (International) and NFHS III 2005-2006 (India) reference values.

Results: Only 6% of children were found with normal Hb level while the percentage of children suffering from mild, moderate and severe anemia were 37%, 49% and 8% respectively. The mean Hb level of the children in all the blocks comes to be 9.6 g/dl. More male children (11%) were found suffering from severe anemia than female children (6%). **Conclusions:** The result shows the high percentage of anemia among children, thus, interventions such as strengthening of health programmes are recommended.

Key words: Nutrition, Anemia, Children, India

PO1701

LESSON LEARNED 'IODINE VILLAGE' DEVELOPMENT FOR SUSTAINABLE IDD CONTROL AND PREVENTION IN THAILAND

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Background and objectives: Ever since 2010, Health Department and Department of Local Administration have encouraged nationwide villages to create Iodine Village in an effort to control and prevention of IDD.

Methods: At least 38, 663 villages (53.13%) have been certified Iodine Villages applying social measures to permit only qualified iodized salt to be sold in the villages. Quality of iodized salt will be inspected two times per year. Iodized salt will be continuously communicated to villages via local radio network, home visit, campaign etc. for sustainable self reliance in IDD control.

Results and Conclusions: After three years IDD control, it found that household coverage of iodized salt (≤30 ppm.) increased from 77.4% in 2009 to 93.5% in 2011. The proportion of IDD in pregnant women decreased from 59.0% in 2009 to 39.5% in 2011.The key success include 1) Awareness creation through an information on linkage of IDD with child cognitive development. 2) Potential development of related workers to be able to transform the IDD knowledge to practice with emphasis on applying simple local wisdom for sustainable development. 3) IDD ambassador appointment among health volunteers to create direct contact among IDD risk groups. 4) Development of tools for self - assessment. 5) Empowerment supervision to identify local intervention and facilitation. 6) Provision of communication materials and I-kit for iodized salt examination. 7) Media advocacy development through national festivals. 8) Lesson learned development, plague presentation, good model village communication 9) Merit, success and cooperation acknowledgement among all concerned well help inspiration to practice better the iodine village.

Key words: Iodine Village Development /Sustainable IDD Control and prevention

PO1702

DEVELOPMENT OF INNOVATION FOOD AND NUTRITION EDUCATION TOOL FOR BETTER NUTRITION IN PRIMARY SCHOOL, THAILAND

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Background and objectives: The objective is a tool for teachers to apply integrated food and nutrition in school curriculum for children to have skills in food and nutrition in life style practice.

Methods: The methodology is the process of participatory development of the tool among teachers, educators, nutritionists, communicator etc, on the proposal and acceptability must be acceptable to teachers prior to actual application in primary school. The issues include a) nutrition flag b) vegetables and fruits c) reduce sugar, fat, and salt in foods d) overweight will be incorporated into health physical education occupation and technology, social and culture sciences, mathematic, Thai language, foreign language and arts.

Results: The key success indicated that 52.12% of 253 schools in the project areas regularly implement the innovative food and nutrition while the others implement only some parts. It found that the number of children with good consumption behavior was 1.12 times higher especially in the issues of the daily vegetable and fruit consumption behavior, non carbonated drinking behavior, lower high sugar, fat and salty sweet consumption, practices of adding fish sauce and sugar in cook food as well as lower overweight children. It also found that the satisfaction among teacher and children as the education tool were joyful to teaching and learning and easy to apply for good food and nutrition behavior change. Besides, more novel food and nutrition had been created among teacher, children and parents.

Conclusions: However it was recommended that content and element should be adopted and applied to meet the needs of users at each level for application at national level of Thailand.

Key words: food and nutrition, education tool, primary school.

PO1703

LESSON LEARNED: IMPROVEMENT OF FOOD QUALITY IN SCHOOL AND CHILD DEVELOPMENT CENTER FOR SUSTAINABLE CHILD NUTRITION

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Background and objectives: Since the Thai government have transferred its administrative authority to local government it found nutrition in local school and child development center (CDC) is not up to par.

Methods: Hence the Health Department together with The Nutrition Association of Thailand under the royal patronage of Her Royal Highness Princess Maha Chakri Sirindhorn had organized a study to find ways and means to strengthen the management capability of the local government, school, CDC, community and social network to be able to develop good nutrition practices for child optimal growth. Five strategy applied were; a) Food and nutrition surveillance of which the information would be utilized for policy planning. b) Potential development on food and nutrition practice, c) Support innovation food and nutrition materials based on FBDG to administrator, child care attendants, cook, food seller, school child teacher, parent, worker. d) Forum for exchanging view and experiences. e) Empowerment supervision and monitoring. It founded 39.2% CDC and 28.8% school were able to develop quality nutritious lunch with vegetable and fruit served daily. The practice had good impacted to child nutrition as stunt and obesity decrease remarkably.

Results: The key success issue included 1) The increase cost of CDC and school lunch to Baht 15 – 20 from Baht 13 per person per meal by the local government. 2) Application of nutritionist to be responsible in food and nutrition or the responsible party including administrator, teacher, cook, school child leader, parent would be trained on food and nutrition regularly. 3) School and CDC. lunch specification be employed for food caterer to be followed. 4) Local central kitchen. 5) Vegetable garden for lunch program.

Conclusions: Key mechanism of the success is a capacity building of the local government for public policy planning on food and nutrition.

Key words: Improvement of food quality/sustainable child nutrition

PO1704

A FOLLOW-UP SURVEY IN JAPANESE FEMALES: CHANGES OF BONE MINERAL DENSITY AND LIFESTYLE RELATED FACTORS

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Background and objectives: To clarify the relationship between bone mineral density (BMD) and lifestyle related factors in Japanese females.

Methods: The subjects were 214 females aged 19-21 years. In 1992-1995, we have measured their BMD (of lumbar spine (L2-4), total body, arms and foots), body habitus, and lifestyle related factors self-reported questionnaire. To compare these values with the ones of themselves at the other points, as a time-series, we intended to measure again the values. 80 subjects of them were actually measured in 2006-2010, hence we investigated them in this study. Note that for each 80 subjects, we have a pair of the values whose distance is in at least 14 years. We used paired-t test in the following. We compared the pairs BMD at the baseline and follow-up. Also, we classified 80 subjects under tertiles, by body mass index (BMI) at the baseline. For each tertiles, we used the values at the two points. Besides, we did by bone-free lean tissue mass index (LMI) as same as above.

Results: On the case of no classifying, we recognized significant differences in BMD of total body, arms, foots ($p < 0.001$), while no difference in L2-4. On the highest tertiles by BMI, we estimated that with respect to L2-4, their BMD increased significantly ($p < 0.05$). On the highest tertiles by LMI, we obtained a similar result as the case of BMI. The other result was that LMI associated significantly with several lifestyles ($p < 0.05$).

Conclusions: We estimated that BMD of some parts had increased from the baseline to the follow-up. We also asserted that, it was important for BMD to keep both body weight and fat-free mass appropriate, in particular, during early life.

Key words: Bone mineral density, Young Japanese females, Body composition.

PO1705

MALNUTRITION AND THYMIC HYPOPLASIA IN THE INFANCY

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Background and objectives: The thymus is an organ primary linfoide; decisive for the thymopoiesis and development of system inmunitario in the early childood, the nutritional lacks, result in thymus structural and functional changes and in the appearing of infectious complications.

Methods: In this study longitudinal prospective were studied 125 patients undernourished in during 6 moths with thymic hypoplasia and recurrent sepsis among 1-7 years old. The patients stratified in working groups according to the measurement of thymic area for ultrasound themselves: Critical (less than 500mm2), moderated (501-999 mm2) and normal (100-1500 mm2).We realized correlation test between groups.

Results: We found a positive correlation among the malnutrition and the thymic hypoplasia, being more significant in the critical respect to the ones that having the normal thymic area and had a positive correlation also among the malnutrition and the appearing sepsis complicated in the infants, with significant changes in the critical and moderated in relation to them with normal thymic area.

Conclusions: Our results show that the malnutrition result in altered thymic activity in early life, therefore, its monitoring in the infants is very important in the development and functioning of thymus, for the opportune intervention in the fight against the infectious illnesses.

Key words: Thymic hypoplasia, Nourishment, Sepsis, Infant, Malnutrition

PO1706

GROWTH AND BODY COMPOSITION CHANGES IN INDIAN UNDERNOURISHED CHILDREN

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Background and objectives: Early life nutrition is linked to later life disease risks. India has the highest number of undernourished children in the world. Body composition and growth of undernourished children in community-based management of acute malnutrition (CMAM) is not investigated before.

Methods: Children from nutrition rehabilitation centres who met the WHO weight-for-height-Z-score (WHZ) categories: severe-acute-malnutrition (SAM, n=57), moderate-acute-malnutrition (MAM, n=29) and average (n=25) were measured at baseline (aged 30±16.8 months), and followed for 18 months. Measurements included standard of living, morbidity, dietary intake, anthropometry; bioimpedance and total body water (TBW) by the stable isotope technique of deuterium oxide dilution. The Institutional Review Board and the local health authorities provided study approval.

Results: As expected the SAM compared with average children had lower anthropometric Z-scores (weight, height, head and mid-upper arm circumference, triceps and sub-scapular skin folds) and lower fat free mass (FFM) and fat mass (FM) at baseline. After 18 months, SAM children had a significant increase in body fat%, yet WHZ-scores had improved from -3.8 to -1.8. Fat mass contributed to 18% of the weight gain in SAM, as compared to 8% in Average children. Younger age was associated with greater increases in TBW, FFM and FM; and low WHZ-scores at baseline predicted a higher body fat % at 18 months.

Conclusions: The children showed composite growth failure. Follow-up of undernourished children showed differential catch-up and growth faltering patterns for weight, height, head circumference and adiposity. Recovery from undernutrition was marked by increase in adiposity, which may persist in later life and contribute to the risk of chronic diseases like metabolic syndrome and type 2 diabetes. The nutrient profile and role of nutrients, in foods provided in CMAM needs to be investigated further.

Key words: Body composition, children, CMAM, undernutrition, chronic disease.

Funding agency: International Atomic Energy Agency, Vienna, Austria.

PO1707

EVALUATION OF THE ACQUISITION OF THE FAMILY FARMING GENRE: DATA ANALYSIS OF AWARD EFFICIENT MANAGER OF SCHOOL MEALS 2011.

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Background and objectives: The Award Efficient Manager of School Meals organized by non-governmental organization

Ação Fome Zero, identifies and rewards best practices of municipalities with municipal public administration of the National School Nutrition Program (PNAE). The purpose of this study was to evaluate the acquisition of the family farming food genre by municipalities awarded the Prize.

Methods: The study used data from the 8th edition of the Prize 2011 (percentage of the purchase of family farming and the types of food purchased).

Results: 19 municipalities made the purchase of family farming, but only 18 municipalities declared the percentage purchase and cited the foods that are purchased. Only 8 counties achieved the goal of 30% of purchase family farming, 8 of the winners found themselves slightly below the percentage and 2 much lower than recommended one. The food groups most commonly bought by 83% of municipalities were fruits / pulps and vegetables, the candy group was purchased by 67% of municipalities. Despite the group of cereals, tubers and roots occupy the 4th position, only 2 municipalities reported buying rice, most of this group purchase were potatoes and cassava.

Conclusions: These data demonstrated that some municipalities may even have reached 30% of food genre coming from the family farming, but this does not guarantee that there is variety in the types of food purchased and neither guarantee that the already purchased are products that encourage healthy eating habits.

Key words: Food consumption. Food production. School feeding.

PO1708

SENSORY AND NUTRITIONAL EVALUATION OF A MUNICIPAL SERVICE OF COMMUNITY KITCHEN FOR POOR AND HOMELESS PERSONS

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Background and objectives:: Local government of Murcia has a service of community kitchen for homeless. It is necessary to adapt the resources and provide of monitoring indicators facing to the increasing demand in the currently economic crisis. The objective is to optimize the supply of menus in order to ensure the health of the users and the efficiency.

Methods: Sampling stratified by sex and nationality. Trained interviewers investigated: 1) anthropometry, socio-demographic data, and food preferences; 2) nutritional assessment by double weighted; 3) acceptability of the usual menu, and 4) perception of the process of assistance.The scales used were hedonic and perceptions facial type, of 7 points, in Arabic and French. Acceptability and the overall assessment were also scored with a note (0-10). The nutritional goal was set at the 40% of daily needs.

Results: Users: 200; N = 50 (45 men); 14 nationalities, 5 alimentary groups: Spanish, Maghrebians, Eastern Europeans, South American and African; Average: 46 years old; There are not underweight, 58% excess weight; 30% limited chewing capacity, 10% do not make another meal a day. Sensory evaluation of 13 dishes of the menu is acceptable (5, 8) and correlates with the percentage remains uneaten. Found deficient texture of rice and pasta. The usual menu has a high acceptability (5, 65) correlating with the overall rating of service (8, 62); The best accepted are dairy products, fruit and legumes, and the worst fish. There are differences between acceptability by nationality. Intake: 813 kcal/meal (deficit: 327 kcal/meal), 31% fat, 19% protein. Negative perception of the amount, the behavior of other users, and noise.

Conclusions: Excellent assessment, with improvement areas: Increase energy and amount, improve the textures and tastes consider. Sensory analysis and perceptions allow you to design menus and services that maximize satisfaction, nutritional intake and minimize remains.

Key words: Homeless, Food Services, Sensory evaluation

PO1709

CONCERN ABOUT HIS BODY, SELF-ESTEEM AND DISORDERS OF EATING IN YOUNG

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Background and objectives: In the last years, it has been sought to understand why youngsters try to diminish their body weight through a variety of mistaken eating and exercising behaviors. These, added to the concern for their body and low self esteem, may turn into a Eating Behavior Disorder (EBD). The purpose of this work was to measure self-esteem, preoccupation regarding body image and EBD, in youngsters in a high school (middle school) in Mexico City.

Methods: To 47 adolescents, 61% women and 49% men, with an average age of 14 years old, three tools wee applied: Eating Attitude Tests (EAT-26) to measure FBD, Body Image

Ansiety (BIAS), modified to measure the concern towards the body, and Assessment Questionnaire self-esteem Evaluation to measure adolescents' self esteem, validated in this population. Weight was recorded in kilograms and height in centimeters to calculate Body Mass Index (BMI) in adolescents. A statistical analysis was performed to calculate frequencies, correlations and associations with a statistical significance lf 95%, using the SPSS computer program.

Results: FBD frequency was of 10.6%, low self-esteem was found in 93.6% and 75.3% are concerned about their body. No statistically significant differences were found, although frequency was higher in women. Overweight and obesity in women were 34.5% for each and 6.9% for morbid obesity. Overweight and obesity in men were 61.1% and 11.1% respectively. Higher FBD, low self esteem and concern towards body frequencies were found in groups with overweight and morbid overweight both in men and women. No statistically significant associations were found.

Conclusions: Despite the small sample, a high risk frequency for EBD was found, in a three women to one man rate. It is necessary to continue with this line for it is a high risk group.

Key words: FBC, self esteem, body image, eat-26.

PO1710

DOUBLE BURDEN OF MALNUTRITION IN BURKINA FASO, A GENDER AND LIFE STYLE BOUND UP PROBLEM RELATED TO EDUCATION AND POVERTY

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Background and objectives: Evidence suggests that nutrition transition with a progressive shift in diet and lifestyle factors plays a crucial role in the increasing cardio-metabolic factors (CMRF). While CMRF are escalating in the developing countries, global and micronutrients malnutrition remain highly prevalence even among adults, portraying the double burden of malnutrition, within a population, household and even within the same individual. This study examined the relationship between nutritional deficiencies, cardio-metabolic risk factors (CMRF) with lifestyle habits in adults.

Methods: We randomly selected 330 households stratified by income tertile. In each income stratum, 110 individuals aged 25-60y and having lived in Ouagadougou for at least six months were randomly selected, and underwent anthropometric measurements and blood sample collection. Lifestyle habits were also assessed with dietary intake computed in dietary patterns using cluster analysis.

Results: Two distinct dietary patterns were identified - 'urban' (29% of subjects) and - 'traditional' (71%). Women, low income and none educated subjects, were significantly aggregated in 'traditional' cluster whereas men, high income and more educated subjects were significantly in 'urban' cluster. Anaemic, iron and vitamin A deficient subjects were significantly more prone to have 'traditional' diet. The 'urban' cluster was characterised by a higher intake of fat, and sugar, whereas a higher intake of protein, carbohydrate and fibres was in the 'traditional'. Both patterns exhibited no difference for CMRF prevalence's. Subjects in 'traditional' diet had more active time and those in 'urban had significantly higher sedentary time. The 'traditional' diet, poverty, female gender and sedentary time have been founded to be the most contributing factors to the double burden of malnutrition.

Conclusions: The rapid nutrition transition is reflected in this co-occurrence of CMRF and nutrition deficiencies, stressing the need for prevention strategies addressing both ends of the nutrition spectrum.

Key Words: Double nutritional burden, diet and lifestyle.

PO1711

THE KUWAIT NUTRITION SURVEILLANCE SYSTEM: AN EXAMPLE FOR OTHER COUNTRIES

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Background and objectives: The Kuwait Nutrition Surveillance System (KNSS) is a nation-wide Nutrition Surveillance system which was established in 1995. KNSS main aim is to provide timely data for monitoring the health and nutritional status of the Kuwaiti population. Identify the functioning of the KNSS as an example for the region.

Methods: The KNSS is designed as a sentinel data collection for "purposive' sampling. The target population covers children under 5 years old and women of child bearing age from the health centers of all the governorates. The school aged children are chosen from sentinel schools. The adult sample is chosen from the Medical Council, Public Authority for Social Security, universities and colleges. The KNSS collects information on the following indicators: weight, height, hemoglobin for all age groups, in addition cholesterol, blood glucose and data on life style including intake of fruits & vegetables, smoking and physical activity patterns for adults. Infant feeding practices data are also collected for children less than two years.

Results: The KNSS data are analyzed annually and reported to the public through media, and to stake holders at MOH who use the information for policy making, policy changes, and to help in guiding and shaping public health programs.

Conclusions: The system is simple, sustainable and tailored to the needs of the country and within the health care system. KNSS provides useful information on trends which can alert the health authorities and trigger policy changes. The KNSS can be considered as an example for the region.

Key words: Kuwait, Nutrition Surveillance, example.

PO1712

DISCREPANCY BETWEEN TWO METHODS OF A QUESTIONNAIRE TO MEASURE FOOD FREQUENCY

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Background and objectives: The frequency questionnaire of food consumption (CFCA) is a relatively economical, fast and easy-to-apply dietary assessment tool. It allows information of the habitual consumption in the long run in large populations, used as the main instrument for the calculation of dietary intake in age groups. The CFCA, is a fragile methodological part in nutritional epidemiology based on information that reports the person memory. The hypothesis is that there is discrepancy in results in the same instrument by submitting it to two methods. Objective : Set if there is difference in the information obtained in the CFCA final when you follow up on the diet of the school in relation to that obtained for first intention (initial CFCA).

Methods: Pre experimental study, observation units were selected on the basis of invitation, were 242 CFCA applied to 121 mothers of three cities in Mexico.

Results: 108 Included food, 12 (11%) have difference in the amounts consumed ($p < 0.05$). Vegetable oil was the only one with values higher in the CFCA final ($p < 0.00$). The total number of food consumed in the CFCA final was lower ($p < 0.000$). The number of food from cereals, fruits, fats and oils and pulses was lower in the initial CFCA ($p < 0.05$). In the initial CFCA, dietary intake of carbohydrates and proteins were higher ($p < 0.05$) and lower lipids ($p < 0.05$) with respect to the final CFCA.

Key words: food, food consumption.

Findings: Dietary information obtained a CFCA is different when the mother was tracking to the diet of the school compared to that obtained for first intention.

PO1713

FOOD FREQUENCY, PHYSICAL ACTIVITY AND SEDENTARY LIFE STYLE OF OVERWEIGHT AND OBESE SAUDI YOUNG WOMEN

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Background and objectives: Obesity is considered as epidemic health problem among Saudi women, thus it is important to determine some of the factors associated with overweight and obesity for planning the appropriate intervention to improve the health status of the community. The aim of the study was to determine the food frequency, Physical activity(FA) and sedentary life style of overweight and obese Saudi young women and its relationship to body weight status.

Methods: 182overweight and obese(BMI > 25) Saudi young women (18-25years) completed a self â€“report questionnaire, Physical activity (FA) was assessed using the official Arabic form of IPAQ, followed by questions about food consumption frequency per week.

Results: The study demonstrated that overweight Saudi young women do not engage in any physical activities except climbing stairs two times per week (21.1%) and house work 3 times/week (20.3%). While the most common physical activities (FA) among obese Saudi young women were walking once a week (33.3%), followed by doing house work every day (24.1%) and climbing stairs once a week (20.4%) and. Both overweight and obese Saudi young women do not eat healthy food such as fish, egg, and yogurt. They consume vegetables and fruits, sweets, juices, and fast food 2-3 times/week. Overweight Saudi young women spend 3hours watching TV or video (22.7%) and two hours using computer (21.9%) and 8 hours sleeping(24.2%). While obese Saudi young women spend 2hours watching TV or video (25.9%) and1 hour using computer (22.2%) and 9 hours or more sleeping(25.9%).

Conclusions: The study indicated a high level of inactivity among overweight and obese Saudi young women, and low consumption of healthy food.

Key words: Food frequency, Physical activity, overweight obese, Saudi young women.

PO1714

THE GRADUATE FROM AGRICULTURE TECHNICAL COURSE AND HIS RELATIONSHIP WITH FOOD AND NUTRITION SECURITY: A WORRYING SITUATION

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Background and Objectives: The Professional Agricultural Technician, among other functions, can plan and monitor all phases of agricultural development projects, administer rural properties and act in programs of technical assistance and agricultural extension next to small producers. In actions that promote Food and Nutrition Security (FNS), it is supposed to be a profession of great importance. The Brazilian government has implemented them on different axes like policies directly linked to the production and distribution of food and local development. The objective is to assess the knowledge of students Federal Institute graduated from the agriculture technical course in the perspective of professional practice with FNS.

Methods: It was applied to 101 graduates a semi-structured questionnaire whose options responses could be 'yes' or 'no and justified'. The variables analyzed were knowledge about: FNS, governmental programs related to the relationship between the profession Agricultural Technician and food security of population.

Results: The analysis showed that 45.5% of agricultural technicians trained by the institution reported had never heard about SAN. Among the 29 students (34.6%) who reported knowledge of SAN government programs, 83% exemplify them properly. For 94.1%, the profession is related to FNS. However, 61.4% of them only related FNS to Good Manufacturing Practices, to the detriment of the social and political context in Brazil. They did not show reasonable knowledge about the topic and not associated it with their professional development, reducing their potential as agents of health promotion and performers of government programs.

Conclusions: The study demonstrated the need to include discussion of political and social content of food security to reorder the curriculum and its linkage with other programmatic contents, allowing the knowledge to Agricultural Technician for the work socially engaged and promoting local development.

Key words: Food Security, Agricultural Technician; Vocational Education; Development Site.

PO1715

NUTRITIONAL STATUS AND DIETARY PATTERNS IN SCHOOLCHILDREN OF THE WAYUU ETHNIC GROUP FROM MARACAIBO, VENEZUELA

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Background and objectives: Malnutrition in early childhood is an important health problem, it causing stunted growth, as well as a limited mental and physical development of schoolchildren. The aim of this study was to determine the nutritional status and dietary patterns in schoolchildren of the Wayuu ethnic group.

Methods: The study was descriptive and cross-sectional, which was evaluated a random sample of 100 children aged 6-9 years, of both genders, from a public school located in the community of Laguna "Las Peonias" in Maracaibo city, Zulia State, Venezuela. Assessment of anthropometry was performed through the combination of indicators (weight/height, height/age and weight/age), according to the WHO criteria. A dietary assessment (food frequency) was also applied. For diagnosis of socioeconomic status was used the modified Graffar method.

Results: Anthropometric analysis showed that 68% of schoolchildren had normal nutritional status, while 32% were malnourished (11% deficit and 21% excess). The frequency of consumption showed a daily intake of pasta, rice and corn flour (80%), banana (81%), sugar (92%), oils and margarine (75%) and eggs, dairy products (72%). The economic assessment showed that 82% of families were living in poverty (56% in relative poverty and 26% in extreme poverty).

Conclusions: We conclude that in this indigenous community there are a lot of social, cultural and environmental factors that adversely compromise the nutritional and feeding of the children in growing period.

Key words: Nutritional status, anthropometry, schoolchildren, Wayuu, dietary assessment.

PO1716

THE NATIONAL EVALUATION PLATFORM: A NEW WAY TO EVALUATE NUTRITION PROGRAMMING IN MALAWI

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Background and objectives: Recent global initiatives promote nationally-coordinated multi-sectorial efforts to address malnutrition at scale. Direct and indirect approaches hold promise for accelerating impact but are difficult to evaluate. IIP-JHSPH is implementing a three-year, four-country project in collaboration with in-country institutions to test the National Evaluation Platform (NEP) approach for evaluating Maternal Child Health and Nutrition programs. The NEP consolidates validated district-level data from existing cross-sector sources (e.g., census, routine information systems, surveillance, household surveys) with ongoing district-level documentation of program implementation and contextual factors. The NEP supports longitudinal assessment of multiple programs, using several analytical approaches to generate findings that support local, national and global decision making. Since 2010, IIP-JHSPH and local partners in Malawi have implemented a NEP design to evaluate the Rapid Scale-Up of Integrated Community Case Management (iCCM) programs in 17 of the country's 28 districts. We examined the feasibility of extending the NEP to incorporate nutrition-specific interventions and outcomes nationally.

Methods: We considered multiple dimensions of feasibility: 1) fit with national policy and implementation landscape; 2) availability of appropriate cross-sector data; 3) availability of valid documentation tools; and 4) data storage, accessibility, and utilization issues. Methods included document review and key informant interviews.

Results: Malawi is a Scaling Up Nutrition (SUN) country with high-level government and donor support for the NEP. Periodic nationally-representative health, nutrition, agriculture and food security surveys are available, but cross-survey indicators are not identical and require quality checks. iCCM documentation tools for community health workers can be modified for nutrition programs. The National Statistics Office is well situated to manage the NEP database.

Conclusions: The cross-sector NEP is feasible and well-suited for evaluation of muliti-sectoral nutrition programs in Malawi. Lessons learned will apply to other NEP countries. Funding support: Canadian International Development Agency.

Key words: program evaluation, Scaling Up Nutrition, Malawi

PO1717

SELECTION OF FOOD IN A DINING ROOM AT UNIVERSIDAD IBEROAMERICANA, MEXICO CITY

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Background and objectives: The selection of food on population groups can be characterized primarily by Genetics and culture to which belongs the group. The decisions of food choices are influenced by several factors, such as past experiences, the environment, choose habits and age (in age groups also influences the context, psychology, tastes, among others).

Methods: In order to describe food choice in one of the dining rooms at the Universidad Iberoamericana, we conducted a transversal and descriptive study of a sample of 397 users, men (60%) and women (40%). We interviewed students, teachers, administrative and service staff of both gender and different ages. We took a picture of the selected food dishes. The menu includes a choice of soup soupy, dry soup, main course with garnish, salad, fruit and/or dessert, bread and/or tortilla. Each time includes at least two options.

Results: 80% of the group selected liquid soup, 78% choose dry soup. 45% prefer rice and 33% pasta. For the main course, 25% opt for chicken; this option generally includes foods of animal origin (93%). 37% consumed beans and 55% prefer salad as garnish; the male population consumed less vegetables. 67% preferred dessert instead of fresh fruit, this is more frequent among students.

Conclusions: We found that selection of food is similar to that described in national surveys and other studies. Characterization by age, sex and working group will allow us to set appropriate interventions by taking into account the specific cultural parameters to establish sustainable actions and promote healthy lifestyle.

Key words: Food selection, preferences.

PO1718

STUDENT CONSUMPTION OF ALCOHOLIC AND ENERGY-DENSE BEVERAGES ACCORDING TO TIME OF CLASS ATTENDANCE IN A PRIVATE UNIVERSITY

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Background and objectives: Young people represent one of the largest groups of consumers of alcoholic beverages and sugary drinks, which makes the study of their patterns of con-

sumption relevant in the context of prevention of disease and older age health complications. The aim of this study was to compare potential differences in the drinking behavior of students attending morning, afternoon and evening classes and its impact on their nutritional status and macronutrient intake.

Methods: In this cross sectional study a sample of college students attending morning, afternoon and evening classes answered a questionnaire about food and beverage consumption that also included a 24-hour dietary recall. Nutritional status was determined by self-reported weight and height.

Results: Students who attended morning-only courses reported the lowest alcohol consumption. Afternoon-only students were the highest consumers of alcohol, which resulted in excessive carbohydrate intake for 73% of the group. Processed fruit juice was the most consumed beverage in all groups (37% morning and afternoon, 47% evening), followed by sodas (13% morning and 20% evening). Overweight was more prevalent among evening-only students (30%) and the highest prevalence of obesity was detected in the morning-only group (6, 7%). Both these groups presented fat intakes above the recommendations (33% evening and 27% morning).

Conclusions: Although the overall majority of the sample was normal-weight (BMI 18.5 - 24.9 kg ¨Mm2), overweight and obesity were more frequent among the morning and evening groups, the highest consumers of fats. Carbohydrate intake in the afternoon group was greatly impacted by sugary drinks and alcohol. It is important to adopt strategies that emphasize the benefits of healthy eating and reducing the consumption of beverages with high sugar and alcohol content.

Key words: university students, food consumption, sugary drinks, alcoholic beverages.

PO1719

IMPACT OF A MULTISECTORAL PUBLIC HEALTH AGRICULTURE INTERVENTION IN A POST-EMERGENCY SETTING IN HAITI.

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Background and objectives: Since the 2010 earthquake, several international organizations are active to providing emergency nutritional interventions, and exploring options for more sustainable food systems in Haiti. This paper reports the impact of a multisectoral intervention implemented by Food and Agricultural Organization, Medecins du Monde France and German Red Cross and aimed at improving food and nutrition security and household resilience.

Methods: The study included a quantitative knowledge attitudes and practices (KAP) survey and focus groups. The KAP survey included 529 households (intervention group = 255 and control group=274). We collected data on food security, dietary practices and dietary diversity, infant and young child feeding practices and sanitation.

Results: The intervention has strengthened operational capacity for managing malnutrition in 7 health centers, provided agricultural equipments and inputs to 1200 households, and supported 800 home gardens and 200 livestock farms. Mothers exposed to the intervention have better practice for breastfeeding and appropriate management of diarrhea. The dietary diversity score in the intervention group increases from 4.9 to 6.8. Fruit/vegetable consumption was higher in intervention group as compared to control group (86% versus 67%) but no difference was observed for animal products. Food insecurity was still highly prevalent (68%) in both groups and was still higher in intervention group. Focus group discussions suggest that overcrowding, poverty, single parent status, emigration, dependency on foreign aid created by distribution of food stamps and some food taboos were potential barriers to the program effectiveness even when the mothers gain the appropriate knowledge. The recurrence of natural disasters was also a potential treat.

Conclusions: The project highlights the possibility to combining emergency initiatives that meet the immediate nutrition

needs and development interventions that enhance the resilience capability of the more vulnerable households and provide more sustainable solutions.

Key words: food security, Haiti, public health, nutrition, emergency.

PO1720

FOR THE DEVELOPMENT OF STRATEGIES TO PREVENT THE RISE OF OBESITY IN MOROCCO

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Background and objectives: policy makers in most countries are aware of the growing social and economic costs of obesity if nothing is done to change the trend. The causes are many and the answer must be multifactorial.

Objective: To explore the views of key stakeholders towards a range of public policy options to prevent obesity in Morocco using a multi-criteria mapping methodology (MCM). Methodology: MCM is based on a 2 to 3 hour structured interview s using MCM mapper software. Stakeholders appraised a set of pre-defined options by reference to criteria of their own choosing and provided relative weights to their criteria, and overall rankings of the policy options.Twelve public policy options were proposed for evaluation by 37 respondents from 33 sectors..

Results: The12 options were all accepted. Behavior change through education get broad consensus. The same goes for those aiming to promote and enhance physical activity at school. Control of advertising is preferred to nutrition labeling. In each group of options, those aimed at children are preferred: curriculum and nutrition, physical activity at school, controlling advertising and marketing in schools. The performances of many options were considered dependent on education but also on a prior sensitization to the problem of obesity

Conclusions: In Morocco, obesity seems not recognized as a problem, and when it is, it is seen as a priority issue, neither of health nor for society. Advocacy with policy makers and the awareness of the population are needed with emphasis on educational measures and those for children.

Key words: Obesity, policy, policy makers, decision making, Morocco. Study funded by CORUS (France), IRD (France) and INNTA (Tunisia)

PO1721

PHYSICAL ACTIVITY AND NUTRITIONAL STATUS OF WOMEN IN PROCREATIVE AGE IN MOROCCO AND THEIR RELATIONSHIPS WITH SOCIODEMOGRAPHIC CHARACTERISTICS

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Background and objectives: Obesity and related chronic diseases have grown rapidly in Morocco, particularly among women. The objective is to describe patterns of physical activity (PA) and energy expenditure (EE) of urban Morocco women and relationships with socio-demographic characteristics.

Methods: A cross-sectional survey in Rabat (2009-2010) conducted on a representative sample of 895 women (20-49y). PA was assessed by validated frequency questionnaire (12 categories of PA). Body Mass Index=weight/height2 defined overweight (¡Ã25kg/m©÷) and obesity (¡Ã30kg/m©÷)., The management of data files and calculation of derived variables were performed using the adequate methods.

Results: Overweight affected the 2/3 of women, obesity nearly the 1/3 and abdominal obesity nearly the half. Activities that contribute to EE (kcal/d) were, in descending order: sleeping, walking, seating, light housekeeping and cooking. Low-intensity activities contributed to 57.5% of the EE; those with moderate-intensity to 21.0%, and high-intensity to 2.6%. Only 2% of women had a very inactive lifestyle; almost half of the women (45%) had a sedentary lifestyle and the third an active one. Only 14% of women had an important activity, and 3% were extremely active. The proportion of women with a higher activity among working women and in women who have a children.

Conclusions: In the study area, the duration of activities is related to certain environmental characteristics, social, cultural and family, regardless of economic status. Such results are useful to consider in the implementation of targeted and tailored to specific population groups to promote physical activity and the fight against inactivity.

Key words: Energy expenditure, obesity, sedentary, urban area, North Africa. Obe-Maghreb 6028: Study funded by CORUS (France), IRD (France) and INNTA (Tunisia)

PO1722

PLASMATIC LEVELS OF COPPER AND ZINC, NUTRITIONAL ANTHROPOMETRY AND LIPID PROFILE IN AN INDIGENOUS POPULATION BARI FROM VENEZUELA

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Background and objectives: Copper (Cu) and zinc (Zn) are essential trace elements involved in different biological functions, such as growth and development, blood cell formation, energy metabolism and immune response. The aim of this study was to establish a relationship between the plasma levels of copper and zinc with nutritional status and lipid profile in an indigenous population Bari from Venezuela.

Methods: Blood samples were collected in 90 indigenous people who live in the community Bari "Kumanda" located in the Mountains of Perija, Venezuela. The nutritional status in children was assessed by mean of combining anthropometrical indicators (weight/age, weight/height, and height/age) and by mean of the body mass index (BMI) in adolescents and adults. Plasmatic Zn and Cu were determined by flame atomic absorption spectrometry and total cholesterol (TC), triacylglycerol (TAG) and HDL cholesterol (HDL-C) by enzymatic methods.

Results: The 72.7% of Bari children presented undernutrition, in 65.2% of adolescent and adult the nutritional status was normal and 30.4% was found with overweight. Plasma levels of trace elements (mg/ml) in children were 0.32±0.23 (Zn) and 0.78±0.35 (Cu), while in adolescents and adults were found levels of 1.03±0.17 (Zn) and 1.15±0.47 (Cu). The 92.1% and 62.5% of children were deficient in Zn and Cu, respectively. In adolescents and adults the overweight was associated with higher levels of TAG and VLDL-C (P=0.042). Children with low plasmatic Zn were found with TAG and VLDL-C higher in comparison with those children who had normal levels of Zn (P=0.001), but adolescents and adults indigenous people with subnormal levels of Cu showed decreased levels of TAG, VLDL-C (P=0.027) and HDL-C (P=0.017).

Conclusions: These results demonstrate that Cu and Zn status could affect plasma lipid metabolism in different age groups of indigenous Bari.

Key words: Copper, zinc, lipid profile, nutritional anthropometry, indigenous Bari.

PO1723

CONCENTRATION OF HEAVY METALS AND ESSENTIAL TRACE ELEMENTS IN SCALP HAIR OF INDIGENOUS CHILDREN BARI FROM VENEZUELA

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Background and objectives: Determination of some chemical elements, such as heavy metals and essential trace elements in human hair has a great value as these evaluations allow scientific knows if some groups of people have been exposed to toxic elements or have been presented nutritional deficit. The objective of this research was to determine the concentration of some heavy metals (mercury, lead, aluminum, chromium, uranium), and essential trace elements (zinc, copper, selenium, manganese) in hair samples of indigenous children Bari.

Methods: We performed a cross-sectional and analytic study, which a total of 40 scalp hair samples were collected from children (2-12 years-old) belonging to the ethnic group Bari that live in the community "Kumanda", located at the Mountains of Perija, Venezuela. Hair samples were rinsed thoroughly with nonionic detergent and deionized water, then were mineralized in an acid medium using Parr digesters. The elemental analyses were performed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Results: Scalp hair samples showed the following levels (ug/g) of heavy metals: Hg 1.72±2.01, Pb 15.52±14.96, Al 70.90±38.79, Cr 3.47±4.06, U 0.32 ± 0.42. Essential trace elements were found in the following concentrations (ug/g): Zn 107.40±68.78, Cu 6.79±4.19, Se 3.19±4.34, Mn 25.33±14.21. Values of Hg, Pb, Cr, and Al were higher than those reported in the literature for human scalp hair. A significant correlation was found between Hg and Cr content in hair samples (r=0.923, p<0.001). Zn and Cu values presented an order of magnitude lower than that reported in the literature for human scalp hair, while Se and Mn levels were higher.

Conclusions: We conclude that there is a source of exposure to heavy metals in this indigenous community, as well as a deficit of some essential trace elements in Bari children.

Key words: Heavy metals, essential trace elements, scalp hair, Bari children, ICP-MS.

PO1724

MATERNAL BMI IN MID-PREGNANCY AND INSULIN LEVELS IN OFFSPRING AT AGE 4 Y.

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Background and objectives: Evidence suggests that maternal prepregnancy body mass index (BMI) and gestational weight gain may be associated with cardiometabolic risk factors in offspring later in life. However, little is known about the effects of maternal BMI during pregnancy on metabolic markers in early childhood. We examined the association of maternal overweight in mid-pregnancy with markers of lipid and glucose metabolism in offspring at age 4y.

Methods: Study subjects were the offspring of women who participated in POSGRAD, a double-blind, randomized, and controlled trial in Mexico in which women were supplemented with 400 mg/d DHA or placebo from mid-pregnancy to parturition. We measured maternal weight and height at baseline (18-22 wk gestation), and classified women as overweight if their BMI > 26.0 kg/m2 using a Latin American reference. We obtained non-fasting blood samples from 524 (53.9% of the birth cohort) offspring at age 4 y and analyzed these for glucose, insulin, and lipids.

Results: Prevalence of women overweight at baseline was 46.8%. In offspring, mean+ SD of the biomarkers were: total cholesterol (157.9 +25.3mg/dl), LDL-C (83.0 +21.9mg/dl), HDL-C (51.7 +10.1mg/dl), Apo B (76.9 +15.2mg/dl), triglycerides (122.1 +67.4mg/dl), glucose (93.7 +10.9mg/dl), insulin (9.7 +11.2ìU/ml), and the glucose/insulin ratio (14.8 +14.2). Offspring of women who were overweight in mid-pregnancy had higher insulin levels (2.15 ìU/ml; 95%CI 0.29, 4.01) and reduced glucose/insulin ratio (-2.75; 95% CI: -5.19, -0.31) compared to those born to women who were not overweight, adjusted for prenatal intervention group, fasting hours and offspring BMI. There were no significant differences in lipid and glucose levels.

Conclusions: Maternal overweight during mid-pregnancy is associated with higher insulin levels and hence, reduced glucose/insulin ratio in offspring at age 4.

Key words: pregnancy, overweight, preschool, glucose, insulin, lipid. Funded by NIH (HD043099).

PO1725

INFLUENCE OF OVERALL MEAL SENSORY CHARACTERISTICS ON SCHOOL LUNCH ACCEPTANCE

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Background and objectives: Food intake at school is an important source to nutritional daily intake. School meals sensory characteristics determine meals acceptance, influencing children food consumption. The present study aims to evaluate children's satisfaction with meal sensory characteristics and its influence on school lunch acceptance.

Methods: A stratified clustered sample of 463 fourth-grade children, aged 9 to 10 years old, chosen from 20 public primary schools in the city of Porto were evaluated. Satisfaction with school lunch in relation to overall sensory characteristics: taste; smell; appearance and temperature, was determined using a questionnaire with a 4-point scale, ranging from "dislike" to "like a lot". School lunch acceptance was assessed by plate waste measurement. Weighing of individual meals and leftovers was performed and plate waste (%) was determined based on individual food servings.

Results: Sensory characteristics of soup were less satisfying than the ones of both main dish and dessert. Boys were significantly more dissatisfied with taste, appearance and smell of the main dish than girls. Children receiving free school lunch were more satisfied with sensory characteristics of all meal components than children with partial or no financial support for school lunch. Average plate waste of soup and main dish was 21.6% and 27.5%, respectively. Assuming that served portions are balanced with children's nutritional needs, these were not being achieved. Rejection of school lunch, expressed by higher plate waste values, was negatively correlated with satisfaction towards taste, smell and appearance of soup (r=-0.223; r=-0.197; r=-0.194) and main dish (r=-0.168; r=-0.126; r=-0.110, all significant at a 99% confidence level).

Conclusions: Children dissatisfaction with school meal overall sensory characteristics was associated with lower acceptance of school lunch, pointing to the need of improving taste and appearance of meals.

Key words: children satisfaction; meal acceptance; plate waste; school lunch.

PO1726

CARDIOVASCULAR RISK IN HEALTH CARE PROVIDERS WORKING IN ROTATING SHIFTS AND DAYTIME JOBS IN THE HERMINDA MARTIN HOSPITAL, CHILLÁN, CHILE

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Background and objectives: The study was carried out in the city of Chillán, Chile, and its objective was to identify the presence of cardiovascular risk factors in health care workers in the Herminda Martín Hospital in order to evaluate and compare factor prevalence, stratifying the risk of a cardiovascular event.

Methods: The sample corresponded to 138 workers, 108 in rotating shifts and 30 in daytime jobs. The Framingham Table was applied to evaluate the cardiovascular risk factors and the risk score was obtained following Framingham. Additionally, a survey was applied to determine sleep habits and alterations.

Results: Men over 45 years and post-menopause women are strongly associated to turnicity. A large percentage of both types of workers studied were overweight or obese and also had total cholesterol over 200 mg/dl. The risk score of presenting a cardiovascular event in 10 years was 2.89 ± 3.37 and 1.58 ± 1.33 for workers with rotating shifts and daytime jobs, respectively, which was significantly different. The variables that significantly predict the Framingham score for workers with rotating were: age, smoking habit, total cholesterol, HDL cholesterol, and systolic arterial pressure.

Conclusions: For workers with daytime shifts, the variables that significantly predict the Framingham score are: smoking habit, total cholesterol, systolic arterial pressure, age when began working, and years in the present job.

PO1727

EFFECTIVENESS OF A LOCALLY PRODUCED READY-TO-USE-THERAPEUTIC FOOD FOR THE TREATMENT OF CHILDREN WITH ACUTE MALNUTRITION IN VIET NAM

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Background and objectives: Peanut-based Ready-To-Use-Therapeutic Foods (RUTF) were shown to have a low acceptability in SE-Asia. Therefore, a RUTF was developed in Viet Nam by NIN, IRD and UNICEF based on locally available ingredients, which showed promising acceptability and impact on nutritional status among preschool children. The present study assessed the effectiveness of this RUTF on weight gain and recovery rates in children with acute malnutrition using the RUTF in a home-based treatment program.

Methods: Community-based, randomized intervention trial with a local RUTF (LOC) and a standard available RUTF (STD) in 150 children, aged 6–59 months, with acute malnutrition, enrolled in a home-based treatment program in Kon Tum province in Central Vietnam.

Results: After 8 weeks intervention, nutritional status of all children was significantly improved ($p<0.001$). Mean weight gain was higher for STD group than LOC group, with increments in WHZ of +1.04 (± 0.97) and +0.69 (±1.01) respectively ($p=0.04$). Height also improved significantly and was not different between the groups, with a mean increase of 27.1 (±28.8) mm after 8 weeks, resulting in a mean increase in HAZ-scores of 0.43 (±0.99). The recovery rate from acute malnutrition with RUTF as home-based treatment was 70.8%, and not different between the 2 interventions. Acceptance (taste and palatability) of the LOC tended to be higher than of the STD.

Conclusions: LOC was effective in the treatment of severe acute malnutrition, and can be used successfully in Integrated Management of Acute Malnutrition programs (IMAM). This study also suggests that IMAM with RUTF can have a positive impact on height of wasted children, including those above 2 years of age. The study supports the current efforts in Viet Nam to include IMAM and therapeutic foods into the National Targeted Program and National Health Insurance scheme.

Key words: children, malnutrition, RUTF, IMAM

PO1728

REFERENCE VALUES OF URINARY HYDRATION BIOMARKERS OF MEN AND WOMEN

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Background and objectives: Reference values for hydration status are not well established either in men or women, as there are few publications that have addressed the issue.

Methods: 341 apparently healthy Greek women (n=141, age:45 ± 14.4y, mass: 70.7 ± 16.1kg, height: 1.62 ± 0.06m, BMI: 26.6 ± 5.9kg/m2) and men (n=200, 47.2 ± 13.5 y, mass: 86.8 ± 14.8 kg, height: 1.76 ± 0.07 m, BMI: 27.8 ± 4.2 kg/m2) provided first morning urine sample which was analyzed for urine color (Ucol) with the use of the eight-point scale, urine specific gravity (USG) and urine osmolality (Uosm).Volunteers also completed a food frequency questionnaire with the help of a trained investigator. Urine Samples were not received while women were on menstruation.

Results: Means and 95% confidence intervals Uosm, Ucol, USG, water consumption and water intake per kg of body weight were 640 mOsm/kg (596-685), 2.8 (2.6-3), 1.018 (1.017-1.019), 1376 ml (1263-1490) and 20.3 ml/kg (18.5-22.2)for women and 734 mOsm/kg (699-768), 3.1 (2.9-3.2), 1.020 (1.019-1.021), 1456 ml (1353-1559) and 17.0 ml/kg (15.8-18.2) for men, respectively.

Conclusions: These data provide reference values derived from various urinary hydration markers that can be used by dietitians, nutritionists, and clinicians in order to provide guidelines for men and women regarding their hydration status.

Key words: Hydration Markers, Urinary, Reference Values

PO1729

REFERENCE VALUES FOR HYDRATION BIOMARKERS OF CHILDREN 8-14 YEARS

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Background and objectives: Reference values for hydration markers do not exist in children. Also there is a lack of studies describing drinking habits of children.

Methods: 152 Greek healthy boys and girls (29 girls, 8-10 y (G8-10); 36 girls, 11-14y (G11-14); 41 boys, 8-10 y (B8-10); and 46 boys, 11-14 y (B11-14)) were asked to collect their urine for 24 hours while conducting normal daily activities. They were also instructed to record the fluids they consumed in a diary specially designed for children, for two consecutive days. Urine samples were analyzed for color (Ucol) via an eight-point scale, urine specific gravity (USG) via refractometry, and urine osmolality (Uosm) via a freezing point depression osmometry.

Results: Means and 95% confidence intervals for TBW, Uosm, USG, Ucol, total fluid consumption and water consumption were for G8-10: 21.2 L (23.1-19.3), 647 mOsm/kg (727-567), 1.018 (1.02-1.015), 2.8 (3-2), 1432 mL (1644-1219) and 976 mL (1178-774); for G11-14: 27.2 L (28.5-25.9), 615 mOsm/kg (680-549), 1.016 (1, 018-1.015), 2.6 (3-2), 1918 mL (2139-1697) and 1197 mL (1392-1003); for B8-10: 21.7 L (23.5-20.6), 686 mOsm/kg (757-615), 1.018 (1.02-1.017), 2.9 (3-2), 1586 mL (1766-1407) and 972 mL (1153-792); for B11-14: 30.8 L (32.3-29.2), 791 mOsm/kg (864-718), 1.020 (1.022-1.019), 3.3 (4-3), 1964 mL (2219-1710) and 1296 mL (1519-1073).

Conclusions: These data provide reference values for children aged 8-14 years, derived from 24-h fluid intake and urinary hydration markers.

Key Words: Reference Values, Children, Hydration Markers

PO1730

ADDRESSING THE CAUSES OF UNDERACHIEVEMENT OF USI AND IDD ELIMINATION IN COUNTRIES WITH IDD-FREE STATUS: LESSONS FROM IRAN

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Background and objectives: Iodine deficiency is the most important preventable cause of impaired brain development and subsequent mental retardation. While Universal salt iodisation (USI) has proven to be successful in eliminating IDD, if monitoring fails or iodised salt processes, distribution and consumption are inadequate, IDD may re-occur. In 2000, Iran achieved IDD-free status, with a total goiter prevalence of 6.5%. Two decades later, a goiter prevalence of >10% and decrease in median urinary iodine values were observed among school children in five provinces. The study sought to identify the causes of persisting pockets of IDD in Iran, and to formulate feasible solutions.

Methods: A literature review and case study were carried out in 2010, including the compilation and analysis of existing empirical data from 1989-2007, provided by Iran's Ministry of Health, an analysis of Iran's IDD and Iodised Salt policy documents, and semi-structured interviews with IDD/USI experts.

Results: Inconsistent training for health workers has resulted in wide variations in IDD assessment capacity. Inadequate public knowledge about iodized salt, and its proper storage and use is widespread in areas with the highest goiter prevalence. The absence of a quality assurance system and production of low quality iodized salt in some provinces contribute to underachievement of IDD elimination.

Conclusions: To address persisting pockets of IDD in Iran, quality assurance and public awareness of IDD and USI must be improved. In addition to social and behaviour change communication (SBCC), improved monitoring of IDD status, enhanced quality assurance of iodized salt, and establishing a system to ensure the sustainability of the iodized salt programme are needed. Recommendations may serve as lessons for any country achieving IDD free status, yet experiencing high levels of IDD amongst limited population groups.

Key words: USI Underachievement, Quality Assurance, Sustainability.

PO1731

OVERWEIGHT AND OBESITY, AN INCREASING PROBLEM IN LIMA, PERÚ; THE NUTRIMOVIL PROGRAM

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Background and objectives: Overweight and obesity are public health problems worldwide. Peru continues to have problems of stunting and anemia but now also has high rates of overweight and obesity. This study evaluated the prevalence of overweight and obesity in a population served by the Nutrimovil program in Lima and Callao during 2004-2008.

Methods: Since 2004, Nestlé Perú has implemented the Nutrimóvil programme (an itinerant nutrition service). Nutritional status was measured in 64, 470 subjects at 4 cross-sectional time points (2004-5; 2005-6; 2006-7; 2008). Nutritional status for subjects under 19 years was classified according to Z-scores of the WHO 2006 reference data: undernutrition <-2sd; normal 2 to 1.49sd; overweight 1.5 to 1.99sd and obesity > 2sd. For adults (19 to 59 years) nutritional status was classified as: underweight BMI <18.5; normal 18.5 to 24.9; overweight 25 to 29.9 and obesity > 30 and in the elderly (> 60 years) underweight BMI < 23; normal 23 to 27.9; overweight 28 to 31.9 and obesity > 32.

Results: The prevalence of overweight and obesity increased significantly in all age groups: under 2 years: from 24.9% to 35.7%; 2 to 5 years: from 14.8% to 26.0%; 5 to 9 years: 21.8% to 30.1%; 10 to 18 years: from 15.7% to 22.2%; adult men: from 47.4% to 60.0%, adult women: from 52.8% to 63.2%: elderly men: from 23.1% to 39.4% and elderly women: from 39.8% to 45.9%.

Conclusions: Overweight and obesity has increased in Lima and Callao by 7-11 percentage points per year in subjects under 19 years and by 6-16 percentage points in adults. The causes of overweight and obesity in this population need to be studied in order to develop public health strategies to prevent and reduce this problem.

Key words: Overweight, obesity, Peru Financial support: Nestle Peru.

PO1732

PERINATAL AND POSTNATAL ANTIOXIDANT NUTRITIONAL STATUS INFLUENCE ATOPIC DERMATITIS IN 3-YEAR-OLD CHILDREN

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Background and objectives : Perinatal and early life dietary factors may induce atopic dermatitis. We examined the role of perinatal and postnatal antioxidant nutrition on the risk of atopic dermatitis (AD) in Korean children at 3 years.

Methods: Our 311 participants were the 3 year old children with mother-child pair data in our prospective study. We assessed the perinatal antioxidant nutrition by maternal blood antioxidant levels during pregnancy and the postnatal nutrition by the dietary intake of the children at 3 years. Maternal antioxidant biomarkers (retinol, ¥á-tocopherol, ¥â-carotene, and vitamin C) were measured at 26 months of pregnancy. For children, atopic dermatitis was assessed by the ISSAC questionnaire and dietary intake by 2-day 24-hour recalls. Results : After controlling for potential confounders, maternal antioxidants such as blood ¥á-tocopherol and retinol were inversely associated with the risk of AD in children at 3 years. Perinatal urinary MDA levels and postnatal antioxidant nutrient intakes (vitamin A [OR=0.36, 95% CI=0.18-0.72], retinol [OR=0.40, 95% CI=0.21-0.81], vitamin C [OR=0.43, 95% CI= 0.21-0.86]) had positive and negative relationships regarding the AD risk of our children, respectively.

Conclusions: In conclusion, the results from our cohort study provide the evidence that perinatal and postnatal antioxidant nutritional status play a role as predictors of atopic dermatitis in early childhood.

Key words: atopic dermatitis, antioxidants, ISSAC, pregnancy, children, oxidative stress

PO1733

EFFECTS OF 'TAKE SPORTS ONE HOUR A DAY' POLICY IMPLEMENTATION IN CHINESE STUDENTS

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Background and objectives: A national physical activity (PA) promoting policy was issued by the Chinese government in 2007 for encouraging students to take at least one hour of intensive physical activity in each school day. The aim of this study was to evaluate the effects of the policy in PA participation and changes in body mass index (BMI) in Chinese students.

Methods: 1) 3211 students in grade 4 to 12 were selected using a randomized clustered sampling method from urban and rural areas of Beijing, Liaoning and Guizhou provinces in China from 2007 to 2009. Data relating PA participation were collected by using a self-filling questionnaire. Logistic regression was used for identifying potential risk factors. 2) Three national data sets (in 2000, 2005 and 2010) were used for assessing BMI changes before and after the policy implementation.

Results: 1) About 53.8% of urban and 45.2% of rural participants met the national recommendation for physical activity (one hour a day). ($p<0.05$) 54.8% of boys and 34.3% of girls met the recommendation. Students met the recommendation in primary school, middle school and high school were 60.2%, 50.8%, 32.7%, respectively. ($p<0.05$) Logistic regression analysis showed that girls (OR, 95% Confidential Interval: 1.83, 1.57-2.13, p=0.00), higher age groups (2.13, 1.93-2.35, p=0.00), and higher SES (1.42, 1.33-1.50, p=0.00) were the independent risk factors for less PA participation. 2) Average BMI increase in 6-22-year boys were 0.3 kg/m2 and 0.4 kg/m2 before and after the policy implementation. And the BMI increase was curbed in 6-22-girls (0.2 kg/m2 in both of the two durations).

Conclusions: Gender, age, and family SES affected PA participation in Chinese students. PA promoting policy is effective in curbing BMI increase.

Key Words: physical activity, policy intervention, Chinese student.

PO1734

HEALTH BENEFITS OF WHOLEGRAIN – A SYSTEMATIC REVIEW OF THE SCIENTIFIC EVIDENCE TO PROPOSE A DAILY INTAKE

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Background and objectives: Recommendation to include wholegrain (WG) in the daily diet is widespread but is rarely quantitative. This work attempts to systematically review the published human studies to identify the daily intake of WG associated to favorable health outcomes.

Methods: Highest caution was put in confirming the nature and the amount of WG and WG food in each study. Overall mortality, obesity, cardiovascular diseases, type-2 diabetes and associated risk factors to both were the considered health outcomes. Databases were searched from 1993 to 2012 and the retrieved papers were screened independently by two trained nutrition PhD. The lowest amount of WG intake associated to an effect for each considered health outcome was determined in each relevant study.

Results: More than 2200 papers were retrieved by the initial search and less than 100 were fulfilling all selection criteria. Most studies, especially the ones on prospective cohorts, concerned US populations who consume low amounts of WG. Intervention studies usually focus on a specific cereal, test only one daily dose for a limited duration and consider risk factors rather than final outcomes; they were used as supporting evidence. Observation studies do not distinguish between the cereal types that constitute WG and consider the whole range of intakes across the population. These studies seem more relevant to identify potential effective doses. There is evidence of a favorable effect for each one of the considered health outcome, while the lowest WG intake needed varies across effects.

Conclusions: Reviewing systematically the data relating WG intake amounts to favorable health outcomes is a prerequisite for a quantitative recommendation of use. Taken the existing evidence, it is important to continue developing whole grain foods, and communicating about their use. For this, estimates about effective doses are important.

Key words: Wholegrain, dietary intake recommendation, mortality, cardiovascular health, type-2 diabetes.

PO1735

PREVALENCE OF OVERWEIGHT AND OBESITY, AND STATUS OF CHRONIC NON- COMMUNICABLE DISEASES AND SOME RELATED RISK FACTORS AMONG EGYPTIAN ADOLESCENTS

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Background and objectives: The prevalence of obesity has been steadily increasing; and the number of obese children has nearly tripled and is more likely to have risk factors for cardiovascular disease, such as type 2 diabetes high cholesterol or high blood pressure. Research objectives were to study the current prevalence of overweight and obesity among adolescents in Egypt from 2000 to 2008, to estimate the prevalence of glucose disorders, hypertension, lipid profile, and metabolic syndrome, and to investigate some related risk factors among 10 to 18 years old school adolescents.

Methods: For assessing prevalence rates of overweight and obesity among adolescents, data from reports of other cross-sectional studies carried out by National Nutrition Institute (2000 to 2005) and Egypt Demographic and Health Survey (2008) were compared. To estimate the prevalence of glucose disorders, hypertension, lipid profile, and metabolic syndrome, a randomized stratified cluster-sample of preparatory and secondary school students was used. Body mass index was calculated and referred to corresponding international reference values for age and sex. A fasting blood sample was drawn to assess lipid profile and fasting plasma insulin.

Results: Overweight and obesity are prevalent among Egyptian adolescents of both sexes, and at least, for girls, the prevalence has increased in the last few years. Pre-diabetic state was present among 16.4% of adolescents. The crude prevalence of hypertension is 1.4%. The overall proportion of adolescents with high total cholesterol is 6.0%; the proportion with high lower density lipoprotein is 7.5%, with high triglycerides of 8.2%, and low higher density lipoprotein of 9.4%.

Conclusions: overweight and obesity, type 2 diabetes mellitus, hypertension and cardiovascular risk factors in young are serious in terms of morbidity and mortality, suggesting that they are an appropriate target for screening.

Key words: Prevalence, overweight and obesity, chronic non- communicable diseases, Egyptian adolescents.

PO1736

INFLUENCE OF SELECTED FACTORS ON FRAILTY SYNDROME AMONG THE ELDERLY: A PILOT STUDY

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Background and objectives: Elderly people are at high risk of malnutrition due to physical, social, and medical factors. Nutrients deficiency can cause health problems, including frailty; and frailty is responsible for a higher number of falls, hospitalization and mortality. Moreover, frailty may develop other risk factors, which in turn may cause malnutrition. The aim of the pilot study was to evaluate the relationships between the frailty status and selected health and nutritional factors in a group of elderly people.

Methods: The study was conducted among 77 community-dwelling elderly people (age 59-96; 51 women, 26 men) from Warsaw, Poland. All data were collected by questionnaires. The frailty status was assessed according to Fried et al. (2001) criteria and the nutritional risk was identified using the Dietary Screening Tool (DST) (Bailey et al, 2009). A Chi2 analysis was performed to examine significant associations, with the p value set at α=0.05.

Results: The majority of the subjects were categorized as either pre- or non-frail (88% in total), and as being at nutri-

tional risk (over 66%). No statistically significant relationship between frailty and nutritional risk was observed. However, non-users of supplements were at higher nutritional risk than supplements users and women were at higher risk than men as far as nutritional risk is concerned. Statistically significant relationships were found between frailty syndrome and marital status, physical activity level and self-reported health status (those living alone, with low physical activity and worse health status were frail more often).

Conclusions: There was a stronger relationship between frailty and health factors than between frailty and nutritional risk. Moreover we conclude that further research is needed and other methods for identifying persons with nutritional risk should be applied to allow for better differentiation between those with frailty and other subjects.

Key words: elderly, frailty, nutritional risk, lifestyle.

PO1737

SOCIO-DEMOGRAPHIC DETERMINANTS OF CHILD MALNUTRITION IN NORTHERN GHANA

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Background and Objectives: Malnutrition remains a major public health problem particularly in developing regions such as sub-Saharan Africa. The first two years of life offers an opportunity for preventing child malnutrition. In inadequacies of nutrition, children are susceptible to frequent illness and other diseases leading to death. The objective was to determine child malnutrition prevalence and the relationship to socio-demographic determinants in northern Ghana.

Methods: A cross-sectional descriptive study was conducted in northern Ghana among 380 mothers with young children (6-23 months of age) in 20 communities (19 children per community). The participants were selected randomly using the Navrongo Health and Demographic Surveillance System. The data was analyzed using Stata12 version to determine the levels of stunting, underweight, and wasting, maternal malnutrition and its associated socio-demographic determinants.

Results: Child undernutrition was (15.26% underweight, 15.53% stunting and 8.42% wasting). Prevalence of malnutrition was found to be highest among the aged group 12-17 months: underweight (50.00%, OR=4.69, CI=1.58-13.93 and P=0.005), stunting (44.07%, OR=17.27, CI=2.29-129.95 and P=0.006) and wasting (53.13%, OR=4.68, CI=1.05-20.90 and P=0.043). Maternal malnutrition: underweight 39 (10.26%), overweight 47 (12.37%) and obese 9(2.37%). The study also found the following determinants to be associated with child underweight (mothers age p=0.040, mother's weight p=0.000, and mother's height p=0.031), stunting (mother's weight p=0.000, and mother's height p=0.001) and wasting (mother's age p=0.050, number of children per woman p=0.002 and mother's weight p=0.000) using regression.

Conclusions: The study found high prevalence of child undernutrition with increasing age. The findings also depict the presence of underweight and overweight among the mother. The socio-demographic factors independently associated with child undernutrition included sex of child, age of child, number of children per woman, education, ethnicity, mother's age, present breastfeeding status, maternal height, maternal weight and religious denomination.

Key words: Malnutrition, sex, child, ethnicity, maternal.

PO1738

DIETARY SODIUM INTAKE AMONG TURKISH ADULTS

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Background and Objectives: Reducing dietary sodium intake has been recommended by health authorities in order to prevent chronic diseases such as hypertension, cardiovascular disease and some cancer types. SALTURK study, conducted on Turkish population, showed that daily salt intake was 18 g, and recommended to promote national health strategies for reducing daily sodium intake. Detailed information on the main food sources of dietary sodium was necessary in the process of developing national strategies. Therefore, this study aimed to obtain the major sources of dietary sodium in Turkish population.

Methods: In a cross-sectional, population based survey, 2965 subjects (1231 male, 1734 female), aged 19-64 years, living in Ankara, Turkey were enrolled. Dietary sodium intake was investigated using a food frequency questionnaire which examined the consumption frequency and amount of 55 sodium-rich food items in the last four weeks. Table salt consumption was not assessed, only, participants were asked whether they add salt at the table or not.

Results: Dietary sodium intakes from food sources were skewed, with a median intake of 2785 mg/d and 5th-95th percentile range of 1396-5775 mg/d. A significant difference was obtained between males (3163 mg) and females (2559 mg) in terms of daily sodium intake ($p<0.001$). The food sources providing the highest amount of sodium were bread and bakery products (34%), dairy products (25%), olives and pickles (15%), meat and meat products (6%), ready-to-eat foods (5%) and sauces (5%). In addition to food sources, 57.5% of the participants stated that they add salt to their meals at table.

Conclusions: In terms of reducing dietary sodium intake, consumers should pay attention to the hidden food sources of sodium such as bread and bakery products, and dairy products, in particular cheeses, as much as table salt.

Key Words: sodium, food sources, Turkish diet.

PO1739

AN AUDIT OF VENDING MACHINES IN PUBLIC PLACES IN REGIONAL NSW, AUSTRALIA

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Background and objectives: Vending machines are widespread in public spaces, providing ready access to predominantly high-energy food and beverages. This study aimed to describe the type and frequency of foods available in vending machines in selected public spaces in regional NSW.

Methods: A quantitative audit of vending machines in Wollongong Hospital, University of Wollongong campuses, and surrounding suburbs was completed using a survey tool adapted from a similar audit of train station platforms in NSW. Information on the type of and cost of food and drink products available, and signage on the exterior of machines was collected. Healthy food items were defined as those with less than 600 kJ per serve, and healthy beverages as those with less than 300 kJ per serve.

Results: Wollongong Hospital contained 21 vending machines with 498 occupied slots for food or beverages. Among the 498 slots, 48.2% were beverages and 51.8% were snack foods. Among the beverage items, 71.8% were classified as healthy beverages; and among the snack foods, 49.6% were classified as healthy. On UOW campuses and 6 surrounding suburbs, 55 vending machines were identified. Among the 1662 slots, 61.8% of slots were beverages, and 38.2% were snack foods. Among the beverage items, 39.2% were classified as healthy beverages (mostly water); and among the snack foods, only 3.4% were classified as healthy snack foods (most unhealthy snack foods were chips, chocolate and confectionary).

Conclusions: Vending machines in public places may cumulatively contribute to excess energy consumption and poor diet quality as many available items are energy dense and nutrient poor. Interventions are required in public places to improve the public's access to healthy food and beverages.

Key words: food environment, food availability, food promotion, vending machines.

PO1740

USING LOCAL FOODS TO MEET NUTRIENT REQUIREMENTS OF 6-23 MONTH OLD INFANTS IN DEVELOPING COUNTRIES: A REVIEW OF THE EVIDENCE

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Background and objectives: The WHO recommends that energy and nutrient dense complementary foods be introduced to all infants at age 6 months with an emphasis on the use of suitable locally available foods. However, there is debate whether 6-23 mo children will be able to obtain all of their nutrient requirements from local foods. Several studies have addressed this question using modeling techniques. We performed a review of the evidence to address the question whether the macro- and micro-nutrient requirements of infants and young children can be met with local foods.

Methods: Studies were identified using Scopus, by crosschecking referenced articles and through local contacts in the MI and GAIN program countries. Criteria for inclusion were (1) features locally available foods and nutrient requirements, (2) observational or controlled interventions, (3) age range of 6-23 months, (4) in Africa, Asia, or Latin America, (5) from 2007 to 2012. Relevant studies and reports were reviewed by 2 independent reviewers. A total of 32 of these met all of the inclusion criteria.

Results: Overall, the results indicate that it is possible to meet most of the nutritional needs of older infants and young children with low-cost locally available complementary foods, if provided in the correct quantities and if animal-source foods are included as part of the daily diet. However, there are important exceptions for critical micronutrients (iron, zinc, calcium, folate, vitamin A) and perhaps essential fatty acids.

Conclusions: This review confirms the difficulty of meeting all of the nutritional needs of 6-23 mo old children with local foods alone. In addition, in many settings the ingredients nee-

ded to ensure that complementary foods are rich in micronutrients may not be accessible or affordable to the local population, stressing the need for additional cost-effective strategies.

Key words: complementary foods, local foods, nutrient requirements

PO1741

SYSTEMATIC REVIEW OF OBSERVATIONAL STUDIES WITH DOSE-RESPONSE META-ANALYSIS BETWEEN FOLATE INTAKE AND FOLATE STATUS MARKERS IN ADULTS AND ELDERLY

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Background and objectives: Dietary reference values for folate intake vary widely across Europe. Data from observational studies on the association between folate intake and biomarkers of folate status (plasma folate, erythrocyte folate and homocysteine) provide estimates of a dose-response relationship which can be used to derive folate intake reference values.

Methods: A systematic review was conducted on prospective cohort, nested case–control and cross-sectional studies in healthy adult and elderly populations which provided data on folate intake and biomarkers of folate status. An intake-status regression coefficient (r) was calculated for each individual study and the overall pooled x and SE established using random effects meta-analysis on a double log scale.

Results: Based on the data from 18 studies, the pooled dose–response relationship between folate intake and biomarkers of folate status showed that for every doubling of folate intake there was an increase in serum/plasma folate by 26%, erythrocyte folate by 21%, and a decrease in homocysteine by 17%.

Conclusions: These findings, combined with data obtained from randomized controlled trials may aid in setting folate intake recommendations as a basis for nutrition policies.

Key words: folate intake-status; dose-response; dietary recommendations. Acknowledgements: The work reported herein has been carried out within the EURRECA Network of Excellence (http://www.eurreca.org), which is financially supported by the Commission of the European Communities, specific Research, Technology and Development (RTD) Programme Quality of Life and Management of Living Resources, within the Sixth Framework Programme, project no. FP6 036196-2. This report does not necessarily reflect the Commission's views or its future policy in this area. This work was in part funded by the Ministry of education and science of Republic Serbia, project III 41030.

PO1743

FUNDING FOR DISTRICT-LED NUTRITION ACTIVITIES IN TANZANIA: BASELINE SCALING UP NUTRITION DATA

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Background and objectives: Malnutrition is a major problem in Tanzania, where 42% of children under five are stunted, and 8 in 10 infants and 6 in 10 <5s are anemic. District health sector budget guidelines (in decentralized Tanzania) have not had a specific budget lines for nutrition to facilitate allocation of funds for district-led nutrition. In an effort to scale up nutrition in Tanzania, the government in 2011 created a budget line for nutrition and instructed all districts to ensure nutrition is integrated into district health budgets. Objective: To determine funding allocations for the district-led nutrition activities in Tanzania in 2010/2011, as a baseline for scaling up nutrition activities.

Methods: District health budgets (FY 2010/11) from all 133 mainland Tanzania districts were reviewed and allocations for nutrition activities were recorded in an excel-based data collection tool designed to systematically collect nutrition activities, their budget allocation and funding source.

Results: Only 12 independent nutrition activities were identified in the budgets across the 133 districts in the country. Remarkably, funding for the twice yearly VASD (Vitamin A Supplementation and Deworming) events were allocated by all districts. In 123 districts (92.5%), no addition nutrition activities were budgeted. Infant feeding was the second largest nutrition activity, budgeted by 10 districts (7.5%), followed by screening for and management of severe acute malnutrition and purchase of iron and folic acid tablets in 9 districts each (6.8%).

Conclusions: Districts have shown efforts in allocating funds for VASD, although there are inconsistencies of implementation budgets across and within district budgets. Other nutrition activities, however, are not being budgeted at scale in the country. Guidance on identification of specific nutrition

activities, as well as tools for planning and budgeting for nutrition activities is still heavily needed in Tanzania.

Key words: District budget, nutrition funding, vitamin A supplementation and deworming, scaling up nutrition.

PO1744

RELATIONSHIP BETWEEN CARDIORESPIRATORY FITNESS, PHYSICAL ACTIVITY AND NUTRITIONAL STATUS IN CHILEAN SCHOLARS

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Background and objectives: In children has been observed that there is a negative association between aerobic capacity (as a biological predictor of morbidity) with obesity, insulin resistance, dyslipidemia and metabolic syndrome. Because a lower aerobic capacity is related to a sedentary behaviour, obesity can be considered a risk factor for cardiovascular disease at early age. The aim of this work is to study the relationship between cardiorespiratory fitness, physical activity and nutritional status in Chilean scholars.

Methods: In representative sample of public schools of 213 children (including 154 girls), between 12 and 13 years old was determined its cardiorespiratory fitness through EUROFIT 20 m shuttle run test, its nutritional status by BMI, according the Chilean recommendation and its physical activity was estimated by a validated questionnaire for Chilean children. The statistical software SPSS 20.0 was used.

Results: we found that prevalence overweight or obesity was the 78% and 65.7% as a lower performance in the cardiorespiratory fitness (all: 26.05 +/- 1.69; boys 26.7 +/- 3.1 and girls: 25.7 +/- 0.16 mlO2/kg/min, P <0.001), physical activity (all: 4.77 +/-1.32 boys: 5.19 +/- 1.3 and girls: 4.61 +/- 1.3 points P <0.001). Nutritional status was associated with cardiorespiratory fitness (P <0.001) and physical activity (P <0.001).

Conclusions: the results of cardiorespiratory fitness and physical activity are lower than international investigations, but de level of overweight and obese are majors than others country and its relation with nutritional status on paediatrics populations is a big public health in the present on Chile, is urgently needed, physical activity interventions in schools.

Key words: Children, Cardiorespiratory fitness, overweight, obesity, physical activity.

PO1745

QUALITY OF CARBOHYDRATES OF FOODS BEING ADVERTISED TO CHILDREN ON CHILEAN TV

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Background and objectives: The evidence shows that quality and type of carbohydrates of food, Glycemic Index (GI), Glycemic Load (GL), sucrose and fructose are possibly related to childhood obesity. These foods are widely offered to children on television advertising.

Objetives: Analyze the quality of carbohydrates in foods advertised to children through Chilean television.

Methodology: This descriptive research has a cross-sectional design. Programs broadcast by Four Chilean TV stations on days randomly selected were recorded. Advertised foods were identified. The information from the nutrition labelling of packaging was recorded. The GI of similar foods was obtained from the International Table of Glycemic Index and Glycemic Load Values 2002. The GL was estimated according to carbohydrates available per portion of advertised foods. Statistical analyses were made with Stata11.0.

Results: 509 food commercials were shown. Of these, 302 were aimed at children (P-value= 0.0000294 (CI95% 1.218397-1.749717) daily average 25.16 SD +-11.82). The foods with higher number of repetitions were breakfast cereals, dairy products, non-alcoholic beverages and fast food. Information about the GI of 17 foods, being these the most advertised, was obtained. Of these, 23.6% had high GI. According to the size of the offered portion, 41.2% of the foods had a medium or high GL (17.6% high GL (>=20), 23.6% medium GL (11 to 19)). No products had information about sucrose or fructose.

Conclusions: An important part of the foods offered to children through TV advertisement has high GI and GL, which could be associated with childhood obesity. Studying the GI of all the advertised food on TV and legislating so the mandatory nutrition labelling of prepackaged food includes qualitative declaration about GI, GL, sucrose and fructose content are required.

Key words: obesity, glycemic index, television advertising.

PO1746

FRUIT AND VEGETABLES ON PRESCRIPTION: A BRIEF INTERVENTION IN PRIMARY CARE

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Background and objectives: Increasing fruit and vegetable consumption is a goal for the UK. Therefore, the effectiveness of a fruit and vegetable voucher scheme coupled with key 'five-a-day' consumption messages as a brief intervention in primary care consultations was assessed in the present study.

Methods: One thousand one hundred and eighty-eight vouchers as a prescription for fruits and vegetables were routinely distributed to patients attending a primary health care centre in a deprived area, and 124 volunteer patients routinely attending the centre were included. Telephone-based questionnaires were used to examine changes in consumption over the short and medium term. Other key aspects assessed in the evaluation related to fruit and vegetable purchasing behaviour, knowledge relating to what constitutes a portion size, the relationship between food and health, and barriers to consumption.

Results: Although76.2% of participants used the prescription vouchers when purchasing fruits and vegetables, a significant change in the consumption or purchasing behaviour was not observed ($P > 0.05$). Participants' level of knowledge relating to the number of portions recommended and the portion size of different fruits and vegetables showed a moderate increase from baseline over the short and medium term. The primary barriers to fruit and vegetable consumption were reported as 'the quality of fresh fruits and vegetables' and 'the money available to spend on food'.

Conclusions: The use of 'the fruit and vegetable on prescription' scheme was an effective method of engaging participants in improving a wareness of key diet-related health messages. However, further intervention is required to produce a significant impact on the actual behaviour change.

Key words: fruit and vegetable prescription, mainstreaming prevention, health settings

PO1747

EFFECT OF MEDITERRANEAN DIET COMPONENTS ON SELECTED CARDIOVASCULAR RISK FACTORS, ALL-CAUSE MORTALITY AND CARDIOVASCULAR MORTALITY: SYSTEMATIC REVIEW

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Background and objectives: Mediterranean diet has been associated with lower risk of cardiovascular diseases. Objective: To evaluate the cardioprotective effect of some of the popular Mediterranean dietary components: olive oil, fish, fruits and vegetables, wholegrains and wine and to propose suitable recommended dietary dosage and frequency of the consumption.

Methods: A updated systematic review of observational and intervention studies in Scopus database (including Medline database) was performed. Inclusion criteria include English-publication studies published since 2001 up to 31 January 2013, adult participants (≥18 years old), interventions which stated frequency of consumption of each investigated component. For studies which showed at least one significant improvement of outcome was considered as cardioprotective.

Results: A total of 4, 033 abstracts were obtained prior to title and abstract screening. Out of this, 67 original research studies were reviewed and 39 studies were included in the final rigorous list for review. Of these 39 studies, 34 had shown protective effects.

Conclusions: Current recent evidence showed that consumption of olive oil, nuts, legumes, fruits and vegetables, wholegrains, and moderate alcohol/wine consumption) could help to reduce the risk of cardiovascular disease and mortality.

Key words: Mediterranean diet, cardiovascular risk, cardiovascular mortality.

PO1748

NUTRITION AND METABOLIC SYNDROME: DISSEMINATION OF EVIDENCE BASED KNOWLEDGE FROM RESEARCH TO PRACTICE IN BANGLADESH

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Background and objectives: Local context of knowledge, attitude and practice (KAP) is of central importance to reduce the public health disasters (including metabolic syndrome) and thus designing of proper strategies to improve health in a population requires sufficient data which are scanty in Bangladesh. Therefore a project was designed an attempt to start a solution

by BIRDEM And WDF (Jan06- Aug11). To build up a database and disseminate research and evidence based knowledge regarding MS absolutely from local perspective of Bangladeshi people and create awareness and specially a significant impact on health professionals and policy makers.

Methods: The TEAM contacted with each and every single institute/university/organization over the whole country to collect primary/secondary - chemical, biological and sociocultural data from research on MS or nutrition relevant to Bangladeshi race and society authorised by them. Data on about 1000 food items and 12000 socioeconomic related KAP were sumupped, compiled and edited for database. Then a substantial volume of culturally sensitive health promotional/educational tools enriched by accumulated findings was developed, piloted and improvised. Publication and circulation of a number of health articles, special issues of a magazine, a calendar, 2 categories of Leaflets and 1 Alphabet book. Distribution of 'Clay-models' (20 food-items). Dispersion of thousands of Mini-display-boards. Training of health professionals (>30 sessions) • Special Classes for patients (337) 'Series of Dissemination Seminars' for all (15) Launching of website www.pushti.org Broadcast of 3 minidocudramas through >12 satellite channels.

Results: The follow-up study says after promotional activities the KAP level is significantly improved. Benefitted people: 3000000Patients and Relatives, 1200Doctors, 600Paramedics, 800Nurses, 100Dieticians/Educators, 60000000Mass people.

Conclusions: Allied persons are now giving the second thoughts to design, run or implement new endeavour focusing the key findings of this project.

Key words: Healthpromotion, Research, Masscommunication

PO1749

PARASITOSIS PRESENCE AND ITS POSSIBILITY OF WORSENING NUTRITIONAL STATEMENT AND ANAEMIA ON 0 TO 10 YEARS OLD POOR CHILDREN IN BAHIA.

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Background and objectives: Parasites are one of the mainly health problems in developing countries. Its presence increases the risk of to contract others diseases. Anaemias and malnutrinution, diseases which could bring fisiopathologic abnormalities and, in consequence, it makes easy to contract others diseases. Objectives: To indentify nutritional statement of 0 to 10 years old children of Bahia.

Methods: It was chosen various schools and nurseries of Bahia. It was evaluated 626 children under parents' authorization. Data collect was made by clinic evaluation, faeces parasitologic evaluation using Hoffman, Pons and Janer and Faust methods from the same sample and nutritional evaluation according to National Center for Health Statistics (NCHS). Data was analyzed using statistic program Epi-Info 3.5.2 version.

Results: 68, 2% of children was positive to one or more helmint parasite, the most common was Ascaris lumbricoides (49, 5%). 14, 4% was positive to some type of protozoo. 30, 1% (n=190) of children had protein energetic deficiency, 15, 3% (n=96) had malnutrition risk, 1, 3% (n=8) had obesity and 53% (n=332) was eutrophic. Abdominal pain and diarrhoea were the most frequent symptoms. Abnormalities presence in ocular mucose or palm color were clear at 30, 5% of cases.

Conclusions: Anaemia and nutritional statement of postive evaluated children predispose the rise of parasitic charge and new infection susceptibility which could bring serious malnutrition condition and chronic anaemias.

Key words: Anaemia. Malnutrition. Parasitosis. Health problem.

PO1750

THE IMPACT OF FAMILY VIOLENCE ON CHILDHOOD GROWTH

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Background and objectives: Although the role of family violence on early childhood growth is of increasing interest, few longitudinal studies from developing countries have assessed such putative associations. Objective: The aim of our study was to examine whether intimate partner violence (IPV) adversely affects growth of children in the first years of life.

Methods: We used a cohort study of 592 children in the second month of life (μ = 35.6 days; SD =.35) attending four primary health care units in Rio de Janeiro, Brazil. Conflict Tactics Scales (CTS1) were used to assess IPV (exposure). Children were considered to have inadequate growth (outcome-stunting) when they were below -2SD based on the WHO length-for-age standards median, measured at the third and fifth

months of life. Associations between variables were expressed as prevalence ratios (PR, baseline) and risk ratios (RR, follow-up), with their respective 95% confidence intervals (95%CI), estimated by Poisson regression models with robust variance.

Results: Children living in families experiencing IPV were at higher risk of stunting in the third month of life (RR=5.77; 95%CI: 1.45–22.96). IPV was not associated with stunting in the fifth month of life (RR=0.73; 95%CI: 0.10–5.43).

Conclusions: Although the estimates are imprecise due to the small number of cases of stunting observed, results indicate that violence in the family might be an important element in the genesis of inadequate infant growth.

Key words: child growth, stunting, intimate partner violence, cohort, Brazil.

PO1751

SOCIAL PROTECTION FOR FOOD SECURITY: THE RIGHT OF VULNERABLE MOTHERS TO SOCIAL ASSISTANCE PROMOTING ADEQUATE SUPPLEMENTARY FEEDING FOR YOUNG CHILDREN

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Background and objectives: Food insecurity refers to both the inability to secure an adequate diet today and the risk of being unable to do so in the future. "Social protection" is a menu of policy instruments addressing poverty and vulnerability, through social assistance, social insurance and efforts at social inclusion. Besides conditional or non-conditional cash transfers, adequate supplementary feeding for young children should also be regarded as part of vulnerable mothers' right to social assistance for their children's food and nutrition security.

Methods: The reformed Committee on World Food Security (CFS, housed in FAO) established a High Level Panel of Experts on food security and nutrition (HLPE, 2009) to strengthen world-wide knowledge about emerging trends in food security. The HLPE report Social Protection for Food Security (HLPE, 2012) reviewed nine social protection instruments, including Supplementary Feeding, that should complement longer term development efforts.

Results: The HLPE report on SPFS (2012) made recommendations to governments and CFS. Regarding food supplementation they include attention both to the impact on children's height and weight, and to the actual forms of feeding programmes. In line with human rights principles and the growing interest in the right to adequate food and concerns regarding sustainability, transfers should be linked to interventions to facilitate behavioural changes that will empower mothers and families to ensure adequate child feeding prepared at home from local resources wherever appropriate.

Conclusions: Social protection systems should provide essential assistance in the short-term and support livelihoods in the long-term. Supplementary feeding, when organised as part of nutrition policies aimed at realising the human rights to adequate food for young children and to social protection for women in vulnerable situations, would enhance the capability of deprived mother's to ensure their children's health on a continuing basis.

Key words: Social Protection, Food Security, Supplementary Feeding, CFS.

PO1752

SOCIOECONOMIC AND FOOD CONSUMPTION FACTORS ARE ASSOCIATED WITH OVERWEIGHT IN MIDDLE-AGED INDONESIAN ADULTS

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Background and Objectives: Very limited information available on the risk factors of overweight among Indonesian adults (IA).This study was aimed at analyzing socioeconomic and food consumption factors of overweight among IA.

Methods: This study used electronic files data of Basic Health Research 2010 of the Health Research and Development Agency of the Ministry of Health, which was design as a cross sectional survey. A total of 12196 adults aged 50-55 years were selected for the analysis. Overweight was defined using Body Mass Index (BMI) more than 25 kg/m2. A logistic regression was used to analyze socioeconomic and food consumption factors of overweight.

Results: The result showed that 28.03% of IA were overweight (include obese). The significant socioeconomic factors ($p<0.05$) of overweight among IA are sex (OR for women=2.026, CI 95%:1.856-2.213), education level (OR for higher education=1.413, CI 95%:1.268-1.575), household income (OR for high income=1.650, CI 95%:1.501-1.815), urban-rural settlement (OR for living in urban=1.463, CI 95%:1.333-1.605), and physical activity (OR for sedentary=1.703, CI 95%:1.540-1.885). Marital status is predictor of overweight only in women (OR for married=1.197, CI 95%:1.021-1.404). The significant food consumption factors are protein intake (PI) (OR for PI>15%=1.292, CI 95%:1.033-1.616) in men and energy adequacy level (EAL) (OR for EAL>110%=1.277, CI 95%:1.041-1.567) in women.

Conclusions: This implies that health awareness on balance diet and physical activity is important for prevention of overweight among IA.

Key words: overweight, middle-aged, socioeconomic, food consumption.

PO1753

DIETARY AND PHYSICAL ACTIVITY HABITS IN ITALIAN AND SPANISH SCHOOL-AGE YOUTH WITHIN THE PROJECT MISSION X: TRAIN LIKE AN ASTRONAUT

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Background and objectives: There is strong evidence dealing with the effects of regular physical activity (PA) and adequate nutrition on several health and behavioural outcomes in school-age youth. Following PA recommendations, school-age youth should participate daily in 60 minutes or more of moderate to vigorous physical activity, limiting screen time to a maximum of 2 hours/day. Objective:The aim of the present abstract is to describe daily PA and dietary habits in two different populations of children and adolescents within the MX project: train like an astronaut, developed to encourage proper PA and nutrition.

Methods: In the frame of the project, a total of 422 (149 Italian and 252 Spanish) school children with an age range of 9-13 yrs, were assessed by means of an online questionnaire, before starting the project at school. Daily habits for nutrition and PA were included. Descriptive characteristics of the studied sample were assessed by SPSS v 19.0.

Results: Only 18% of the Italian and 25% of the Spanish subjects meet the PA international guidelines. Physical Activity is practiced less than 2-3 times per week by 31% of the Italian and 25% of the Spanish children. Both Italian and Spanish subjects show the same levels of sedentary behavior with an average screen time of 1-2 hour. Spanish children report lower daily vegetable intake than Italian ones (9% vs. 26%, respectively). Regarding sugar beverage intake, higher consumption was reported by Spanish students than by Italian ones (35% vs. 9%).

Conclusions: A high percentage of school-age youth does not meet current recommendation for PA in both countries. Spanish students show higher levels of daily PA, higher sugar beverage intake and lower daily vegetable intake when comparing with Italian ones Both Spanish and Italians meet current recommendation for daily screen time.

Key words: health promotion, school-based intervention, physical activity, nutrition.

PO1754

NATIONAL SURVEY OF CHILDHOOD OBESITY IN SWEDEN - INDIVIDUAL AND SOCIETAL ASPECTS

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Background and objectives: To correctly assess the national prevalence of overweight and obesity in children highly representative data are required. Measuring the children in schools is expected to result in high participation, while family questionnaires which are required to get data about individual socio-economy (SES) and lifestyle are more demanding. This project permitted comparison of area- and individual level approach when analysing prevalence and how the urban-rural gradient in overweight and obesity was related to SES.

Methods: Anthropometric data from 4538 children in grades 1 and 2 in a nationally representative sample were collected in 2008. School areas were classified to be urban, semi-urban or rural based on population density, and as low, medium and high SES based on proportion of the population with university degree. Individual SES based on parental educational level was available from questionnaires for 3721 children. Overweight and obesity was classified by IOTF.

Results: The overall prevalence of overweight (including obesity) was 16.6% (3.0%) and 15.6% (2.6%) for children with family questionnaire. Prevalence differed significantly between subjects with and without family questionnaire. The urban-rural gradient was similar when area and individual approach was used but there was a difference in explanatory value of SES factors between the designs. Parental weight status was the strongest marker for child weight status.

Conclusions: Asking for detailed information results in a more selected population and affects the prevalence. Area and

individual education levels and parental weight status are markers for a cluster of lifestyle factors that differ between individuals and groups.

Key words: paediatric obesity, socio-economic status, level of urbanization Acknowledgements: This study was financed by the Swedish Research Council and The Swedish Council for Working Life and Social Research.

PO1755

MULTISECTOR ACTION TO PROMOTE NUTRITION SECURITY IN FIVE COUNTRIES IN ASIA

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Background and objectives: One billion people in the world suffer from chronic hunger; two-thirds of them live in Asia. This crisis has far-reaching effects, and robs millions of children of their full potential for growth and development. "Nutrition security" is more than food security; it's the outcome of good health, clean environment, and good caring practices. The Maternal and Young Child Nutrition Security Initiative in Asia (MYCNSIA, 2011-14, EU/UNICEF) aims to improve nutrition security among women and children through an evidence-based, multi-sector approach. Targets for impact include 5 percentage point reduction in stunting, and one-third reduction in anaemia among young children and pregnant women.

Methods: MYCNSIA is implemented in five countries (Bangladesh, Lao PDR, Indonesia, Nepal, Philippines). Action is under four programme Pillars: (1) strengthening upstream policies and awareness, (2) capacity development, (3) data and knowledge sharing, (4) scaling-up direct interventions. Direct interventions include Iron-folic acid in pregnancy; early (within 1 hour) and exclusive (for 6 months) breastfeeding; micronutrient powders for children 6-23 months; IYCF Counselling; vitamin A supplementation; zinc for diarrhoea management; fortification of staple foods; improved water and sanitation; home production of food and animal products; nutrition services with social-protection and cash-transfer programmes.

Results: Baseline data from 2011 revealed stunting from 29-41%, child anemia 39-78%, and anemia in pregnancy 18-53%. To date, seven new or revised nutrition policies have been adopted; over 17, 000 people have been trained on Community IYCF Counselling; process and behavioural indicators have improved (e.g. minimum acceptable diet improved from 31% to 40% in selected areas); impact evaluation is expected 2014.

Conclusions: In line with the global Scaling-Up Nutrition (SUN) movement and the "1, 000 Days" approach, there is great need and potential to reduce chronic malnutrition (stunting) by enacting a multi-sector approach from health, agriculture, social protection, education.

Key words: Stunting; Anemia; Multi-sector nutrition action; 1, 000 Days.

PO1757

PHYSICAL ACTIVITY LEVEL AND OBESITY STATUS OF FACTORY WORKERS IN OGUN STATE, SOUTH-WESTERN NIGERIA

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Background and objectives: The aim of this study was to assess the physical activity level and obesity status of some factory workers in south-western Nigeria. Adults with varying working conditions were randomly sampled from two factories (A food company and a Pharmaceutical company).

Methods: Physical activity level was estimated using the long format of the International Physical Activity Questionnaire (IPAQ). Diagnosis of obesity and abdominal obesity was done using the WHO standard recommended method of determining of body mass index (BMI) and waist circumference (WC) and subjects were classified into 3 BMI groups underweight, Normal and overweight/obese. A total of 150 adults were recruited.

Results: In women, the prevalence of overweight/obesity (BMI „d 25 kg/m2) is 41.9%, higher than in men 39.5%. The prevalence of abdominal obesity (waist „d 88cm in women and „d 102cm in men) was higher in women than in men (45.2% vs. 9.2%). The overall overweight/obesity was 40%. Overall level of physical inactivity in the study was 24.0%. Thirty six (24.0%) of the subject had no physical activity (PA), 19 (12.7%) had insufficient physical activity, 58 (38.7%) had moderate PA, while 37 (24.7%) had high physical activity. There existed a relationship between the recreation physical activity level (PAL) values and the BMI groups ($P < 0.05$). However, there was no statistical relationship between Total PAL and BMI groups

Conclusions: A 40% prevalence of obesity/overweight and a 36.7% prevalence of low/insufficient physical activity amongst adults working in the factory can be reduced by introducing occupational physical activity to work place. This would help worker lead a healthier lifestyle in their day to day activities and the overall quality of life improved.

Key words: Physical activity(PA), obesity, overweight, BMI

PO1758

HEALTHY LIFESTYLE FOR THE PREVENTION OF CHILD OVERWEIGHT AND OBESITY IN THE COMMUNITY PHARMACY WITHIN A PUBLIC HEALTH MULTIDISCIPLINARY APPROACH

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Background and objectives: The Working Committee of Prevention and Community Health (COPISC) is created by integrating the different professionals that carry out preventive and community health promotion in Barcelona. The prevention of overweight and obesity in children is a priority given the current rates (25.7% and 16.8%, respectively). Families need to be supported to make informed choices about their diet and their levels of physical activity. Pharmacy teams are ideally placed to offer this support. Moreover, for those people who do not routinely access primary care services, pharmacists might be the only healthcare professional seeing them on a regular basis.

Methods: A pilot intervention (6 months) is designed for the prevention of child and youth overweight and obesity (0-16 years) in the community pharmacy. The study area are two basic health areas' pharmacies. Homogeneous and consensual (minimums) messages to develop the interventions thought out the different health professionals were formulated after a review of effective interventions. Tools were developed around dietary counseling (including sugary drinks and fast food occasional consumption, breakfast composition, relevance of family meals, serving-size control). and physical activity promotion (60'/day, <2 h/d of screen (TV, computer…) exposure and 9-hour sleep). To not use drugs and the involvement of families is stressed in the program. Community pharmacies are widely accessed by families, and can inform and support family members and carry measurements of body mass index, weight circumference and body fat percentage.

Results: A protocol is applied with an algorithm to describe the interaction between pharmacist and other health professionals to detect, follow-up and referral if needed to dietetic services and medical services.

Conclusions: The community pharmacy's intervention in preventing child overweight and obesity through promoting healthy lifestyles is a possible additional strategy in coordination with other health professionals.

Key words: child, obesity, overweight, pharmacy, public health

PO1759

MEDIATING ROLE OF GENDER IN DYNAMICS BETWEEN CASH CROPPING AND FOOD AND NUTRITION SECURITY IN BURKINA FASO

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Background and objectives: International community is increasingly advocating for approaches that integrate agriculture, nutrition and health. However, the impact of some agricultural interventions such as cash cropping on food and nutrition security and the mediating role of women remain ambiguous in literature. Objectives: To determine the implications of cotton cropping in Burkina Faso on the daily activities of women and household food security and child nutrition.

Methods: A mixed methods study was conducted in four villages of Hauts-Bassins, the leading cotton producing region of Burkina Faso. A questionnaire on the impacts of cotton on women's role and household food security was completed by 275 women. Twelve focus groups were conducted with 44 men, 40 women and 39 representatives of stakeholder organizations.

Results: In this region, cotton farms were mostly owned by men. Household incomes seemed to increase with cotton production. However, the cash flow was annihilated by the high cost of agricultural inputs. Overall, 67.3% of households were food insecure, 35.3% of their children were stunted, 17.8% underweight and 5.3% wasted. Women farmers felt that cotton was causing food insecurity and child malnutrition in their area due to lack of control over cotton income due to local social norms. Cotton women worked in average 41.6 ± 7.3 hours per week in cotton activities, and 81.3% felt that they had less time to rest because of cotton workload. Working time was negatively associated with food security score. Participants in the focus groups mentioned that these changes in women daily activities have reduced time for caring of children and to do income generating activities.

Conclusions: Cotton farming seems to affect women empowerment and increase exposure to food insecurity and gender inequalities. Increased in women workload worsens the cotton-child nutrition dynamics.

Key words: cotton cropping, food insecurity, child nutrition, women, Burkina Faso

PO1760

HEALTHY RESTAURANT MENUS: OFFER AND DEMAND. THE EUROPEAN BAROMETER FOOD - SPANISH RESULTS

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Background and objectives: The European Barometer is a tool that was created within the FOOD (Fighting Obesity through Offer and Demand) project to promote healthy eating habits of employees and make balanced meals available in restaurants. A balanced diet is linked to health and well-being for employees and as well results in an increased productivity; and in turn decreases the rates of absenteeism.

Methods: A study aiming at following and understanding any needs and changes in the habits of employees and restaurants, was conducted through the European Barometer FOOD which numbered 6, 324 employees and 832 restaurants' answers from the seven participating countries (Belgium, Slovakia, Spain, France, Italy, Czech Republic and Sweden) in 2012.

Results: The study on eating habits reveals that 79% of European consumers believe that the nutritional quality of the meals is a decisive factor when choosing a restaurant, even ahead the proximity to workplace. Spanish consumers are more demanding on the nutritional quality: 88% of them prefer restaurants that offer healthy meals. Furthermore, 83% of them believe it is crucial that the restaurants offer varied meals. The survey shows that 70.4% of European employees have a lunch break every working day and it is in Spain where employees are the most often going to a restaurant (48.3%) for their break, while the European average is 28.4%. For Spanish consumers, factors for their meals' choice are the distance, the speed of service, a friendly atmosphere, abundance of vegetables, presence of foods steamed, grilled or baked, providing local and seasonal foods, and/or that the menus meet their individual dietary needs.

Conclusions: For employees who are going to a restaurant at lunch time the nutritional quality of the offer is a decisive factor. Spanish consumers are the most demanding on this issue.

Key words: Workplace, restaurants, employees, healthy menus

PO1761

IMPACT OF A DIABETES EDUCATION PROGRAM ON KNOWLEDGE, ATTITUDE AND PRACTICE IN BANGLADESHI TYPE 2 DIABETIC SUBJECTS

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Background and objectives: knowledge-based education is the most feasible strategy to prevent diabetes and its complications in this low resource society. The present study was to see the impact of diabetes education program in terms of knowledge, attitude and practice (KAP) among Bangladeshi type 2 diabetic subjects.

Materials and Methods: Total 500 type 2 diabetic subjects (male 43%, female 57%) attending the structured diabetes education program in different health care centers under BADAS were included. Baseline data were collected before providing education and the followup data were collected after 12 months of providing diabetes education.

Results: In follow up, fasting (mean±SD, mmol/l 9.8±4 vs 8.2±3; p=0.0001) and ABF (mmol/L, 14±5 vs 11.8±4; p=0.0001), serum glucose were significantly reduced. KAP scores of the subjects, (%, 56±15 vs 68.4±11, 78±5 vs 85.8±6, 38.9±14 vs 67.9±18, respectively; p=0.0001) were significantly increased after intervention. Before intervention better knowledge was associated with better attitude (r=0.29, p=0.0001) and practice (r=0.49, p=0.0001). After intervention these associations {knowledge vs attitude (r=0.23; p=0.0001); knowledge vs practic (r=0.28, p=0.0001)} became stronger. Age (r=-0.09, p=0.04) showed a significant negative association with knowledge score. Year of education (r=0.27, p=0.0001) and diabetes education (r=0.13, p=0.01) showed a significant positive association with knowledge score. Diabetes education (r=0.21, p=0.0001) and number of education class (r=0.11, p=0.03) showed significant positive association with attitude score. Age (r=0.14, p=0.003) showed significant positive association with practice score though monthly income (r=-0.09, p=0.04) showed significant negative association with practice score.

Conclusions: Diabetes Education Program is associated with improved glycemic control and increased Knowlege, Attitude and Practice. The present data also show that better knowledge leads to better attitude and practice and a diabetes education program is positively associated with knowledge and attitude.

Key words: impact, education, diabetes

PO1762

PROCESS EVALUATION OF NUTRITION EDUCATION PROGRAM IN GREEK PRIMARY SCHOOLS

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Background and objectives: Process evaluation of nutrition education programs has been scarcely reported in the literature, leading to a lack of adequate data on how interventions are implemented and whether program goals are met. The aim of the study was to evaluate the application of a nutrition education program in Greek primary schools, which was delivered through active learning techniques.

Methods: Three hundred twenty two students, aged 8-10 years old (157 boys and 165 girls) were voluntarily enrolled in the study from eleven primary schools of Attica district. The nutrition education program incorporated theatrical play sessions by specially trained life scientists, with the participation of the teacher. Intervention monitoring was undertaken by Regional Health Education Authority personnel on-site, during program delivery. The evaluation tool was a questionnaire, which measured adherence to the curriculum, realization of aims, teacher participation and active learning techniques used.

Results: 48.8% of the classroom teachers participated in the program. 66.1% of these personnel were adequately prepared for each session, while 62.2% met the aims described in the curriculum. Adherence to delivery plan reached 68.5% while 29.9% of the students were fully responsive and cooperative. Active learning techniques were implemented in 44.9% of cases. Our data suggest that only half of the teachers were included in the classroom team, 2/3 of which were adequately prepared. Consequently, 3 out of 10 students were fully exposed to the activities planned.

Conclusions: Nutrition education through active learning can operate effectively, when the classroom teacher is involved in the curriculum. Moreover, the personnel must be adequately prepared to adhere to program plan and apply the techniques that will mobilize the students. Therefore, our program should be better prepared to meet the needs of the trainers, besides addressing the needs of the students.

Key words: process evaluation; nutrition education; children

PO1763

PARENTAL KNOWLEDGE AND PRACTICES OF VITAMIN SUPPLEMENTATION IN YOUNG CHILDREN, AND ITS RELATIONSHIP TO MALNUTRITION

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Background and objectives: Vitamins are micronutrients that play an important role in the human metabolism. Vitamin supplementation has been used to improve children's appetite and growth. Although vitamin preparations are available over-the-counter, many children received vitamin supplementation from clinics and hospitals. However, few cases of vitamin overdose have been reported. This study was performed to evaluate the parental knowledge and practices of vitamin supplementation in young children (1-5 years) and its relationship to undernutrition status, at QSNICH.

Methods: A cross-sectional study was performed at the Well Child Clinic, QSNICH, from 1st – 31st May, 2005. Five hundred parents of young children, aged 1-5 years were interviewed about demographic data, knowledge and practices of vitamin supplementation by trained health personnel using the questionnaire. Weight and length/height were measured and assessed for nutritional status using Thai growth reference. The relationship between vitamin supplementation and malnutrition was analyzed using Chi-square test and $p < 0.05$ was considered statistically significant.

Results: Regarding parental knowledge, 57% knew the benefits of vitamin supplementation, 74% did not know the toxic effects. Prevalence of vitamin supplementation was 75.6%, including vitamin C 62%, multi-vitamin (MTV) 35%, and cod-liver oil 20%. Vitamin supplementation was obtained from over-the-counter in 59%, health services 40%, and friends 1%. The reasons for vitamin supplementation were poor feeding 63%, under-weight 23% and unhealthy status 14%. MTV supplementation was significantly higher in malnourished children ($p < 0.001$).

Conclusions: The prevalence of vitamin supplementation was high, especially MTV in malnourished children. Parents should be educated and warned about the dangers of excessive vitamin consumption.

Key words: Vitamin supplementation, Knowledge, Practices, Malnutrition, Children

PO1764

BIOMARKERS OF OXIDATIVE STRESS AFTER STRENUOUS PHYSICAL EXERCISE.

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Background and objectives: Numerous studies indicating that exercise of sufficient intensity and duration increases the formation of reactive species and that antioxidant mechanisms cannot scavenge them, thus resulting in oxidative stress. The aim of this study was to analyze biomarkers of oxidative stress after performing strenuous physical exercise.

Methods: A group of 25 sportsmen participated in the study. 90 min rectangular test were performed on a bicycle ergometer at 70% of the VO2max. Protein carbonyl groups were determined by an ELISA kit (Biocell Corporation Ltd, New Zealand) according to the manufacturer`s intruccions. 8-OHdG analysis was carried out with an ELISA kit (Japan Institute for the Control of Aging, Fukuroi, Shizuoka, Japan). Reduced and oxidized Glytathione were determined by colorimetric determination (OxisResearch TM Bioxytech GSH/GSSH-412 TM Burlingame, USA). Differences with p less than 0, 05 were considered statistically significant. Calculations were performed with SPSS software v. 17, 0.

Results: Initially mean values of carbonyl groups are 38.5±11.5 µmol/mg. After performing strenuous physical exercise these values increased (41.8±10.8 µmol/mg), and significant differences were observed ($p<0.05$). After 24 hours these values decreased (37.7±10.8 µmol/mg) and significant differences were found. According to the 8-OHdG results (damage DNA), after strenuous physical exercise the levels of 8-OHdG decreased, but no significant differences were observed. At 24 h the mean values increased, and significant differences were observed. According to the GSH/GSSH results, average values were higher immediately after exercise (9.4±2.4 µM vs 8.9 ±2.1µM) although no significant differences were found. At 24 hours these values increased.

Conclusions: performing strenuous physical exercise modifies oxidative stress biomarkers analyzed.

Key words: physical exercise, oxidative stress, rectangular test, protein carbonyl.

PO1765

QUANTIFICATION OF VITAMIN A IN FORTIFIED OILS USING A FAST AND SIMPLE PORTABLE DEVICE: EVALUATION AND COMPARISON TO HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY

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Background and objectives: Vitamin A deficiency is one of the major public health's problems in developing countries. In order to improve vitamin A status of population, food fortification programs have been widely developed this last decade. Oils are considered as a good matrix for food fortification because of the fat soluble properties of vitamin A. Oil fortification is increasing all around the world and controls are needed for companies and state commissions. The most commonly used methods for vitamin A quantification are High Pressure Liquid Chromatography (HPLC) and spectrophotometry. Even though these methods have proved their reliability, it required qualified personnel to lead time-consuming experiments. Furthermore, high volumes of solvents necessary pose a problem not only of cost but also of environment. Testing alternative methods involving lower investment and reducing ecological consequences is interesting.

Methods: A rapid test kit with a portable device (iCheckTM CHROMA and iExTM ELAN) was compared to a reference high liquid chromatography method (HPLC), for three types of vegetal oils (colza, groundnut and soya).

Results: The iCheckTM device presented a good linearity from 3 to 30 mg retinol equivalents per kg (mg RE.kg-1) and a limit of quantification of 3 mg RE.kg-1 in colza and groundnut oil, and 4 mg RE.kg-1 in soya oil. The inter and intra-assay precision ranged from 1.48% to 3.98%. Accuracy, estimated by root mean squares error (RMSE), ranged from 3.99 to 5.49 reveals a lower precision than HPLC (from 0.40 to 2.25). An underestimation for groundnut oil and en overestimation for soya oil were noted. Although a lack of precision, the portable device offers a rapid approximation of vitamin A in a range of 3 to 15 mg RE.kg-1 in fortified oils.

Conclusions: This range corresponds to the international recommendation of oil fortification (5 to 15 mg RE.kg-1).

Key words: Vitamin A, oil, chromatography.

PO1766

HEALTH WORKERS EFFECTIVENESS IN DELIVERING NUTRITION COUNSELLING AT PRIMARY HEALTH FACILITIES IN FCT ABUJA, NIGERIA

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Background and Objectives: Nutrition indicators in Nigeria are some of the worst in Africa with 41% of children less than five years of age stunted, 14% wasted and 23% underweight. Poor infant and young child feeding (IYCF) practices resulting from inadequate knowledge and conflicting local beliefs were identified as major contributory factors. Health workers are expected to be knowledgeable in IYCF since caregivers rely on them for guidance. Research was conducted to evaluate the IYCF knowledge base of health workers (HWs).

Methods: Data was collected from primary health centers (PHC) using the Rapid Health Facility Assessment (RFHA) method. Multistage sampling technique was used to select interviewed PHCs. Nutrition knowledge of PHC HWs was collected using a structured interviewer administered questionnaire. Eighteen PHCs across 3 Area Councils in the Federal Capital Territory Abuja were assessed.

Results: HWs knowledge on IYCF practices showed that 95% were knowledgeable on breastfeeding issues while 69% and 52% respectively knew the correct time to introduce and right quantity of complementary foods to give each day. Almost all (82%) the HWs did not know the correct age to introduce complementary foods to children. About 62% are involved in food demonstration activities while 74% promote continued breastfeeding with complementary feeding. Only 55% have heard about vitamin A fortified foods however 44% are unable to identify the vitamin A fortified food's logo.

Conclusions: The survey shows HWs inadequate knowledge on complementary feeding. Timely introduction of complementary foods and the quality of foods to be given seems to be a problem with majority of the HWs opting to introduce watery pap with little nutritional value. Providing refresher training to health workers to correct their misunderstandings and reinforce their counseling skills is essential to ensuring the quality of nutritional counseling and reducing malnutrition

Key Words: Knowledge, complementary feeding, health workers.

PO1767

NUTRITIONAL STATUS AND DIETARY HABITS AMONG PHARMACY STUDENTS IN SERBIA

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Background and objectives: Dietary habits have important role in providing optimal nutritional status and chronic diseases prevention. The aim of this study was to assess the dietary habits and nutritional status among the students of the Faculty of Pharmacy in Belgrade.

Methods: A total of 264 female students with the mean aged 23, 2 ± 1, 6 participated in this study. The data related to eating, drinking and smoking habits were obtained based on self-administered questionnaire. The height, body weight, body fat percentage, waist and hip circumference were measured, and body mass index (BMI) and waist-to-hip ratio (WHR) were calculated.

Results: According to BMI, 81, 8% of students had a normal BMI and 13, 6% were underweight. Dietary habits of the students showed that 46, 6% reported taking meals regularly. Approximately 48% of the students skip their breakfast daily. Only 31, 3% of students reported daily intake of vegetable, while 37.3% reported consuming fruit every day. About 18, 6 % of the students consume fast food daily, and the highest percentage consumes it 3–4 times a week (42, 9%). Alcohol intake and smoking were not common among students.

Conclusions: In this study we have demonstrated that many students have unhealthy dietary habits. Educational interventions should be planned to decrease the health risks attributable to their eating behaviors.

Key words: nutritional status, dietary habits, students. This work was supported by the Ministry of Education, Science and Technological Development, Republic of Serbia, Project No III-46001

PO1768

RELATIONSHIP BETWEEN STUNTING TO DESEASES, PATERNAL EDUCATION, AND SOCIAL ECONOMY IN INDONESIAN CHILDREN

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Background and objectives: SEANUTS is a comprehensive nutrition survey conducted in four South-East Asian Countries namely Indonesia, Malaysia. Vietnam and Thailand. The study collected anthropometry, biochemical parameters, die-

tary intakes, health status, and socio-economic status of child's family. In Indonesia, SEANUTS is run by Persagi (Indonesian Nutrition Association) in 7, 211 children aged 0.5-12 years selected randomly from 48 districts all over Indonesia in 2011. The objective of this presentation is only part of the SEANUTS particularly on stunting and associated risk factors

Methods: Height of children were measured by trained enumerators using length measuring board and stadiometer. Date of birth was recorded based on birth certificate and age was calculated. Stunting is defined as <-2.00 a-score using WHO Child Growth Standard. Risk factors of child characteristics and morbidity in previous month, and family socio-economic status were collected by using questionnaires, blood analysis, 24-hour dietary recall.

Results: The results showed that the prevalence of stunting was the highest among four countries 32.7 percent, higher in rural (38.8%) than urban areas (24.6%), lowest in youngest age group (> 2 year old) (28.8%), and no clear difference by gender. Rsk factors of stunting was strongly asscіated with lower parents' education, poor family as measured by score of valuable goods owned, poor score of child morbidity, low birth weight, and poor dietary intakes.

Conclusions: Stunting in Indonesia is high and associated with family and child characteristics, morbidity and dietary intakes

Key words: stunting, nutritional status, Indonesian children

PO1769

CONSUMPTION OF NON CALORIC SWEETENERS IN UNIVERSITY POPULATION

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Background and objectives: Non-nutritive sweeteners are one option for maintaining sweet taste through reducing the energy content diet of children and young people. However, several epidemiologic studies suggest that consumption of products containing non caloric sweeteners may promote excessive intake and body weight gain by weakening a predictive relationship between sweet taste and the caloric consequences of eating. It may be associated with a decrement in the ability of sweet taste to evoke reflex responses which are thought to help maintain energy balance by interfering with fundamental homeostatic, physiological processes. Knowledge about consumption habits of non caloric sweeteners can contribute to plan educational interventions in this way. The objective of this work is to determine the habitual consumption of non caloric sweeteners and its relationship to some possible conditional factors in a university population

Methods: A Cross-sectional observational study has been conducted on a sample of 604 students from University of Castilla-La Mancha (Campus of Albacete). A questionnaire was self-administered which reported information about habitual intake of non caloric sweeteners besides some sociodemographic and anthropometric factors.

Results: The average age of students was 20, 63 ±4, 45 years, 50, 33% women (n = 304) and 49, 67% men (n = 300). Habitual consumption of non caloric sweeteners in females was twice (20, 93% than in male (10, 28%), being normal weight BMI majority in both sexes. Only 1, 06% of women and 3, 4% of men were obese. Positive significant correlation (p<0, 01) between BMI and non caloric sweetener consumption while negative significant correlation (p<0, 05) between BMI and number of daily meals have been found.

Conclusions: Taking into account that young people often take low calories beverages besides added non caloric sweeteners, the regular intake of non caloric sweeteners could be an important factor to promote obesity in the future in this healthy population.

Key words: caloric sweeteners, obesity, BMI.

PO1770

PROGRAM ACTIVITIES FOR THE OBESE PATIENT (PAPO)

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Background and objectives: Searching increase the effectiveness of the interdisciplinary treatment of obesity in adolescence, the Division of Adolescent Medicine, Department of Pediatrics UNIFESP developed 15 years ago the PAPO. This study aims to assess the impacts of changes in feeding behavior of obese adolescents.

Methods: Were selected 16 girls from 13 to 16anos age, BMI> 85th, to participate in the program that consists of complementary areas (Physical Education, Nutrition Education,

Psychology and Sports Modalities. These activities occur in groups three times a week, one hour per week per area for four months. Nutrition in adolescents were instructed to perform three goals; eat each 3 hours without repeating a portion and without nipping the intervals, and other targets with the aim of balancing food intake. The dietary questionnaire was designed to assess the behavior, stipulating a number expected by the end of the program for each item. To compare the anthropometric data was used the Student t test for dependent samples and dietary habits we used the marginal homogeneity test.

Results: There were no statistically significant changes in anthropometric measurements. In relation to eating habits, some changes were statistically significant, with a reduction in the number of girls who: consume sweet and fatty foods in more than three days a week; fast-food consume more than twice per month; repeated portions more than one day per week; nip between meals in over three days of the week; not eat each three hours at least six days a week, and eat their meals in front of the TV or computer more than three days a week.

Conclusions: The PAPO is efficient to stimulate change in eating behavior of obese adolescents.

Key words: behavior, dietary goals, obesity.

PO1771

DEVELOPMENT OF ANAEMIA ASSESSING INDEX (AAI) TO ASSESS THE RISK OF ANAEMIA AMONG 6 TO 24 MONTHS OLD CHILDREN

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Background and objectives: Early identification of the anaemic risk children is important to develop appropriate interventions to reverse the high prevalence of anaemia among young children. The aim of the present study was to develop an anaemia assessing index (AAI) to assess the risk of anaemia among 6 to 24 months old children.

Methods: This study was conducted as a cross-sectional study in Sri Lanka. A sample of 456 children aged between 6 to 24 months was selected using cluster random sampling method. A comprehensive literature review was done to identify the risk factors associated with anaemia among children. A pre-tested interviewer administrated structured questionnaire was used to develop the AAI. The HaemoCue method was used to measure haemoglobin concentration, and anaemia was defined as haemoglobin < 11 g/dl. Socio economic (SE), child feeding practices (CFP), mothers' nutrition knowledge (MNK), communicable diseases on previous month (CDPM), water, sanitation and home gardening practices (WSH), and mother and child nutrition status (MCN) were identified as six main indicators. A composite AAI was developed by discriminant analysis using identified six main indicators. **Results:** The developed index was AAI = - 4.8 - 0.7 * SE + 2.3 * WAH + 3.1 * CFP + 1.6 *MNK + 0.8 * MCN + 1.3 * CDPM. The overall prevalence of anaemia among the study group was 79% and 4 % was severely anaemic. SE, CFP, MNK, CDPM, WSH, MCN indicators were identified as risk factors for anaemia and they were significantly associated (P<0.01) with low hemoglobin levels among the children.

Conclusions: A composite AAI was developed to assess the risk of anaemia among 6 to 24 month old children. Sensitivity and specificity of the AAI were 80.6% and 80.2%, respectively.

Key words: Index, anaemia, children, indicators

PO1772

THE TYPE OF DISEASE AFFECTS DIETARY ADHERENCE

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Background and objectives: The role of diet in the prevention and management of various chronic diseases is established. However, patients' adherence to the proposed regime is a prerequisite. Various factors affect dietary adherence, including age, sex or nutritional knowledge of the individual. Aim of this analysis was to explore whether the type of the disease [Metabolic Syndrome (MetSyn) or Rheumatoid Arthritis (RA)] or the type of intervention affects dietary adherence of patients receiving similar lifestyle intervention.

Methods: Ninety patients with RA (n=32) or MetSyn (n=58) (41% men, mean age: 23 to 81 years) received a 6 month lifestyle intervention program, based on the principles of the Mediterranean diet, participated in the study. The intervention was delivered either by telephone or face to face contact. All participants were underwent anthropometric, dietary and physical activity evaluation at baseline and at the end of the intervention. Dietary adherence was assessed through the Mediterranean Dietary Score (MedDietScore). The score ranges from 0 to 55: higher values indicate greater adherence to the Mediterranean diet.

Results: At baseline, patients with MetSyn, compared to RA patients, were younger and they, had greater BMI and MedDietScore values (all p<0.001). Repeated measures analysis that the type of disease (p=0.001), but not by the type of intervention (p=0.374), was significantly associated with chan-

ge in dietary adherence, as evaluated by MedDietScore. No interaction between disease and type of intervention was found (p=0.667). Further adjustment for age, sex or BMI did not change the results.

Conclusions: These findings indicate that the type of the disease may affect adherence to a dietary intervention. More research is warranted on the specific characteristics of the diseases that affect adherence and potential interactions with biological factors.

Key words: dietary adherence, metabolic syndrome, rheumatoid arthritis.

PO1773

THE EFFECT OF NUTRIBUTTER SUPPLEMENTATION ON COMPLEMENTARY FEEDING PRACTICES AMONG YOUNG CHILDREN IN AN URBAN SLUM OF HAITI

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Background and objectives: In Haiti since the January 2010 earthquake, high-energy dose food supplementation programs have been implemented with little regard for populations in transition and infant and young child feeding (IYCF) practices. We hypothesized that a low-dose (108 kcal) micronutrient-fortified food, Nutributter®, offered within a package of integrated health services would preserve IYCF and promote linear growth.

Methods: Healthy, singleton infants ages 6-12 months (n=589) were randomized to: control group; Nutributter® for 3 m; and Nutributter® for 6 months. Children were followed monthly for 6 months, and again 12 months from baseline to test for sustained effects. Diet was examined through 24-hour recall of frequency of complementary foods and breastmilk consumption. Dietary diversity was defined as number of different foods consumed in a day. Changes in IYCF, uptake of health services, and Nutributter® acceptability and uses were assessed at each visit and through qualitative methods of in-depth interviews and focus groups.

Results: Panel regression analysis, generalized least squares (GLS) with random effects, showed that Nutributter® supplementation significantly increased dietary diversity by 0.23 (±0.07 SE) after controlling for child age, baseline diversity score, maternal education, and household income (p<0.001). Breastfeeding frequency was reduced in the Nutributter® groups, but the effect did not interfere with linear or somatic growth. Qualitative findings showed that despite apprehension to buy peanut butter in the market, mothers trusted the fortified paste delivered through the healthcare system.

Conclusions: This mixed-methods RCT demonstrated that low-dose food supplementation not only maintained, but improved some IYCF practices. Efforts are needed to change perceptions about breastfeeding and poverty in this context and redirect complementary feeding programs towards low dose, micronutrient fortified foods.

Key words: Breastfeeding, supplements.

PO1774

INFORMING SCHOOL MEAL POLICY THROUGH USE OF A NOVEL WEB-BASED DATA COLLECTION METHOD IN SWEDEN

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Background and objectives: School meal policies have the potential to improve public health nutrition. Sweden is one of very few countries with a policy of providing free meals to all school children regardless of parental income. National guidelines for school meals exist but adherence varies widely. The lack of a national monitoring system has meant that the quality of school meals, the factors related to it, and its effects on public health has long gone undocumented. We developed an innovative, validated instrument 'School Food Sweden' (www.SkolmatSverige.se) to overcome these problems. The instrument is web-based and consists of three levels, covering topics from meal choice/provision, nutritional quality, hygienic food practices, meal service and related pedagogic activities, environmental impact and organisational factors.

Methods: In the course of developing the instrument we invited 695 primary schools to test it (spring 2011); 191 completed the compulsory first level. 'Nutritional quality' is a summary variable indicating whether meals met the nutritional recommendations for iron, saturated fat, vitamin D and fibre. 'Lunch quality' summarises the number and type of warm meals and salad buffet offered. Cross-tabulations were performed against school size, type (municipal/private), geographical region, and reported access to a catering dietician.

Results: "Lunch quality" was positively associated with school size, with municipal schools and with the eastern region of Sweden (P< 0.05). Nutrition recommendations for all four nutrients were met in only 6% of schools. "Nutritional quality" was significantly associated with lunch quality (P<0.005) but not directly with any of the other variables.

Conclusions: These results are an important first step in understanding the complex determinants of school meal qua-

lity. The instrument is now available to all primary schools and means that school meal policy can in future be informed by relevant and timely data.

Key words: school meals, children, monitoring.

PO1775

OBJECTIVELY MEASURED PHYSICAL ACTIVITY IN NORMAL WEIGHT/OVERWEIGHT, NON-STUNTED/STUNTED GUATEMALAN CHILDREN AND ADOLESCENTS

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Background and objectives: Prevalence of childhood overweight is rising in developing countries, where stunting is still a public health issue. Data on physical activity (PA) is scarce when both conditions coincide. Our objective was to assess PA in normal weight non-stunted (NW-NS) and stunted (NW-S) and overweight non-stunted (OW-NS) and stunted (OW-S) school-age children.

Methods: 37 NW-NS (BMI-Z < +1; HA-Z >-1), 88 NW-S (BMI-Z < +1; HA-Z > -1), 50 OW-NS (BMI-Z < +1; HA-Z >-1) and 46 OW-S (BMI-Z < +1; HA-Z > -1) subjects (112 girls/109 boys, 6.7 - 17.7 y old) were recruited in 9 low-income, urban schools from Guatemala City. Subjects wore an accelerometer (Actigraph) on the waist up to seven days (epoch set at 60 seconds). Records were considered as valid when there was at least 660 minutes of continuous recording and data on at least one weekend day and two weekdays. PA is reported as total counts/day and minutes/day doing moderate to vigorous physical activity (MVPA, >2100 counts/minute, mean ± SD).

Results: Boys were more active than girls (658 ± 218 vs 560 ± 222 counts/day, 66 ± 38 vs 49 ± 33 minutes/day MVPA, $p<0.01$). There were no differences in counts/day among nutritional status groups ($p=0.08$). MVPA was lower in NW-S (53 ± 37) and OW-S (52 ± 35) compared to NW-NS (74 ± 42).

Conclusions: Stunting impaired daily physical activity, particularly of moderate to vigorous intensity, regardless of weight status.

Key words: Obesity, stunted, physical activity. Acknowledgements: Funding was received from the International Atomic Energy Agency and the National Institutes of Health (R01 MH067981-04, NHLBI HHSN-268200900028C)

PO1776

NUTRIENT INTAKE AND TELOMERE LENGTH AMONG JAPANESE AND KOREAN POPULATIONS

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Background and objectives: Telomere length may be affected not only by physical aging but also by life style factors including dietary intake. This study clarifies the relationship between nutrient intake and telomere length among Japanese and Korean populations.

Methods: Telomere length was measured by monochrome multiplex quantitative PCR (MMQPCR) method with buccal swab that is a low-invasive material for sampling. The telomere length was finally expressed as a relative telomere length (RTL) comparing with reference sample. The subjects of this study consist of 135 men and women(92 Japanese and 43 Koreans) voluntarily recruited with a written informed consent. The participants were mostly officer for Japanese and those of having medical checkup for the Korean. Age distribution of both populations indicated that Japanese was younger when compared to the Korean. The data of nutrient intake was obtained by validated food frequency questionnaire (FFQ) for both populations. Logistic regression analysis was used to identify the important nutrients affecting RTL.

Results: The values of RTL were negatively correlated with age only for Korean population($r=-.318$, $p=.04$). For nutrient intake, RTLs were positively correlated with values of Fe, beta-carotene, folic acid, and fiber and negatively with fat and Mg in both populations. Korean females showed a greater value of RTL than that of Japanese regardless of its elderly sample. Logistic regression analysis indicated that value of beta carotene was significantly associated with RTL after adjusting age, sex, and other confounding variables.

Conclusions: Intake of nutrients suggesting of anti-oxidative activity may be effective in preventing telomere shortening among Asian populations.

Key words: telomere, nutrient, Japanese, Korean

PO1777

GLOBAL MALNUTRITION CAPACITY BUILDING ENABLED BY ELEARNING AND SOCIAL MEDIA

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Background and objectives: The outcomes of severe malnutrition in children can be significantly improved by providing training to those undertaking the management of children with malnutrition. Making standardised and accessible training available globally could play a major role in reducing childhood mortality by malnutrition. Access to Internet is improving at a great rate across the world, offering a huge potential for technology enabled training in the developing world. Utilising the technology to offer such training, in 2010 the International Malnutrition Task Force and University of Southampton developed a high quality training course, called "Caring for Infants and Children with Severe Acute Malnutrition". After its successful field test in Uganda, it was introduced to the health communities, agencies and professional bodies at international events. However, bringing the course to those who needed it most was slow.

Methods: To increase its uptake, from October 2012 marketing strategies using social media were devised to promote the course widely. Their effectiveness was investigated in January 2013.

Results: For 4 months 1200 people from over 100 countries, including Haiti and N.Korea, enrolled the course, indicating 3, 000 per annum. There now is a global demand for the course, with 10 people a week enrolling via Google, 20 responding to posts in LinkedIn/Facebook, and many others responding to "word of mouth" recommendations. Most are health professionals, for whom training is directly relevant but unavailable through other means. It has also begun to be used by academic institutions, embedded within curricula, and NGOs for community-based training.

Conclusions: The malnutrition course has great potential for providing training globally, directly to those who need it. Feedback is very positive, describing improved knowledge and competency in malnutrition management required in work places. Social media can provide the opportunity to bring learners and learning together.

Key words: eLearning, Malnutrition, training, Social media.

PO1778

MORTALITY DUE TO MALNUTRITION AMONG UNDER 5-YEAR-OLD CHILDREN AND ITS RELATION TO SOCIOECONOMIC INDICATORS IN COLOMBIA

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Background and objectives: The child health situation in the Americas has improved in the last years thanks to social and economic development and better health-care coverage. In Colombia, however, problems such as respiratory infections, diarrhea, malaria, and malnutrition persist. Objective: To analyze the structure and trend of malnutrition mortality among under 5-year-old children in Colombia from 1985 to 2006 and establish its relation to socioeconomic indicators.

Methods: Descriptive, ecological study based on official mortality records from the Colombian Vital Statistics System. Net and adjusted rates, mortality standardized reasons, and Poisson regressions for trend analysis were obtained. A multiple linear regression model was built to estimate the relation between the malnutrition mortality rate and socioeconomic indicators.

Results: The analysis included a 22-year period in which 370, 136 deaths of under 5-year-old children were registered, 4, 1% due to malnutrition. The trend analysis showed two significant inflection points in 1994 and 2000, the first one decreasing, the second one, increasing. The unfulfilled basic needs index, the human development index, and the prevalence of breastfeeding explained 37% of variations in malnutrition mortality rates.

Conclusions: The increasing trend in malnutrition mortality rates starting in 1994 highlight the fact that the implementation of the Colombian Health-Care System did not have the expected effect, quite the contrary health care has deteriorated. Higher mortality rates appeared between 2000 and 2001, just when poverty levels in Colombia worsened.

Key words: Malnutrition, mortality rate, Colombia.

PO1779

NEPAL'S NATIONAL IRON INTENSIFICATION PROGRAM IMPROVED IFA COVERAGE FOR PREGNANT WOMEN AFTER 5 YEARS AND AFTER 10 YEARS PROTECTED AGAINST ANEMIA

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Background and objectives: The global health community has looked to Nepal's Iron Intensification Program (IIP) as a successful scale-up of a national iron folic acid (IFA) supplementation program for pregnant women. The IFA coverage increased from 23% to 59% between 2001 and 2006 and to 80% in 2011. Contradictory to the improved coverage of IFA for pregnant women, the anemia rates increased from 42.4% in 2006, to 47.6% in 2011. These unexpected results highlighted the need for further study of the IIP and implications for IFA coverage and anemia.

Methods: We estimated the possible impact of exposure to the ten year IIP on IFA supplementation coverage and anemia in mothers through multiple regression modelling of the 2006 and 2011 Demographic Health Surveys controlling for IIP district exposure, age, pregnancy status, wealth, religion, parity in the last 5 years, weight status, education, and ecological region. Sampling weights were utilized and data analysed using multilevel modelling because respondents were nested within districts.

Results: In the 2006 and 2011 surveys, 4, 693 and 2, 168 women provided blood samples respectively. In 2006, women who lived in districts with IIP implemented were more likely to receive IFA supplements in comparison to those who lived in districts without IIP (OR=1.85, 95% CI=1.16, 2.94). Similar results were obtained in 2011. Multiple regression analyses indicated that in 2006, women who lived in IIP districts were not significantly less likely to have moderate or severe anemia. However, in 2011, women who lived in IIP districts were marginally significantly less likely to have moderate or severe anemia (OR=0.56, 95% CI=0.30, 1.03).

Conclusions: The IIP increased IFA coverage and may protect against anemia. Further studies, both qualitative and quantitative are still underway to explore how the program can be further strengthened in Nepal.

Key words: Iron Folic Acid Supplementation, Pregnant Women, Anemia, Nepal, Scale-up.

PO1780

WHEN RESEARCH STUDY AND NUTRITION PROGRAM IMPLEMENTATION TIMELINES CLASH – A CASE REPORT ON VITAMIN A SUPPLEMENTATION FROM SOUTH AFRICA

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Background and Objectives: Public health (nutrition) decisions are taken with communities or entire countries as the unit of intervention. However, there may be contextual differences within countries that need to be recognised. The policy implications of the need for vitamin A supplementation (VAS) in the Northern Cape Province (NCP) of South Africa (SA) have been presented elsewhere. That study was done in collaboration with the local health department and dietitians. An impasse arose when the research was halted because of the imminent implementation of a VAS campaign in the study town, threatening the findings of the study. The objective of the presentation is to describe the events prior to the deadlock between research team and decision-makers, the resolution of the problem, and make recommendations for avoiding similar situations.

Methods: A narrative description of the events leading to the impasse between the research team and decision makers at national and provincial level, as well as the agreement that was reached.

Results: The research study was approved by the IRB and the NCP Health Department and intended evaluating vitamin A status before the under-fives received VAS. The imminent campaign would impact the results of the study. Representation was made to the IRB, which ruled that the long-term benefits of completing the study were higher than the risk of deficiency - the children were consuming preformed vitamin A and preliminary results showed no immediate need for vitamin A. Approval for postponement was sought and received from the National Nutrition Department and the NCP Health Department, after intense, prolonged telephone and email communication.

Conclusions: The "distance" between researchers and policy makers/ programme implementers/decision-makers is crucial, so that any problems affecting the conduct of research studies may be addressed timeously, and preferably pre-empted.

Key words: Researchers; decision-makers; programme implementation; partnerships.

PO1781

MEAT CONSUMPTION AND GENERAL AND CENTRAL OBESITY IN SPANISH ADULTS

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Background and objectives: It has been hypothesized that elevated meat consumption may increase risk of general obesity, indirectly contributing to risk of obesity-related chronic diseases. Despite research linking meat consumption to dietary patterns such as higher intakes of energy and reduced intakes of low energy-dense foods such as vegetables, evidence of a link to obesity remains limited and inconsistent.

Methods: This cross-sectional analysis included 2600 adults aged 24-85y (mean 62y) recruited between 2007- 2012 from the general population as controls in a multi-case control study of cancer from 10 Spanish regions. Dietary intakes were assessed using a previously validated food frequency questionnaire. Logistic regression was used to assess associations between higher proportions of meat consumption (g/100 kcals) and odds of overweight, obesity and elevated waist circumference (WC >88cm women, 102 cm men), adjusting for age, sex, region, education, smoking, and alcohol intake.

Results: Meat consumption (mean intake 4.6g/100 kcals) was positively associated with energy intake. Women in the top tertile of meat intake had increased odds of overweight (OR=1.6; 95%CI=1.0-2.4), obesity (OR=2.5; 1.6-3.9) and elevated WC (OR=1.4; 1.1-1.9). These associations were stronger for cured/processed and red meats than for poultry/white meats. However, associations in men were null, both for meat intakes as a whole and for meat subtypes. Excluding low energy reporters, adults <45y, or additionally adjusting for intakes of seafood, fruits and vegetables, had no meaningful effect.

Conclusions: Though findings are consistent with an increased risk of obesity and excess energy intakes related to meat consumption in women, evidence was lacking in men. Further research is needed to assess to what extent associations between meat consumption and obesity may be linked to correlated dietary patterns which may vary by gender or food culture, and whether such patterns are prospectively related to excess weight gain.

Key words: Meat consumption, central obesity, BMI.

PO1782

POSSIBLE CAUSES OF HIGH RATES OF NON-RESPONDENTS IN COMMUNITY MANAGEMENT OF ACUTE MALNUTRITION (CMAM): THE SCI NORTH NIGERIA EXPERIENCE

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Background and objectives: Non-respondent's cases in the Community Management of Acute Malnutrition (CMAM) project by Save the Children International with funding from European Commission for Humanitarian Aid Office (ECHO) in Northern Nigeria as a major concern. This is largely due to a number of factors, Malnutrition and child mortality remains an issue of public health significant in Northern Nigeria and high cases of non- respondents remains a major source of concern in terms of program quality. This study accesses factors responsible for the high cases of non-respondents in CMAM.

Methods: Qualitative data was compiled from 4 Local Government Areas (LGA) with high non-respondents. 5 patients' cards were randomly selected from 15 facilities (static/fluctuating weight, referrals, physical examination and Drug administration). Visits were made during clinic days to observe the dispensing of Ready To Use Therapy Food (RUTF). 40 household caregivers and village-heads were also interviewed to get information on RUTF usage and consumption at home.

Results: Qualitative analysis shows that 90% of the non-respondents had regular attendance during their treatment in the facilities, 82% did not receive vaccinations for measles

and other illnesses, 85% for anti-malaria drugs at any time during their treatment. Interview information gathered showed that non-respondents patients were not given correct doses of RUTF at home (50% of RUTF rations was shared with non-SAM patients and there were cases of sales of RUTF). 95% were not visited by the Community Volunteers (CVs) to guide them on the usage of RUTF and 70% of facilities did not give key messages on RUTF consumption to the caregivers.

Conclusions: the survey on possible reasons for non-respondent to SAM revealed poor management of clients. The effective management of SAM requires careful and systematic medical treatment to complement treatment with RUTF and adequate community participation.

Key words: CMAM, RUTF, Non- respondents and Caregivers.

PO1783

THE CHRONIC EFFECTS OF COFFEE INGESTION ON HYDRATION STATUS: A COUNTERBALANCED CROSS-OVER STUDY IN A FREE LIVING POPULATION

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Background and objectives: It is often suggested that coffee causes dehydration and its consumption should be avoided or reduced to maintain fluid balance. The aim of this study was to compare the chronic effects of moderate coffee consumption against water ingestion across a range of hydration assessment techniques.

Methods: In a counterbalanced cross-over design, 50 habitual coffee-drinking males participated in two conditions; coffee (C) or water (W). Each condition consisted of two consecutive days during which participants consumed 4x200 g coffee (4 mg/kg caffeine) or water. All food and fluids were provided to participants during each trial. Total body water (TBW) was calculated via ingestion of deuterium oxide and analysis with Isotope Ratio Mass Spectrometry to observe fluid balance. Nude body mass (BM) was measured daily. Urinary (USG, osmolality, 24 h volume, sodium (Na^+), potassium (K^+) and creatinine) and haematological hydration markers (haematocrit, serum osmolality, total plasma protein, creatinine, blood urea nitrogen, serum Na^+ and K^+) were recorded daily throughout both conditions. Plasma was collected daily for analysis of caffeine for compliance.

Results: There were no changes in TBW from beginning to end of either trial and no differences between trials ($p>0.05$). No differences were observed between trials across any haematological markers. No differences were observed between trials in 24 h urine volume, USG, osmolality or creatinine ($p>0.05$). No differences in serum Na+ concentrations were observed between trials (141.2±2.5 and 141.2±2.4 mmol/L for C and W, respectively), although mean urinary Na+ excretion was higher in C than W ($p=0.02$). No significant differences in BM were found between trials, although a small but progressive daily fall was observed within both conditions (0.39±0.5 kg; $p<0.05$).

Conclusions: These data suggest that coffee, when consumed in moderation by caffeine-habituated males contributes to daily fluid requirement and does not pose a detrimental effect on fluid balance.

Key words: Fluid balance, Coffee, Hydration.

PO1784

EFFECTS OF WEB-BASED INTERVENTION ON KNOWLEDGE ATTITUDES AND BEHAVIORS RELATING HEALTH EATING IN CHINESE SCHOOL CHILDREN

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Background and objectives: To evaluate the feasibility and efficacy of a web-based family oriented nutrition intervention in knowledge, attitudes and behaviors relating healthy eating in Chinese children.

Methods: A three-month parallel trial was conducted in two primary schools in a rural-urban fringe zone of Beijing, China, including one intervention and one control school. Children in grade 4 and grade 5 and their parents participated in the study. The target website was just provided to the intervention group. We used questionnaires to evaluate the effect of intervention. The web-logging on rate in the intervention group was estimated by using group interview in children and a phone call report in part of the parents (n=40).

Results: about 423 families participated in the study. After three months of intervention, the increase in children's healthy eating related knowledge was significantly higher in the intervention school than that in the control school ($P<0.05$). The changes in scores of healthy eating related attitude, self-efficacy and behaviors of children were not significantly different between the two schools ($P>0.05$). The score of parents' knowledge in the control group decreased significantly more than that in the intervention group ($P<0.05$). The changes in scores of availability of healthy foods at home and parental modeling were not significantly different between the two groups ($P>0.05$). The reported logging-on rate in children and parents were just about 20% and 15%, respectively.

Conclusions: The web-based and family oriented nutrition intervention can improve the healthy eating relating knowledge of children and parents, but didn¡¯t promote the attitudes, self-efficacy, behaviors and home nutrition environments. The web-logging rates were very low both in parents and children. Further study is needed in improving the logging-on rate in web-based nutrition intervention in Chinese children.

Key words: Children; Healthy eating; Nutrition environment; Web-based nutrition intervention.

PO1785

FOOD CONSUMPTION AMONG BRAZILIAN BENEFICIARIES OF "BOLSA FAMÍLIA" PROGRAM

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Background and objectives: Aiming to reduce poverty and, consequently, ensure food security, over 13 million Brazilian families have been supported by Federal cash transfer program "Bolsa Família" (BFP) per year. This study aims to describe energy consumption (average) among beneficiaries of the Program.

Methods: The data used were obtained from the Brazilian Household Budget Survey microdata (POF 2008-2009), carried out by the Brazilian Institute of Geography and Statistics (IBGE), and related to the sample composed by 34, 003 persons (10 years old or more). From this total, 7, 600 were identified as BFP beneficiaries. The method used to obtain food consumption data was food diary.

Results: The average energy consumption among BFP beneficiaries was 1855.8 kcal/day (sd=826.39). The others (non beneficiaries) ingested 1917.48 kcal/day (sd= 832.91). Discriminating analysis in geographic regions/states it was identified that only in São Paulo state the beneficiaries ingested more energy (1907.07 kcal; sd=1639.48) when comparing with non beneficiaries (1868.1 kcal; sd=1318.11). Observing results for macronutrients, outstands the average lipid ingestion, systematically smaller among beneficiaries in general. The exception was beneficiaries living in São Paulo state, that achieved the bigger quantity of lipids ingested per day per person in the entire country (60.4g; sd=65.28).

Conclusions: The results of energy consumption were not excessive among beneficiaries and non beneficiaries. Data from São Paulo state (the richest state) needs attention, especially regarding to lipid ingestion. Considering the increase on overweight and obesity prevalence in Brazil, it is recommended the food consumption monitoring and the adoption of healthy life habits for population.

Key words: diet, energy consumption, social programs.

PO1786

AVAILABILITY OF ULTRA-PROCESSED FOOD IN THE NEIGHBORHOOD IS RELATED TO BMI IN WOMEN LIVING IN AN URBAN AREA OF BRAZIL

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Background and objectives: There are few studies in developing countries assessing the effects of food environment on nutritional status. The aim of this study was to evaluate whether there are differences in Body Mass Index (BMI) of women living in neighborhoods with different ultra-processed food availability.

Methods: Though a cross-sectional design, 531 women with children under 10 years of age were sampled from 36 randomly selected census tracts in the urban area of Santos, Brazil. Nutritional status of women and socioeconomic data were collected in household interviews. Concomitantly, availability of food in all stores of the census tract neighborhood (a buffer with 500m radius) was assessed. The stores were classified according to the percentage of ultra-processed foods sold, using the median as the cutoff point, and census tracts were also classified according to the predominance of food stores with varying availability of ultra-processed items. BMI values of women living in the two groups of neighborhoods were compared using t-test and a significance level of 5%.

Results: The percentage of stores classified as having greater availability of ultra-processed foods was 76% in the neighborhoods with the highest concentration of these stores and 51% in the neighborhoods with lower concentration. The BMI of women who lived in census tracts with greater availability of ultra-processed foods was significantly higher compared to those with lower availability (26.4 x 25.1 km/m2, respectively, p = 0.017). This results was further adjusted for socioeconomic status in a linear multiple regression model (p=0.03).

Conclusions: the nutritional status of women may be related to the availability ultra-processed food in the neighborhoods of residence. These results suggest the need for public policies in the food supply chain articulated the intervention actions on the environment, to increase the availability of minimally processed foods.

Key words: food environment, ultra-processed food, urban areas.

PO1787

ASSESSING THE IMPACT OF INTEGRATED HEALTH, NUTRITION, AGRICULTURE AND ECONOMIC EMPOWERMENT PROJECTS ON THE NUTRITIONAL STATUS OF LIBERIAN REFUGEES CHILDREN IN BUDUBURAM CAMP, GHANA.

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Background and objectives: Refugee settlements are characterized by food insecurity, malnutrition, health and sanitation problems. Services provided to address these issues are mostly sectorial and parallel activities. PointHope, an NGO operational in the Bududuram Refugee Camp integrated the Health, Nutrition, Agricultural and Economic Empowerment services it provided to Liberian refugees at the camp in Ghana. The approach is to address the underlying causes of malnutrition within the household and prevent relapse of malnutrition.

Methods: Refugee households of malnourished children or persons are identified and enrolled in any of the three different programmes 1.)A Nutrition Programme focused on rehabilitation of malnourished children/persons 2) Agriculture skills training programme, established to simultaneously produce food to feed into the Nutrition programme and to train food insecure household members on agriculture. 3) Skills trainings programmes for household members. Baseline information on child anthropometric indicators, household food security and frequency of illness were collected in 2008 prior to the start of the integrated programme. Indicators were then monitored till 2012, when all components of the model were in place.

Results: Of an average population of 4000 refugee children under*five years of age, Global Acute Malnutrition reduced from 11.9% in 2008 to 5.6% in 2012. General report of sickness of children under*five years to the camp clinic has reduced by 60%. 804 malnourished refugee children's households have received a kind of support in nutrition or skills training among which 303 refugee households became self-reliant and have repatriated to Liberia. Of the camp population of 3, 000 refugees, 21% were at risk or food insecure in 2008, which was reduced to 15% in 2012.

Conclusions: Causes of malnutrition are multi-factorial, the integrated programmatic approaches may reduce malnutrition, reduce relapse, and solve the diverse but basic causes. The approach could be helpful in refugee management.

Key words: Refugee, integrated programmatic approach, malnutrition.

PO1788

NEGATIVE WEIGHT EVOLUTION AMONG NORMAL BIRTH WEIGHT BRAZILIAN INFANTS: A NEW APPROACH TO NATIONAL DEMOGRAPHIC AND HEALTH SURVEYS

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Background and objectives: The first two years of life are characterized by accelerated growth and development, especially considering that, by this time, both are more strongly determined by environmental factors than by genetic characteristics. These environmental factors are interlinked through a multidimensional chain of cultural, socioeconomic and biological determinants. The study aim was to describe the prevalence and identify social determinants for negative weight evolution(WEZ) in normal-birth-weight(NBW) infants.

Methods: Data was from the latest Brazilian Demographic and Health Survey-2006/07. We selected children between 0-23 months(n=1482), living in the same house with their mothers. WEZ was calculated subtracting the survey's and birth's weight-for-age z-score, considering this variable a biological indicator capable to identify environmental influences on infant's growth, given that poor anthropometric outcomes reflect poor health status. To quantify associations, WEZ was dichotomized in negative and positive. A negative WEZ indicates that a child fell from the expected weight gain pattern. Multivariate models were used to estimate the prevalence ratio of negative WEZ determinants, based on the UNICEF´s Conceptual Framework of Malnutrition.

Results: Almost 42% of infants with NBW experienced negative WEZ. From eight variables significantly associated with negative WEZ in the bivariate analysis, these were the independent determinants in the fitted model: living in less developed regions, residing in households with moderate or severe food insecurity and having mothers with education lower than 8 years.

Conclusions: About 1.8 million infants were exposed to environments that impaired their growth. We found that macro environmental determinants had more influence than proximal ones for negative WEZ. This approach to health surveys was sensitive to characterize inequalities among different socioeconomic contexts and to identify risks for negative WEZ in different levels of determination. Acknowledgement: Silveira JA receives a scholarship from Fundação de Amparo à Pesquisa do Estado de São Paulo.

Key words: Infants; Surveys; Nutritional Disorders.

PO1789

LONG-TERM EFFECT OF A WORKPLACE HEALTH&WELLNESS PROGRAM ON BODY WEIGHT, RELATED METABOLIC AND HEMODYNAMIC MARKERS IN MEXICO EMPLOYEES

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Background and objectives: Prevalence of non-communicable diseases in Mexico has become a public health problem, with high economic impact due to diseases associated and presence of early mortality at high productivity ages. For adults, workplace is the ideal venue of intervention, reason why this study shows the long-term effect of a workplace-promoted health and wellness program (VIVE SALUDABLE-ADN), on body weight and related metabolic and hemodynamic markers.

Methods: From 2003 to 2009, 2341 administrative employees from the PepsiCo Mexico, voluntarily participated in the program comprising physical activities, personalized nutritional counseling and rest activities. Anthropometric, clinical and biochemical measures were done, baseline and after 6 months of intervention. 1560 participants' data were analyzed. Means were compared by years using ANCOVA analysis adjusted by age, gender, business area, job level and previous participation in the program.

Results: Metabolic syndrome prevalence observed in this population was 7% in 2006, 8.3% in 2007, 8.4% in 2008 and 4.4% in 2009. No significant changes in weight and BMI were observed, but an increase in body fat percentage in women from 2006 to 2008, with a plateau in 2009 (p=0.001). Similar results were observed in other variables in 2006(1), 2007(2), 2008(3) and 2009(4); BP: Females SBP: (p=0.003 (3vs1, 2, 4)), DBP: (p=0.001 (3vs1, 2, 4; 2vs4)), Males SBP: (p=0.24 (3vs4, p=0.0503)), DBP:(p=0.022 (3vs1, 2, 4)); Glucose(mg/dL): Female:76.92±0.83, 79.66±0.63, 86.62±0.75 and 86.02±0.66 (p=0.0001(1vs2, 3, 4; 2vs3, 4)); Males:83.83±0.95, 86.21±0.74, 90.55±0.90 and 89.16±0.85 (p=0.0001(1vs3, 4; 2vs3, 4)); HDL-C(mg/dl), Females: 50.54±1.17, 54.21±0.94, (p=0.016, 3vs4); Males:40.11±0.87, 42.50±0.74 (p=0.04, 3vs4); Triglycerides(mg/dl): Females, 106.07±6.57, 140.73±5.10, 126.24±5.90 and 112.05±5.29 (p=0.0001 (1vs2, 3; 2vs4)); Males, 150.84±8.87, 182.91±7.10, 159.00±8.48 and 167.49±8.00 (p=0.037 (1vs2; 2vs3).

Conclusions: Study shows that it takes a continued effort, 3 to 4 years, to see beneficial results with a reduction in the progression and even a reversion of parameters associated with increased body weight, such as metabolic and hemodynamic abnormalities in workplace health and wellness programs.

Key words: Workplace, lifestyle, poromtion.

PO1790

PREVALENCE OF OVERWEIGHT AND OBESITY AMONG ECUADORIAN WORKERS AND THEIR ASSOCIATION WITH LIFE STYLE FACTORS, EXERCISE, AND EATING HABITS

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Background and objectives: Personal characteristics can determine eating and exercise behaviors leading to greater risk of overweight and obesity. To study the relationship between overweight and obesity prevalence with socio demographic data, related illness, physical activity level, eating and exercise habits and the relationship between self efficacy and physical activity.

Methods: A cross sectional study conducted on 917 Ecuadorian private employees (663 men and 254 women). Surveys were conducted to obtain life style information, anthropometric data, eating habit (Fruit and Vegetable Stage of Change questionnaire), physical activity habit (Physical Activity Stages of Change and self efficacy questionnaire) and physical activity level (International Physical Activity Questionnaire). Statically, descriptive statistics, chi-squared test and multiple correspondence factorial analysis were used.

Results: Prevalence of overweight and obesity was 40% and 9.4%, respectively; higher in males (p<0.001), married (p=0.000), primary education level (p=0.024) and increases with age (p<0.000). Overweight and obesity were associated with hypertension and dyslipidemia (p<0.001).Overweight, obesity, abdominal obesity, high percentage of body fat and hypertension were associated (p<0.000). Individuals (83%) who fulfilled fruit and vegetable consumption recommendation were classified in maintenance stage of change. Conversely, most individuals who did not fulfilled fruit & vegetable recommendation were at the lower stages of change. Most of individuals (65.3%) were sedentary. Exercise stage of change was associated with physical activity level (p=0.000). Most of sedentary subjects were in contemplation stage of change. In contrast, active and very active subjects were in maintenance stage. Lower self efficacy was associated with obesity.

Conclusions: Overweight and obesity were more prevalent in men. Overweight, obesity and abdominal obesity were associated with cardiovascular disease. Employees need a healthy diet and physical activity promotion. Stage - based interventions would be appropriate, with focus on lower stages of change.

Key words: Obesity; exercise; eating; behavior.

PO1791

EVALUATING THE BEHAVIORAL EFFECT OF JUNK FOOD ADVERTISING AND BRAND PLACEMENT ON CHILDREN

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Background and objectives: In the context of increasing obesity, previous studies have analyzed the influence of advertising in children's preferences demonstrating a modest but consistent effect on children's wishes. These have rarely focused on either brand-placement, or the combined-effect (synergy) with advertising. Seeking to orient public nutrition policies, this research evaluates the separate and joined-effect of advertising and placement on children's preferences, and whether it may change across age.

Methods: We did a 3x3 factorial experiment, with promotional tools (advertising, placement and synergy), and age (9, 12 and 15) as factors. The dependent variables were the behavioral disposition toward the product category (junk food) and the advertised brand (McDonalds). The sample was 382 children (57% women) distributed across the nine combinations. Children were exposed to a film clip (with/without McDonalds placement scene) including a commercial break (with/ without McDonalds advertisement). A self-administered questionnaire was answered where the dependent variable and covariates (sex, prior exposure and appreciation of the film) were examined.

Results: Covariates were equally distributed across conditions. Two-way ANOVA evaluating the disposition toward the product category (F=3, 090, p=0, 047) and for the brand (F=3, 347, p=0, 031) show a main effect for promotional tool but neither for age nor for the interaction of both. The combined use of advertising and placement increased the disposition toward the category and brand. Advertising and placement performed similar in both dependent variables.

Conclusions: This study shows the similar persuasive effect of advertising and placement, and the amplified effect of using both together. These findings suggest that public nutrition policies should regulate not only advertisement of food but also placement since these tools are used in an isolated or a combined way. The absence of a significant effect of age opens the question about the acquisition of new cognitive defenses after 9 years-old.

Key words: Obesity, Children, Advertising, Placement

PO1792

NUTRITIONAL RISK AND FUNCTIONAL IMPAIRMENT IN THE ELDERLY (NURSING HOMES AND FREE-LIVING) YUCATAN, MEXICO

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Background and objectives: The present study examines the association of nutritional status and functional capacity (hand grip strength) in institutionalized and free-living elderly in Yucatan, Mexico.

Methods: 121 women (40 in nursing homes and 81 free-living) and 37 men (19 in nursing homes and 18 free-living), agreed to participate in the study. The age range was 60 to 97 years. Body Weight (kg) Height (m), triceps skinfold (mm), arm circumference (cm) were collected using standard methods and nutritional indicators were calculated using validated equations. Grip strength in both hands was measured using a mechanical dynamometer.

Results: Findings show differences (P <0.001) in body weight (53.8 vs 62.4), BMI (kg/m2) (26.2 vs 29.5), arm circumference (26.4 vs. 29.4), arm fat area (cm2) (22.7 vs. 28.5) among nursing homes and free-living women. For its part, the indicators that showed differences between free-living and nursing homes men were (P <0.05): triceps skinfold (11.7 vs. 9.1) and arm fat area (25.2 vs 21.3). Grip strength in both hands, was higher only in free-living women (P <0.05), no difference was found in males.

Conclusions: We conclude that nutritional indicators fat and muscle mass are better in free-living women, while in males, body fat is higher in institutionalized subjects. Further research is required grip strength in males as an indicator of nutritional risk.

Key words: nutrition, handgrip strength, elderly.

PO1793

BUILDING POLITICAL COMMITMENT AND CONSENSUS FOR LONGER MATERNITY LEAVE AND STRONGER LEGISLATION ON THE MARKETING OF BREASTMILK SUBSTITUTES

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Background and objectives: Across infant and young child (IYCF) interventions, maternity leave entitlements and restrictions on marketing of breast milk substitutes (BMS) are two policies that help create an enabling environment for families to follow recommended child care practices. Research shows that longer maternity leave can positively impact rates of exclusive breastfeeding, and that stronger marketing restrictions can decrease use of formula for infants and young children. Beginning in 2009, a coalition of government, multilateral, and non-governmental partners in Vietnam initiated advocacy efforts with two objectives: (i) Lengthen paid maternity leave for all mothers to six months; and (ii) More closely align Vietnam's legislation with the International Code of Marketing of Breast Milk Substitutes and subsequent World Health Assembly resolutions.

Methods: A methodical process, starting with stakeholder analysis, was used to build political commitment and generate consensus for policy change. The highly collaborative effort included conducting research early and thoroughly to build the case for change; creating tailored and localized advocacy materials to package the evidence base; leveraging the comparative advantages within a broad stakeholder network to create change; and strategically using champions and the media. These approaches became part of an iterative process that created political momentum and pathways to influence decision-makers and build consensus for the two policy changes.

Results: In June, 2012, Vietnam's National Assembly voted in favor of expanding paid maternity leave to six months and ban marketing of BMS for children under 24 months, including feeding bottles and teats. Both laws passed with over 90 percent of the vote.

Conclusions: Using best practices for policy change can effectively influence policymakers' understanding of the role IYCF policies play in protecting health and nation development, and can ultimately influence legislative decisions to create an enabling environment for IYCF.

Key words: maternity leave, BMS Code, IYCF, policy, advocacy.

PO1794

PERSEO PROJECT: PROCESS EVALUATION, LEVEL OF IMPLEMENTATION AND EFFECTIVENESS

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Background and objectives: PERSEO is a school based community intervention Project aimed to promote healthier food and physical activity habits among primary school children. In this paper we analyze the influence of the degree of implementation of the project on effectiveness.

Methods: Six Spanish Autonomous Regions (Andalucía, Canarias, Castilla-León, Extremadura, Galicia, Murcia), Ceuta and Melilla participated in PERSEO Project. 67 primary schools were recruited and randomly assigned to the intervention (n=34; 5646 children) and control group (n=33; 6139 children). The intervention was implemented during school years 2007-2008 and 2008-2009. A specific process evaluation protocol was designed previous to implementation. Based on process evaluation, a intensity of implementation score was calculated (0-10). The implementation score was included in logistic regression analysis for effectiveness evaluation.

Results: Mean implementation score for intervention schools was 4, 32 ± 1, 81; median 5 (highest 8). On average, 50% of the program was implemented as planned. Significant differences were observed in implementation score between schools, between classes within schools and between school grades. There were significant differences in implementation score by region as well. Adjusting for baseline BMI, OR for being obese at the end of the project was 1, 56 (95IC% 1, 03-2, 36) for the control group. Considering as reference a high level of project implementation, OR for being obese was 1, 15 (95IC% 1, 10-1, 20) for low level of implementation.

Conclusions: Results highlight the need to ensure a high level of implementation to reach the intended objectives, reinforcing teachers involvement and sustainability of policies adopted in schools.

Key words: schoolchildren obesity food habits physical activity

PO1795

BASELINE EVALUATION OF A CONTINUING EDUCATION PROGRAM FOR HOME DELIVERED CARE SUPPORT PROVIDERS: NUTRITION RISK

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Background and objectives: A continuing education program for workers in the public home delivered support care service was designed with the aim of increasing awareness and motivation about the relevance of food and nutrition care for the welbeing of the clients of the service. In this paper results of baseline evaluation regarding nutritional risk of users of the service is presented.

Methods: A 20 hour education program was designed. As part of the evaluation, a protocol for baseline assessment was designed including determinant factors of nutrition risk, food habits and physical activity of clients.

Results: In the first phase of the project 75 people providing care in two city districts were involved. About 600 clients receive care in these districts. Data were collected for 218 users. Mean age of clients was 76, 89 yr for men and 81, 19 yr for women. Consuming more than 3 drugs daily, eating alone and limitations for buying, preparing or consuming food and beverages were key determinant factors of nutrition risk in the group. Prevalence of malnutrition was estimated 5% and 37, 5% were likely at risk of malnutrition according to MNA screening.

Conclusions: Prevalence of risk of malnutrition is high among home delivered support care. Awareness and adequate training for care providers should be essential for a high quality service.

Key words: Continuing education; nutrition risk; home delivered care; elderly

PO1796

EARLY CHILDHOOD STIMULATION IMPROVES GROWTH OF DISADVANTAGED CHILDREN IN RURAL MEXICO

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Background and objectives: Despite positive impact of the conditional cash transfer program, Oportunidades on child growth, the prevalence of stunting remains high in rural areas of Mexico, particularly in the south. Early childhood stimulation (ECS) may improve child growth. We evaluated the impact of combining 2 large-scale programs in Mexico (Oportunidades and the Initial Education ECS program) on child growth and development in a large randomized effectiveness trial and report here the effects on growth.

Methods: This cluster randomized controlled effectiveness trial was implemented in southern Mexico in small rural communities with a high prevalence of chronic malnutrition and was stratified by indigenous and non-indigenous communities. Eligible communities were randomly assigned to the ECS program or comparison group. All Oportunidades beneficiary children 0 to 4 y of age were eligible to participate in the study; we report here results for a longitudinal sample of those 0 to 2 y of age at baseline. The ECS program was implemented after baseline and the effects assessed after 2.5 y of implementation. Program effects were assessed with a difference in differences estimator using a multilevel model.

Results: Groups were well balanced at baseline within strata but the prevalence of stunting was significantly higher in indigenous (46.5%) than non-indigenous (26.9%) communities. In non-indigenous communities, the prevalence of stunting did not change significantly from baseline to follow-up in the ECS group (+3.1 percentage points, PP; 95%CI -2.6, 8.8), while there was a large increase in the control group (+16.1 PP; 8.6, 23.6) (p=0.007).

Conclusions: The addition of ECS to the benefits provided by Oportunidades can provide a further benefit to child growth among in non-indigenous communities in southern Mexico. Further analyses are underway to understand limitations that may have limited impact in indigenous communities.

Key words: early stimulation, Mexico, impact evaluation.

PO1797

MONITORING NUTRITIONAL STATUS OF CLIENTS OF BASIC HEALTH UNITIES IN THE STATE OF SÃO PAULO

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Background and objectives: The Nutritional and Alimentary Surveillance System (SISVAN) allows performance descriptive/analytic diagnosis of nutritional situation of Brazilian population.Objectives: To verify nutritional state of clients of the Basic Health Unities of the State of São Paulo, employing data obtained from SISVAN implanted by the General Coordination for Foods and Nutrition (GCAN) according to the guidelines of the National Policy for Food and Nutrition (PNAN) regarding the warranty of adequate health conditions for the Brazilian population.

Methods: This research was developed from information on the nutritional state of people monitored by the SISVAN.

Results: The number of registers in relation to the total population is considered to be very low, meaning that less than 3% of the population is registered at SISVAN. The amount of children with low weight wavers around more or less 1%; nevertheless the amount of children with very low weight, in a percentage between 6, 7/10, 1%, representing an average of 8, 7% (DP +1, 9). From the percentage of adolescents registered, in average, 2, 8% present thinness/marked thinness; 72, 9% are eutrophic and 57% present excessive weight; among these, 31, 3% are overweight and 26, 1% (DP+1, 63) were classified as being obese. Among the elderly, only 34, 2% are eutrophic, while 10, 9% present low weight and 55, 9% (DP+4, 80) are overweight.

Conclusions: Regardless of the low rate of registers at SISVAN, results of this study show an alarming situation regarding nutritional status, registered, in proportion, a high number of persons overweight in all age brackets. Strategies for health promotion and prevention must receive more attention and subsides by the public organs, at municipal, state and federal levels, in order to reach a higher level of efficacy of the actions designed to avoid the worsening of morbid situations and reducing the evolution of hazards that may demand more complex attention.

Key Words: Nutritional State. Monitoring. Food and Nutrition Surveillance System

PO1798

EFFECTIVENESS OF A LARGE-SCALE FOOD BY PRESCRIPTION PROGRAM IN ETHIOPIA ON RECOVERY FROM MALNUTRITION AND HIV PROGRESSION AMONG HIV+ ADULTS

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Background and objectives:: Determine effect of food supplement provided to malnourished HIV+ adults (BMI <= 18.5) also receiving standard ART care on recovery from malnutrition, HIV disease progression and survival.

Methods: RUTF, assessment, and counseling were provided to MAM or SAM subjects that were pre ART or ART for up to 6 months at 15 clinics (n=1956), with 8 matched comparison clinics (n=639). Longitudinal nutritional and HIV status data were collected. Recovery was defined as having a BMI >= 18.5 recorded for 2 or more consecutive visits.

Results: In treatment and comparison groups, respectively, rates were as follows: recovery 11.3% and 7.4% (p=0.005), non-response 15.9% and 31.9% (p<0.001), default 70.6% and 59.6% (p<0.001) and died 1.5% and 0.8% (NS). Controlling for baseline variables, participants in treatment gained 0.75 more BMI points on average than comparison if MAM (16<=BMI<18.5) at baseline (p<0.001), and 0.92 points more if SAM (BMI<16) (p=0.004). Median change in CD4 count was 29 cell/uL (IQR=114) in treatment group versus no change (IRQ=99) in the comparison group (p=0.015).

Conclusions: Adding a therapeutic food ration to an ART regimen for malnourished adults with HIV in Ethiopia led to improved BMI, recovery from malnutrition, CD4 count and functional status compared to a similar group that did not receive food assistance, demonstrating a quantitative benefit of macronutrient supplementation on HIV health and nutrition outcomes beyond that of ART alone. Issues of default from program need to be given consideration.

Key words: malnutrition, HIV.

PO1799

NATIONAL SCHOOL MEALS PROGRAM AND THEIR INTERFACE WITH FAMILY FARMING: THE BRAZIL CASE

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Background and objectives: In Brazil, in 2009, a new legislation was approved about the National School Meals Program (PNAE – Programa Nacional de Alimentação Escolar) related to their conceptions and guidelines, which establishes that at least 30% of the financial resources must be channeled to purchase food from familiar farming (AF – Agricultura Familiar). The objective of the study was to obtain a panoramic view of the achievement of this type of purchasing in brazilian school meals in the year of 2011, describing the limits and progress made since the implementation of the new legislation.

Methods: This research was carried out in 2012 and it is a cross-sectional study. Electronic questionnaires have been sent to all education secretaries of the 5564 Brazilian cities. Descriptive analysis with absolute and relative frequencies has been used.

Results: 93.2% of the Brazilian cities have answered the questionnaire (n=5184), of which 73% have purchased food from familiar farming, and more than 30% of the cities declared purchase organic food. Examples of reported difficulties are

insufficient amount of food to supply all school meals (n=2300) and the lack of variety of food facing the needs raised by the menu (n=2278).

Conclusions: It might be highlighted the expressive acceptance of the cities to the incentive measures in favor of familiar farming in Brazil, promoted by the National School Meals Program, since the new legislation has covered a short period of time.

Key words: School Meals, Familiar Farming, Purchasing of food.

PO1800

AFTER-SCHOOL NUTRITION EDUCATION, AND PARENTS' AND PEERS' INFLUENCE CAN IMPROVE FRUIT AND VEGETABLE CONSUMPTION AMONGST INTERNATIONAL SCHOOL CHILDREN IN DENMARK

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Background and objectives: Children in Europe are increasingly at risk of nutritional disorders due to inadequate diets, especially those low in fruits and vegetables (FV). While EU member countries currently implement a variety of health education programmes designed to improve nutrition in school age children, including increasing fruit and vegetable intake, the results of such programmes are mixed. Objective: A study was carried out among 5-12 year-old international school students attending an after school program in Copenhagen to identify determinants promoting or inhibiting FV consumption and assess the outcomes of an educational intervention to promote FV consumption and to meet the Danish recommended daily intake (RDI).

Methods: Using a pre-test/post-test experimental study design, 53 study participants were selected at random from two age groups (ages 5 to 7, ages 8 to 10) attending an after school programme from 18 different countries were selected to participate in the study. The children completed food frequency questionnaires (FFQ), followed by questionnaires to determine knowledge, attitudes and practices of nutrition and FV consumption. A 15-day education intervention was administered. Students' lunches were observed and recorded one week before and after the nutrition education intervention. The Body Mass Index (BMI) of students was recorded.

Results: Post-test results demonstrated increased FV consumption by children in both age groups, with various reasons cited including family and peer influence, and taste preference. Nutrition education interventions for children influenced them to consume more FV. Parents and teachers also influenced and motivated children to taste new FV by encouraging them to eat more and varied FV.

Conclusions: Further research is needed to determine which interventions are most effective in promoting increased FV consumption. After school programmes provide ideal opportunities to improve nutrition knowledge and practice.

Key words: Fruits and vegetables, School-based nutrition interventions.

PO1801

CHILD UNDER NUTRITION, A CROSS SECTIONAL STUDY OF THE ASSOCIATED FACTORS AMONG CHILDREN ATTENDING CHILD WELFARE CLINIC IN CAPE COAST METROPOLIS

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Background and objectives: Child under nutrition is common with children under age five in cape Coast Metropolis despite the effort of the Health sector. To understand the menace, there is the need to assess the factors associated with this problem. This study was aimed at assess the factors associated with child under nutrition in the Cape Coast Metropolis.

Methods: This was a cross sectional study involving 100 mother / caregiver child pairs selected from the 3 major child welfare clinics in the metropolis. Data collected included child anthropometric measures, socio demographic Characteristics of mothers and breastfeeding.

Results: Mean age of 1.74 SD 0.80 Completed months was recorded for children in this study. Mothers were found to earn a median amount of $261.8 (104.7, 316.7) of this amount, mothers indicated spending a median amount of $104.7 (52.4, l57.0)on food. Mild (23.7%)to Moderate (8.2%) wasting and mild (19.6%) to moderate (6.2%) stunting rates were recorded. Significant association was found with current breastfeeding status and length for age, marital status and weight for age and mother/caregiver educational status, lenght for age and weight for age.

Conclusions: Malnutrition is common among the children.

Key words: undernutrition, children.

PO1802

EVALUATION OF NUTRITION SURVEYS IN FLOOD AFFECTED AREAS OF PAKISTAN: SEEING THE UNSEEN

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Background and objectives: In July and August 2010, Pakistan experienced the worst floods recorded in its history. The floods affected more many million people with thousands lives lost. Nutrition assessment surveys were conducted in flood affected areas of the two largest provinces (Punjab and Sindh) led by United Nations Children Fund (UNICEF) to assess nutrition status of children between 6 – 59 months while Aga Khan University (AKU) undertook a parallel assessment including micronutrient status in their project areas within Balochistan, Sindh and Punjab.

Methods: Standardized Monitoring & Assessment of Relief and Transition (SMART) methodology was used for all the surveys in Punjab and Sindh. A total of 881 children from Sindh, 1143 from Punjab and 817 from AKU project areas were measured for anthropometry and their households being interviewed. All three data sets were entered into ENA for z-score calculation and prevalence of malnutrition.

Results: Global Acute Malnutrition (GAM), defined as low weight for height (less than – 2 z-score and or oedema) was found to be 21-23% in Sindh, 14% in Punjab and 16% in AKU project areas. The other notable finding was widespread evidence of Chronic Malnutrition (Stunting) which was 52-54% in Sindh, 47-53% in Punjab and 48% in AKU project areas.

Conclusions: The findings indicated that while immediate life-saving interventions were needed, there was a wakeup call to address chronic malnutrition as well. Through wide and high level dissemination of the survey results, treatment and importantly prevention of malnutrition has become a visible priority for provincial and federal government in Pakistan and overseas development aid.

Key words: Nutrition Survey, Floods, Chroning Malnutrition.

PO1803

SOCIO-HISTORICAL STUDY OF A FEDERAL FOOD POLICY FOR WORKERS

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Background and objectives: in 1976, Brazil initiated a new subsidizing companies model that offered food to employees through the Fiscal Incentive Program to Food Worker (FIPFW). The menu must follow nutritional parameters established by the government and to have a nutritionist as responsible. Currently, the program benefits 169.000 companies, covering 16 million workers and involves 19% of Brazilians nutritionists. To understand the possibility conditions for its social construction, it was conducted a sociohistorical study supported in the Pierre Bourdieu reflexive sociology.

Methods: it was performed documentary analysis, 21 in-depth and 3 structured interviews. The documents were obtained in the institutions and from internet. For the provisions in-depth study, it was selected an intentional sample of agents involved in the program genesis, identified through the snowball strategy.

Results: it was noted that the program has emerged within the bureaucratic field, but in conjunction with the economic field agents, mainly major industries and catering corporations executives. The program was idealized by a physician and nutrition specialist David Luiz Boianvsky who, converting his social capital in bureaucratic capital, enabled the program start. The most important capitals for the program genesis were the Ministery of Work political capital and the bureaucratic, private and militant administrative capitals, potentiated by the social capital.

Conclusions: the FIPFW represented the previous model rupture, by shifting the worker food control from the State to inside the companies. It was possible to identify a specific social space development, where are disputed the fiscal benefit forms and amounts and who is responsible for setting the menu. Health and nutrition issues occupy a secondary position, which helps to understand the high chronic diseases prevalence identified by numerous studies about Brazilian workers.

Key words: Worker food; nutrition policies; sociogenesis; Brazil; fiscal benefits; Pierre Bourdieu.

PO1804

NUTRITION ASSESSMENT AND RESPONSE IN FLOOD AFFECTED AREAS OF PUNJAB- CRISIS AND HOPE

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Background and objectives: Pakistan experienced on of the world flood in history during 2010 that affected all 4 provinces of Pakistan. UNICEF in collaboration with the Punjab Bureau of Statistic (BOS) and Health Department Government of the Punjab conducted a nutrition survey in the flood affected areas of the most populous province of Pakistan during November-December 2010 to assess the impact on leval of malnutrition and coping mechanism of the population.

Methods: SMART methodology was applied for the survey designing and sampling procedure while WHO growth standards were used as reference to classify malnourished children. The survey was conducted in two different strata: Severely and Moderately Affected Areas during November and December 2010. 1200 (600 in each survey area) households were interviewed and all children between 6 to 59 months of age were measured.

Results: Prevalence of Global Acute Malnutrition (GAM) was found to be 14.0% (with 95% CI 11.4 – 17.0%) and severe acute malnutrition (SAM) of 3.6% (with 95% CI 2.4 – 5.3%). Chronic Malnutrition (Stunting) affected more than 50% children. 40% had taken a loan since the flooding and another 40% had started selling valuable assets. 35% families had received some financial assistance and about 90 percent of them received from Government sources- an amount of PKRs. 20, 000 or above. In addition, there was association of between wasting and living in kacha households, taking a loan with interest, wealth quintile and the geographical areas.

Conclusions: Acute malnutrition in flood affected areas was not much higher than the national prevalence but the study revealed a very high rate of chronic malnutrition and the impact of flood across all socio-econmic groups. Coping mechanism was alarming of a very deteriorating situation but the response and rehabilitation program was very encouraging.

Key words: Floods, Assessment, Malnutrition, Coping Mechanism.

PO1805

SNACKS THAT INTERSPERSE MEALS: SMALLS IN GRAMS IS NOT EQUAL SMALL IN CALORIES.

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Background and objectives: Some studies have observed an inverse relationship between daily eating frequency and body weight. We have no evidence of this effect at population level without intervention. Brazilian Food Guide recommends at least three meals interspersed with snacks daily. In this study we describe Brazilian eating frequency separated by meals and snacks, and investigate its relationship with total daily calories.

Methods: We used data from Pesquisa de Orçamentos Familiares 2008-2009 (POF-2009) modulus 7, where 34, 003 people (≥10 y) filled out a 24h food registry. Daily eating episodes were divided in ≤ 2, 3, 4, 5, 6 e ≥ 7 and classified into small snack (≤200 grams), medium snack (>200 to ≤350 grams), large snack (>350 to ≤500 grams) and meal (> 500 grams). Household income was stratified into fifths. Food composition was estimated based on the IBGE-TACO (Brazilian Food Composition Reference).

Results: Increase eating episodes is correlated to proportion of small snacks (r=0.37), daily caloric intake (r=0.32) and daily gram of food intake (r=0.43). The proportion of daily calorie filled by snacks increases with the number of snacks (r=0.67). Correlation among eating episodes and daily calories is higher in poorest (r=0.32) than in richest (r=0.29) and among eating episodes and proportion of small snacks is stronger in richest (r=0.37) than in poorest (r=0.35).

Conclusions: Brazilian Food Guide recommendation of intersperse main meals with small snacks has increased daily total calorie consumption more than contributed to balancing calories through daily eating episodes.

Key words: eating frequency; caloric intake; snacks.

PO1806

ESTIMATING THE IMPACT OF GENDER ON NUTRITIONAL OUTCOMES AMONG EXTREME POOR PROJECT PARTICIPANTS IN BANGLADESH

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Background and objectives: Almost half of children under five years of age are malnourished in Bangladesh (48%). This high level malnutrition has been linked to both poverty and poor child feeding practices. Helen Keller International – Bangladesh, with support from DFid, developed an intensive, nutrition and gender sensitive poverty alleviation program in two unions of one of the least developed areas of Bangladesh (Chittagong Hill Tracts). This three year program dramatically reduced stunting among pre-school aged children of project participants, from 51% to 40%. Additional analysis was used to determine if this reduction was more closely related to income gains or increased empowerment and collaboration within participant households.

Methods: Panel data, from before, during, and after the program was collected from 440 households participating in the program. Of these 440 households, 240 had a child from whom anthropometric measurements were taken.

Results: Program results indicated large increases in household and women's dietary diversity and sizable increases in women's empowerment indicators. Additionally, household per capita income increased from 8 taka per person per day at baseline to 39 taka per person per day at end line. Women reported increased support with household tasks over the course of the project. Increased women's and household's dietary diversity was correlated with several measures of women's empowerment. In addition, households with stunted and severely stunted children reported not being able to freely discuss household finances with their spouses, and reporting that their husband was a higher priority for food consumption. Multivariate models indicate that household support was the largest driver of the improved child growth outcomes. Indicators related to female mobility showed poor correlation with nutrition, likely because women from poorer households were more mobile.

Conclusions: Integration of gender into income and equity programs can increase impact.

Key words: extreme poor, gender, stunting.

PO1807

NUTRITIONAL STATUS AND LIFE STYLE FACTORS ASSOCIATED TO CARDIOVASCULAR DISEASE RISK IN ECUADORIAN WORKERS

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Background and objectives: Cardiovascular diseases (CVD) are growing contributors to worldwide and Ecuador mortality, a country that is experiencing a rapid health transition. Nutrition has been extensively investigated as risk factor for major cardiovascular diseases and is also linked to other cardiovascular risk factors. To study cardiovascular (CV) risk prevalence and to assess the relationship between nutritional status and cardiovascular risk prevalence in Ecuadorian university employees.

Methods: In 2011 a cross sectional study conducted on 132 (72 men and 60 women) Ecuadorian individuals working at Universidad Internacional del Ecuador, aged 20 y 74 years, with no previous history of cardiovascular disease or diabetes. Individuals who consented to participate complete a questionnaire including: nutritional screen, life style information, anthropometric data. Cardiovascular risk level for estimating 10-years Risk of having a heart attack was calculated using Framingham Risk Equation. Statically, descriptive statistics and chi-squared test were used.

Results: Prevalence of overweight and obesity was 45% and 13%, respectively; higher in males, married and tertiary education level. Central obesity was prevalent in women (p=0.000). Most of the subjects (93%) were classified in low risk of having a heart attack in the next 10 years, whereas 5.3% were in moderate risk and 1.3 in high risk. High CV risk was found in male ($p< 0.018$) with tertiary level of education, married, aged from 51 years or more who worked mainly at university administrative area. More individuals (44%) with CV risk were overweight. A 66% of individuals with CV disease risk had dyslipidemia and CV risk was associated with visceral fat ($p< 0.033$).

Conclusions: Overweight and obesity were more prevalent in men. Central obesity was prevalent in women. CV disease risk was associated with visceral fat. Employees need a healthy diet and physical activity promotion.

Key words: Obesity; Nutrition, Cardio vascular risk.

PO1808

BENEFITS OF DIFFERENT INTENSITY OF AEROBIC EXERCISE TRAINING IN MODULATING THE ANTHROPOMETRIC INDEXES OF OBESE COLLEGE STUDENTS

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Background and objectives: Anthropometric indices [body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR)] have been reported to be related to the risk of chronic disease. Due to the limited data with controversial results on the role of different aerobic exercise intensity on anthropometric indexes. The purpose of this study was to determine whether progressive aerobic exercise intensity effects the changes in anthropometric indices and health-related physical fitness measurements in obese college students.

Methods: Forty-eight obese subjects [body mass index (BMI) d 27 kg/m2, aged 18-26 years old] were randomized into four equal groups (n = 12): light-intensity training group (LITG): 40-50% of their heart rate reserve (HRR); middle-intensity training group (MITG): 50-70% of their HRR; high-intensity training group (HITG): 70-80% of their HRR, and control group (CG). The aerobic exercise training program was performed 60 minutes per day on a treadmill three days/week in a training period of 12 weeks. All subjects' anthropometric data, blood biochemical parameters, and health-related physical fitness components were measured at baseline and after 12 weeks.

Results: At baseline, there were no significant differences in anthropometric indices among four groups. After 12 weeks of exercise intervention with different intensities, HITG and MITG had significantly higher changes in body weight, WC, WHR and WHtR than LITG. The changes in BMI and percent body fat differ among four groups.

Conclusions: The twelve week high or middle intensity exercise training program effectively improved obese college students' body weight and WC might be to preventive the risk of abdominal obesity-related chronic disease.

Key words: Aerobic training, exercise intensity, body composition, health-related fitness.

PO1809

STUDENTS' PERCEPTION OF A CONDITIONAL CASH TRANSFER PROGRAM WHICH PROVIDES THEM WITH SUBSIDIZED SCHOOL LUNCHES IN JAMAICA

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Background and objectives: A conditional cash transfer to ensure that children in primary and secondary schools in Jamaica receive school lunches was evaluated to determine the children's experiences and opinions of the program and perceived benefits.

Methods: A cross-sectional study was conducted using a random selection of schools from clusters (primary, junior high and secondary) within each parish in the country and a systematic selection of children within schools. Children were interviewed to ascertain their experiences and any perceived benefits of the program.

Results: 1734 students from 75 schools were interviewed. 46% reported receiving lunch five days per week while 34% got lunch 3-4 days. 28% made a co-payment for lunch. When the subsidized lunch was not provided 37.6% of students bought snacks, 32% bought a cooked lunch, 8.2% reported not eating anything and 2.7% reported not attending school on those days. Students reported psychosocial effects such as being bothered (8.9%), embarrassed (7.2%), feeling inferior compared to other children (8.9%) and angry (7.0%) because other persons knew that they were on the program. Significantly more girls than boys reported feeling embarrassed (9.0% vs 5.2%). Younger students were more likely to be bothered and embarrassed than those in the higher grades. 10% of students reported being teased by other students and 9.7% said that adults at school treated them differently because they were on the program. More than 60% of students felt that their attendance and concentration on school work were better, 58% reported better attention in class, while 50 % felt that their behaviour in class was better as a result of their program participation.

Conclusions: Students generally had positive views of the impact of the programme on their school performance. There was some evidence of negative psychosocial effects of program participation.

Key words: conditional cash transfer, school lunch.

PO1810

HEMOGLOBIN LEVELS OF 1 TO 5 YEAR OLD CHILDREN ADMINISTERED VITAMIN A SUPPLEMENTS IN SELECTED HIGH VAD AREAS IN LEYTE, PHILIPPINES

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Background and objectives: Micronutrient malnutrition often occurs as multi-nutrient deficiency. Studies show relationships between iron indices and vitamin A status however the mechanism remains unclear. In the Philippines vitamin A deficiency is addressed through vitamin A capsule (VAC) supplementation, food fortification and food-based approaches. The paper described the iron status of 1-5 year old children in areas with high vitamin A deficiency (VAD) and change in hemoglobin levels in children given high-dose vitamin A capsules.

Methods: This is part of a research undertaking conducted by the Food and Nutrition Research Institute in collaboration with Tulane University of New Orleans, Louisiana which examined effects of extra VAC supplementation on serum retinol levels of 1 to 5 year old underweight children using quasi-experimental research design. This analysis described the iron status of children given vitamin A capsules and change in hemoglobin levels thereof. Study groups were: children given regular VAC, extra VAC supplementation, and those exposed to vitamin A fortified oil (VAFO) promotion. Descriptive statistics were used to measure iron status of the children. Change in mean hemoglobin was compared across vitamin A exposure groups using t-test and analysis of variance.

Results: Prevalence of iron deficiency anemia (IDA) was significantly higher among children with VAD at baseline (51 percent) compared to children with acceptable to high levels of serum retinol. Mean change in hemoglobin was highest among those supplemented with three extra VAC (1.36 g/L) and exposed to VAFO promotion (1.32 g/L) among anemic children.

Conclusions: There was moderate VAD and IDA among children at baseline. Mean change in hemoglobin was not significant across vitamin A exposure, however significant across iron status. Significant responses to supplementation were evident among anemic children who received three VAC. Combined effects of vitamin A and iron supplementation need to be examined.

Key words: hemoglobin, vitamin A supplementation.

PO1811

DIETARY RECOMMENDATIONS FOR ALCOHOL CONSUMPTION: A NARRATIVE REVIEW

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Background and objectives: The purpose of this paper is to review food-based dietary guidelines (FBDGs) as a vehicle to guide populations towards responsible and sensible drinking of alcoholic beverages. The problems with alcohol policies are briefly discussed and the option to use FBDGs as a way to recommend about alcohol consumption stated.

Methods: A computer search on FBDGs of different countries was done

Results: Of the 75 countries for whom FBDGs could be found, 56 included a guideline on alcohol consumption. These guidelines varied from explicit advice not to drink, to warnings not to drink during pregnancy and breastfeeding, to drink sensibly, responsibly or moderately, with some countries advising on age restrictions for drinking or giving amounts (units) that are compatible with good health.

Conclusions: A discussion of drinking patterns in different countries indicated that present alcohol consumption in many do no reflect the advice given in the FBDGs. It is concluded that at least in South Africa, a guideline "not to drink" may be indicated.

Key words: Food-Based Dietary Guidelines, alcohol.

PO1812

MATERNAL NUTRITION KNOWLEDGE IS ASSOCIATED WITH MEETING THE MINIMUM ACCEPTABLE DIET AMONG CHILDREN 6-23 MONTHS IN GHANA

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Background and objectives: Starting and maintaining appropriate complementary feeding, is essential for growth of children; preventing irreversible growth insults. In Ghana, sub-optimal diets beyond age 6 months are common and associated with growth faltering. The study assessed feeding among children 6-23 months in Ghana.

Methods: Cross-sectional study of 110 mother-child pairs attending child welfare clinics in Accra, Ghana. Questionnaires were used to collect data on background and child feeding knowledge. Child dietary diversity (DDV), meal frequency, and minimum acceptable diet were determined using a 24-hour dietary recall. Chi-square analysis was used to determine the association between feeding and two age groups; 6-8 months and 9-23 months. Predictors of minimum acceptable diet were determined using logistic regression.

Results: Fifty-three percent of children were aged between 6-8 months while 57% were between 9-23 months. Majority (91%) were breastfed on day preceding the interview. Most children (64%) were fed as frequently as recommended for age; only 41.8% were fed meals with minimum DDV. Between groups, 71.7% children aged 6-8 months were fed the recommended number of times compared with 56.1% for children 9-23 months. In contrast, significantly more children aged 9-23 months received dietary diverse meals (p=0.021). Minimum acceptable diet was met by 31.8% of all children, but this did not differ significantly between the two groups (6-8 months, 28.3% vs. 9-23 months, 35.1%; p=0.540). A higher feeding knowledge score among mothers, was the only significant predictor of a child being fed a minimum acceptable diet after controlling for confounders (OR=1.48; p=0.005).

Conclusions: Nutrition knowledge of mothers is an important factor in determining the way infants and young children are fed.

Key words: Complementary feeding, nutrition knowledge, dietary diversity.

PO1813

NUTRITIONAL DIAGNOSIS AND PROMOTING HEALTHY LIFESTYLE IN TEENAGERS IN HIGH SCHOOL IN CELAYA, GUANAJUATO.

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Background and objectives: Under increasing rates of chronic degenerative diseases, it is important to start from the early stages of development to assess adequate nutritional status, and if necessary implement appropriate measures to improve it.

Methods: This study took place in a high school in Celaya, Guanajuato, Mexico, and working with students between 12 and 15 years. The aim was to assess nutritional status and promote healthy lifestyles. We used the SPSS version 19. Statistical analyzes for quantitative variables were: mean and standard deviation for qualitative variables were frequencies. We assessed 157 students, of whom 50.3% were female and 49.7% male, mean BMI was 20.86, found that 30% of those tested had ideal state of nutrition, obesity 22.9%, 21.7% overweight, 14.6% moderate malnutrition and 8.3 % moderate. Workshops were implemented with students and mothers to provide guidance and promote healthy lifestyles.

Acknowledgments: We thank the Mexican Youth Institute for the scholarship provided for implementing the program.

Key words: nutritional status, high school students, healthy lifestyles.

PO1814

NUTRIMETRIA: A SCORE FOR WEIGHT AND HEIGHT IN SCHOOL CHILDREN

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Background and objectives: Mexico ranks number one in the word in incidence of overweight and obese children. We present clinical tools that help in the management of malnutrition.

Methods: anthropometric measures are taken and processed in the epidemiological software Epi-Info for Windows in order to generate a numerical nutritional score for each of the possible nine combinations of weight and height measurements (each based on the categories of low, medium or high) in school children. Numerical values assigned to these weight and height categories are added to obtain a numerical nutritionalscore where the number six corresponds to a child with normal (medium) height and weight. These nutritional scores can be summarized in a 3x3 table where the rows correspond to these

weight categories and the columns to these height categories. Low, medium and high categories for weight resulted dividing the whole range of body mass values using the cutoff values of one standard deviation above and below the mean body mass value, and those for height resulted from the cutoff values of two standard deviations above and below the mean value of a measure of height that adjusts for age.

Results: Among 637 school children ranging in age from 6 to 14 years, 320 (52.32%) obtained a score of 6; 28 (4.39%) obtained a score of 4 (0.62%); 4 obtained a score of 5; 279 (43.8%) obtained a score of 9; and 6 (0.94%) obtained a score of 11. The percentage of overweight or obese children was 44.74%, which is higher than the national value of 34.4% (Chi-squared = 17.59, p < 0.0002). The percentage of children with low height (adjusted for age) was 4.39% points lower than the national value of 13.4% (Chi-squared =34.79, p<0.00002).

Conclusions: This nutritional score is useful in the management of malnutrition.

Key words: Nutrimetria (nutritional score), height and weight measurements.

PO3327

A STUDY OF CHILEAN SCHOOL CHILDREN: RELATIONSHIP BETWEEN SUGARED NON-ALCOHOLIC BEVERAGES AND BODY MASS INDEX

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Background and objectives: The changes in food consumption patterns in the last few years have been notable. A generalized increase in calorie consumption indicates that this intake is due to behaviors and habits acquired early in life. The objective was to evaluate the relationship between sugared non-alcoholic beverages and Body Mass Index (BMI) in Chilean school children.

Methods: The study used a population-based cross-sectional design. Multi-stage probability sampling was used to select 1074 school children between the ages of 6 and 18 residing in urban and rural areas of the country. A Quantitative Consumption Tendency Survey was applied, which analyzed the food habits and behaviors in the last 30 days. Linear multivariate models were adjusted to determine the increase in BMI per 250 ml daily serving.

Results: Of the total, 92.0% (CI = 89.9-94.2) consume sugared beverages daily with a mean of 424.3 ml (p25-p75=212.1-707.2). For school children who consumed more than one serving (250cc) daily, the increase in the BMI coefficient in school children aged 6 to 13 is â=0.13 (p<0.01) and â= -0.23 (p<0.01) in school children aged 14 to 18.

Conclusions: Chilean school children have a high daily consumption of high-energy beverages. Consumption of sugared non-alcoholic beverages is positively associated with BMI only in school children aged 6 to 13.

Key words: School children, diet, sugared beverages.

PO3328

ANTHROPOMETRIC ASSESSMENT AND BLOOD PRESSURE IN MEXICAN SCHOOL-AGED CHILDREN

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Background and objectives: Accurate indirect measurements of body fat are fundamental in order to detect as early as possible whether the population overall or a given child has high blood pressure (BP) Objective: To examine associations between anthropometric measures as body mass index [BMI], waist circumference [WC], waist-to-height ratio [WHtR] and BP among school-aged children.

Methods: 1239 children aged 9.4 years (range; 7.6 to 13.5) were assessed in 10 public schools of low socioeconomic status in México City. BP was assessed according to the American Pediatric Academy. Anthropometrics, including weight, height, waist circumference [WC] and body composition (BIA and Fat Mass) were taken in all children. BMI and WHtR were calculated. BMI was categorized in agreement with the International Obesity Task Force cut points. HtR was calculated by dividing the WC by the height.

Results: 49.5% were boys, mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) were 107.7 and 75.0 mmHg, respectively. We observed that WC showed the highest correlations with SBP (r=0.588, p<0.001) and DBP (r=0.509, p<0.001), while BMI showed the highest correlations with total FM (r=0.956, p<0.001). Linear regression was also performed to calculate the variation of BP explained by different anthropometric indices (R2), the results confirmed our findings in the partial correlations analyses. Further analyses in boys and girls separately showed that BMI explained the greater variation of DBP (R2=29.6%) in boys and SBP (R2=35.8%) in girls compared with WC and WtHR, meanwhile WC explained in a higher proportion SBP in boys (R2=37.3%) and DBP in girls (R2=23.2%).

Conclusions: Among Mexican school children, BMI and WtHR do not differ in their associations with BP. However WC was a better indicator of BP, and may be preferred because of its simplicity, additional data are needed to examine its relation to another cardiovascular risk factors.

Key words: Anthropometrics, hypertension, children.

PO3329

ASSOCIATIONS OF DIABETES AND OBESITY GENOTYPES TO DIETARY PATTERNS IN PRE-SCHOOL AND SCHOOL AGED CHILDREN

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Background and objectives: For the effective prevention and treatment of obesity and diabetes It is important to attempt to elucidate the genetic as well as the behavioural and environmental factors influencing dietary intake. The aim of this study was to determine whether obesity and diabetes genes were associated with dietary patterns in pre-school and school aged children.

Methods: The Auckland Birthweight Collaborative (ABC) Study is a longitudinal study in Auckland, New Zealand, approximately half the sample were born SGA. Dietary information has been collected by food frequency questionnaires at 3½ (n=550) and 7 (n=591) years of age. Dietary pattern scores were created from these questionnaires using factor analysis. DNA was collected at 11 and genotyped for 54 snps on 42 obesity and diabetes genes, including 7 snps on MC4R and FTO. The relationship between dietary patterns and genotype were assessed using generalised linear models.

Results: Three dietary patterns were determined: junk, traditional and healthy. There were 15 associations between dietary patterns and genotypes, including 5 on MC4R and FTO, however there was little consistency in the relationships between the two time points. Given the number of associations tested we would expect to detect 16 significant effects at the 5% level by chance.

Conclusions: The results suggest that there is no association of childhood dietary patterns with obesity and diabetic genotypes. Childhood dietary intake thus would appear to be influenced almost entirely by socio-demographic and environmental factors and not influenced by genes.

Key words: Genotypes, birth weight, dietary patterns, diabetes, obesity.

PO3330

CHARACTERIZATION OF AREAS OF DEFICIENT KNOWLEDGE ABOUT DM AMONG TYPE 2 BANGLADESHI DIABETIC SUBJECTS ATTENDING A TERTIARY CARE HOSPITAL

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Background and objectives: Bangladesh has the highest number of diabetic population in the world and knowledge-based education is the most feasible strategy to prevent diabetes and its complications. The present study aimed to identify the deficient areas of diabetes related knowledge among type 2 DM subjects and to characterize patients with the lowest levels of knowledge.

Methods: Under an observational cross-sectional design 500 type 2 DM subjects (M 58%, F 42%; age 49.4±8.8 years, M±SD) were purposively selected from the OPD of BIRDEM Hospital (the central hospital of the Diabetic Association of Bangladesh). Data were collected by a pre-designed, pre-tested, interviewer-administered questionnaire.

Results: Although 81% subjects had fairly good idea about the basic definition of DM, 98% had no correct knowledge about its risk factors. About 34% subjects did not know the normal fasting blood glucose level. About 24% subjects had no idea about the principles of dietary management. Virtually all subjects (97%) did not know about the food exchange system. About 81% subjects had no knowledge about the basic rules of foot care. The male group (15%) had comparatively less knowledge about the principles of dietary management compared to female (9%). Occupation played a more consistent role in determining the area-wise knowledge level with housewives having very low level in all areas; 27% in basic definition of DM, 36% in its risk factors, 16% in the normal fasting blood glucose level, 8% in the principles of dietary management, 36% in food exchange system and 31% in the basic rules of foot care. Conclusion: Bangladeshi patients with diabetes have some knowledge of DM although the overall knowledge level is poor. The risk factors of diabetes, monitoring, principles of dietary management, food exchange system and basic rules of foot care are the commonest deficient areas.

Key words: Dietary menagement, type 2 diabetes mellitus.

PO3331

MONOUNSATURATED FAT INTAKE AND HYPERTENSION AMONG URBAN SCHOOL CHILDREN IN MEXICO CITY

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Background and objectives: The quantity and quality of fats consumed in the diet influence the development of cardiovascular risk factor. Studies focusing on lipids and lipoproteins are well documented; less information exists on the role of fats on blood pressure (BP) during childhood. The objective was to examine the relation between fat intake and blood pressure among school children.

Methods: Cross-sectional data were examined. 1239 children were evaluated in 10 different public schools of low socioeconomic status in México City. BP was assessed according to the American Pediatric Academy. A 24-hour intake recall was obtained. High fat intake group (HFI) had a total fat intake >30% of the total energy intake and the recommended fat intake group (RFI) <30% of the total energy intake.

Results: Mean age was 9.4±0.7 years old, 49.5% were boys, the prevalence of overweight and obesity was 23.6 and 12.3%, respectively. 44.9% of the children presented systolic or diastolic hypertension. Mean systolic blood pressure (SBP) was 107.8 mmHg and 75mmHg for diastolic blood pressure (DBP). The 79.6% of the sample belonged to the HFI. DBP was significantly higher in the HFI group compared with the RFI group (77.1mmHg vs. 73.4 mmHg, p=0.039). The difference in SBP was not significant. A linear regression showed that total fat intake (p=0.045) and monounsaturated fat (p=0.003) were positively related to SBP, meanwhile DBP was only related to monounsaturated fat (p=0.05).

Conclusions: Prevalence of hypertension among school children is higher than reported in national surveys as well as a high fat diet intake. Among these children, BP was lower in those with lower intake of fat, suggesting that fat intake profile is related with BP. High monounsaturated fat intake may contribute to higher SBP and DBP levels in school children, putting them at risk for the development of hypertension.

Key words: Fat-intake, hypertension, school children.

PO3332

PREVENTION OF LINEAR GROWTH FALTERING AMONG LOW BIRTH WEIGHT INFANTS IN RURAL BANGLADESH: A COMMUNITY-BASED CLUSTER RANDOMIZED TRIAL

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Background and objectives: Low birth weight (LBW) infants in low income countries are vulnerable to frequent infections resulting in postnatal linear growth faltering. The study estimated relative efficacy of directed use of water-based hand sanitizers (HS) containing benzalkonium chloride and a new expanded multiple micronutrient powder (MNP) along with nutrition, health and hygiene education (NHHE) to prevent infections and linear growth faltering among LBW infants in rural Bangladesh.

Methods: A prospective 2X2 factorial, cluster-randomized controlled trial was conducted among 467 full-term LBW infants from 0-12 months, using 48 clusters randomly assigned as follows: A. From 0 to 6 months, i) NHHE alone or ii) NHHE plus HS; B. From 6-12 months i) NHHE alone; ii) NHHE plus HS; iii) NHHE plus MNP (to be provided with complementary foods); and iv) NHHE plus both HS and MNP.

Results: Preliminary results suggest that infants in the 'NHHE plus both HS and MNP' group gained more in length by 12 mo than those with 'NHHE alone' [mean (95% CI) = 2 cm (0.5 cm); P<0.01] and had a greater increase in length-for-age z-score (LAZ) [0.33 (-0.25, -0.47); P<0.05]. Mean duration of diarrhea episodes during infancy (0-12 mo) was significantly lower in the 'HS plus NHHE' group compared to the 'NHHE alone' group (3.1±1.2 vs. 5.8±1.6 days, P<0.01). Upper respiratory tract infections (URTI) and cough were also significantly lower in the 'HS plus NHHE' group compared to the 'NHHE alone' group (22.5% vs. 27.1% and 8.1% vs. 11.2%, P<0.05, for both).

Conclusions: A novel approach of using hand sanitizer in combination with MNP may reduce infections and prevent li-

near growth faltering among term LBW infants in the first year of life.

Key words: Low birth weight, linear growth, stunting, infection, hand hygiene.

PO3333

TRENDS AND DETERMINANTS OF MATERNAL AND CHILD UNDER-NUTRITION IN NEPAL: FURTHER ANALYSIS OF THE NEPAL DEMOGRAPHIC HEALTH SURVEY, 1996-2011

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Background and objectives: Nepal has made progress in reducing micronutrient deficiencies and under-nutrition. But 41 percent of children under five are stunted and almost 25 percent of women aged 15-49 are underweight in 2011. The Government of Nepal (GoN) has renewed efforts to further reduce under-nutrition, requiring understanding of trends and possible causes. This project aimed to explore trends and determinants of child and maternal nutrition in Nepal (1996-2011), for design and targeting of interventions; results will help inform implementation of the multi-sector nutrition plan (2013-2017), involving expansion of a package of nutrition specific and nutrition sensitive interventions for accelerated reduction of under-nutrition.

Methods: Analysis of Nepal Demographic and Health Survey data was performed using data of 12,515 children aged 0-35 months. Selected nutrition indicators were examined using bivariate and multivariate analyses.

Results: National improvement in stunting was substantial, but with wider inequities by ecology and wealth quintiles. Stunting improved within all wealth quintiles (greater among richest), with women's education contributing significantly. Water supply and sanitation had interactive effects on stunting. Maternal underweight has improved, mostly in recent years, in the Terai, with increased education and within every wealth quintile (greater among richest). Child and maternal under-nutrition differ among caste/ethnic groups. Tobacco use was associated with lower height-for-age of children and BMI of women. Adequately iodized salt use positively affected weight-for-age.

Conclusions: Improving women's education and strengthening tobacco control programs are important for reducing child and maternal under-nutrition. Increasing wealth, and improvement in both water supply and sanitation, drive enhancement of child nutrition. Targeting interventions by location and caste/ethnic group is indicated. Programs that target children should include mothers. Future study of proximate determinants of maternal and child under-nutrition would be beneficial for further recommendations for nutrition-specific interventions.

Key words: Determinants, disparity, trends, stunting, under-nutrition.

PO3334

25-HYDROXYVITAMIN D, ITS GENETIC DETERMINANTS AND THE RISK OF CARDIOVASCULAR DISEASES IN THE GERMAN ARM OF THE EPIC-STUDY

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Background and objectives: Cohort studies have shown inverse associations between 25(OH)D and CVD risk. Also, genetic variants related to 25(OH)D have been identified. The use of these variants as instrumental variables enables analyses on 25(OH)D and CVD risk in cohort studies that are not affected by reverse causation and less prone to confounding. Instrumental variable analyses on 25(OH)D and the risks of myocardial infarction (MI) and stroke were carried out in a case-cohort study nested in the EPIC-Germany study.

Methods: A subcohort (n=2132, mean age: 50.6) was randomly selected and included into the analyses along with incident cases of MI (n=559) and stroke (n=471) that occurred during a 7.6 year-follow-up. Plasma 25(OH)D was measured in baseline samples by LC-MS/MS. Eight single nucleotide polymorphisms (SNPs) were selected as potential instrumental variables and genotyped. Associations between 25(OH)D, SNPs, and the risks of MI, stroke, and overall CVD were assessed by multivariable regression analyses.

Results: Subjects with 25(OH)D levels <25 nmol/L had a higher risk of MI and stroke than those with levels ≥50 nmol/L, the hazard ratio for overall CVD being 1.57 (95% CI: 1.15-2.15). Two SNPs in the GC and DHCR7 genes were strongly associated with 25(OH)D ($p<0.01$). A SNP score that explained 4.4% of the variance in 25(OH)D was not related to the risk of MI, stroke or overall CVD (HR: 1.0, 95% CI: 0.71-1.42).

Conclusions: Despite significant associations between 25(OH)D and CVD risk in the present study, the lack of association observed for the SNPs indicates no major role of 25(OH)D in the development of CVD. However, detection of modest associations between SNPs and CVD in larger consortia cannot be excluded. Together with upcoming results of RCTs, these studies will provide better insights into the potential of vitamin D in CVD prevention.

Key words: Vitamin D, CVD, SNPs, cohort.

PO3335

BUILDING NUTRITION CAPACITY FOR SCALING UP NUTRITION IN AFRICA

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Background: Recent developments towards reducing the burden of nutrition-related disease in high burden countries highlight the importance of professional capacity in nutrition to ensure effective delivery and sustainability of nutrition interventions. Our focus is to highlight capacity needs vis-à-vis meeting the objectives for scaling up nutrition interventions in Africa.

Methods: The International Malnutrition Task Force (IMTF) in conjunction with the African Nutrition Society undertook a training workshop on developing competency-based curricula for training nutritionists in Africa. This was followed by in-depth study of current nutrition training in Africa Higher Education Institutions, the latter to ascertain types and levels of courses, staffing capacity and graduate destinations. Group discussions and plenary sessions allowed participants to express their thoughts in the former whilst self-reported questionnaires were administered to institutions as well as an online search to enable data gathering, collation and analysis in the latter.

Discussion: The workshop identified gaps in current training and the need for standardised knowledge, skills and competency-based curricula for training of nutritionists in Africa irrespective of country resource base. Determining competencies and coming to an agreement on what every nutritionist should know was the expected outcome for this workshop. The review of African HEI capacities and types of training revealed that less than 45% of institutions were adequately staffed, there was lack of uniformity in curricula and standards; content, emphasis and focus differed widely.

Conclusion: We conclude that there is a wide gap between current and future expectations for meeting the needs for scaling up nutrition and training levels and capacity in nutrition-related subjects in Africa. This requires serious efforts to help mitigate and thereby meet the needs for scaling up nutrition interventions in high burden countries.

Key words: Scaling up nutrition; capacity building; nutrition training; Africa.

PO3336

COST OF OBESITY FOR THE NATIONAL HEALTH SYSTEM IN BRAZIL: AN APPLICATION OF THE COST-OF-ILLNESS METHOD

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Background and objectives: Obesity is a global public health problem and a risk factor for several diseases that financially impact the healthcare systems. According to the National Survey conducted in 2008-2009, obesity affects 14.8% of the Brazilian population, including 12.5% of adult men and 16.9% of adult women. Obese individuals represent nearly 25% of all overweight men and nearly a third of all overweight women. The prevalence of overweight and obesity have sharply increased over the last four decades. This study aimed to estimate the costs attributable to obesity, measured by Body Mass Index ≥30 kg/m2 (BMI) and morbid obesity, defined as BMI ≥ 40 kg/m2, in adults aged 20 and over from the Brazilian public health system¡¯s perspective in 2011.

Methods: The cost-of-illness methodology was adopted with a top-down approach based on prevalence. The proportion of the cost of each obesity-associated comorbidity was calculated and obesity prevalence was used to calculate the attributable risk. Direct financial cost data (hospitalization, bariatric surgery, outpatient care, medications and diagnostic procedures) were extracted from the Ministry of Health information systems, available on the web.

Results: Costs attributable to obesity totaled US$ 269.6 million (1.9% of expenditures on medium- and high-complexity health assistance). Morbid obesity costs amounted to 23.8% of all obesity costs (US$ 64.2 million) despite having an 18 times lesser prevalence. Bariatric surgery costs in Brazil totaled US$ 17.4 million in 2011. Conclusion: The financial cost of obesity to the Health System in Brazil in 2011 was estimated at nearly US$ 269.6 million and morbid obesity cost was proportionally 4.3 times greater than that of obesity cost.

Conclusions: Studies of this nature need to be made in Brazil more frequently to allow monitoring of the economic impact of the obesity epidemic over the years.

Key words: Obesity, morbid obesity, costs and cost analysis, Brazil.

PO3337

DO ARABIC WEIGHT LOSS MOBILE APPLICATIONS COMPLY WITH EVIDENCE-BASED WEIGHT MANAGEMENT GUIDELINES?

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Background and objectives: Saudi Arabia (SA) has a growing problem of obesity especially in women. Mobile phone technology has successfully been used for health promotion including obesity. Many smartphone users gather health information from their devices with 20% downloading health applications (Apps). SA is one of six countries that has the highest smartphone users in the world. However, it has been shown that 47% of SA App users prefer them to be in Arabic. In recent studies of health and weight loss Apps, it was found that most Apps did not cover all aspects of evidence-based weight management guidelines. The aim of this study was to identify and systematically review Arabic weight loss Apps for compliance to these guidelines as used by Breton et al (2011).

Methods: The six most relevant App stores were systematically searched using the Arabic words for weight and diet. Apps were downloaded if they met the inclusion and exclusion criteria. Data was extracted to identify whether Apps had features which adhered to the practices as well as user ratings and cost. Apps were scored out of 13 according to the practices.

Results: Sixty-five Arabic weight loss Apps were identified, mostly (58%) from Google Android. The average practices score was 2.2 out of 13 with no Apps scoring more than 6 and only nine scoring 4-6. Meal planning was the most common (38%) feature. Five Apps were rated 5-stars with a mean rating of 4.2 stars. Most Apps were free and the highest cost was £2.99. Conclusion: Current Arabic weight loss Apps have low levels of compliance with recommended weight management guidelines. It is suggested that existing Apps should include more features based on the evidence or that a new Arabic App be developed.

Key words: Mobile technology, weight loss management, Arabic

PO3338

FOOD CONSUMPTION, NUTRITIONAL DIAGNOSIS AND BODY IMAGE PERCEPTION INTO THE SCHOOL-AGED CHILDREN AT TABASCO STATE. MEXICO

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Background and objectives: During, the school-aged, to monitor the nutritional status by dietary indicators, anthropometric and body image perception is necessary, to obtain causative agents and detect potential deficiencies and excesses risks factors. To analyze food consumption, nutritional diagnosis and body image perception in school-age children at Tabasco State. Mexico.

Methods: A Descriptive study was conducted in six elementary schools. Between April 2011 and February 2012, Sample: 2084 children aged 5 to 13 years old. Some variables were measured: age, sex, grade level, weight, height, body mass index, waist circumference index, body image perception and frequency food consumption

Results: age of 8.6 (SD = 0.5, 5-13), 52% female and 48% male. Water was the most consumed liquid, next milk and soft drinks. Favorite foods by groups were corn tortillas, milk, tomatoes, edible oil, bananas and beans. 0.6% low-weight, 53.1% normal-weight, 18.3% overweight and 28% obesity. Overweight children perceived as normal, thin and very thin his/her body image. Meanwhile, obese children perceived as thin, normal and overweight his/her body image. The diet was high in carbohydrates, proteins and lipids, producing overfeeding. Inadequate and lacking water consumption compared to the consumption of soft drinks, thus leading a higher caloric intake of simple carbohydrates.

Conclusions: The diet was not balanced, with excessive carbohydrates, proteins and lipids. Children had a body image perception that lessens weight problem; obesogenic environment could be changing its perception and might trigger eating disorders. Through multidisciplinary interventions would improve the quality of life of children by providing them information to make them aware of their diet and their body image perception.

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Keywords: School-age children, food consumption, body image perception, obesity, overweight.

PO3339

NEW SODIUM REDUCTION TECHNOLOGY'S POTENTIAL FOR DECREASING DIETARY SODIUM INTAKE IN POPULATIONS AT RISK

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Background and objectives: Current US dietary data indicate that there has been little progress in reducing sodium intake. Multiple solutions are needed to help decrease sodium intake in order to meet population-wide recommendations of 2300 mg/d and 1500 mg/d for at risk groups, including African Americans and persons aged ≥ 51 years (y). Using NHANES 2007-2010 data, we modeled the potential impact on sodium intake via a new sodium reduction technology, SODA LO™ Salt Microspheres (Tate & Lyle, Hoffman Estates, IL, USA) based upon potential usage levels in 953 foods.

Methods: Suggested sodium reductions ranged from 20-30% and usual intakes were modeled by assuming market penetration of 50 and 100%. SAS 9.2, SUDAAN 11, and NHANES survey weights were used in all calculations with assessment across gender, age, and ethnic groups. The National Cancer Institute method was used for usual intake determination.

Results: Current sodium intakes as mean (SE) exceed recommendations across all ethnic groups for 2+ y and 51+ y at 3458 (21) and 3323 (21) mg/d and for African Americans at 3290 (33) and 3032 (56) mg/d. Sodium reduction, with 50 and 100% market penetration, was estimated for 2+ y and 51+ y at 137 (2) and 274 (3) mg/d and 122 (2) and 244 (4) mg/d, respectively. For African Americans, 2+ y and 51+ y, sodium reduction was estimated at 141 (3) and 282 (6) mg/d and 114 (3) and 229 (6) mg/d, respectively.

Conclusions: These reductions represent ~4-9% potential decreases in intake thus innovations like SODA LO™ could contribute to meaningful reductions in sodium intake. Using the maximal sodium reduction of 282 mg, there is potential for a reduction of 950,000 cases of uncontrolled hypertension with a direct medical cost savings of about $1.5 billion dollars.

Key words: Sodium, Epidemiology

PO3340

THE COMBINED IMPACT OF FIVE LIFESTYLE FACTORS ON ALL-CAUSE, CANCER, AND CARDIOVASCULAR MORTALITY – A PROSPECTIVE COHORT STUDY AMONG DANES

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Background and objectives: An accumulating body of evidence has shown that individual lifestyle factors are associated with premature mortality. As lifestyle behaviours coexist several studies have investigated the impact of a combination of lifestyle factors on mortality, but few have used public guidelines and none have studied the association in a Scandinavian population. Our objective was to investigate the combined impact of five lifestyle factors on all-cause, cancer, and cardiovascular mortality based on international and national health recommendations.

Methods: The study population included 51 521 Danes aged 50-64 years, without any diagnosis of cancer, cardiovascular disease, or diabetes at baseline (1993-97). Lifestyle factors were chosen a priori and included smoking, alcohol consumption, physical activity, waist circumference, and diet. These factors were dichotomised according to adherence to international and national recommendations and combined in an index. Adherence to each recommendation yielded 1 point in the index.

Results: During a median follow-up time of 14 years, 6768 participants died. After adjustment for potential confounding factors, adherence to one additional recommendation was for men associated with mortality rate ratios (95% confidence interval (CI)) of 0.71 (0.68-0.73) for all-cause, 0.73 (0.70-0.77) for cancer, and 0.66 (0.62-0.71) for cardiovascular mortality. Among women, corresponding mortality rate ratios were 0.70 (0.68-0.73) for all-cause, 0.75 (0.71- 0.79) for cancer, and 0.59 (0.53-0.66) for cardiovascular mortality. If participants had adhered to at least four recommendations at baseline, 51% (95% CI: 48-55%) of all deaths among men and 48% (44-52%) of all deaths among women might have been prevented.

Conclusions: Adherence to a combination of modifiable lifestyle behaviours was associated with a markedly lower risk of all-cause, cancer, and cardiovascular mortality. Adherence to health recommendations could have prevented a substantial fraction of deaths, suggesting a huge preventive potential by improving healthy lifestyle behaviours of the population.

Key words: Lifestyle, mortality

PO3341

VIEWS OF PARENTS IN FOUR EUROPEAN COUNTRIES ABOUT THE EFFECT OF FOOD ON THE MENTAL PERFORMANCE OF PRIMARY SCHOOL CHILDREN

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Background and objectives: Children's nutrition is largely determined by the home environment. The importance parents attribute to food as an influence on mental performance was investigated.

Methods: Parents of school children (aged 4-11yrs) were recruited through state primary schools in four European countries. Participants were asked to sort 18 cards representing possible determinants of four elements of mental performance (attention, learning, mood, behaviour) according to perceived strength of effect. Determinants were identified from the literature, and grouped in six categories: food-related, school environment, physical, social, psychological, biological. Effects were scored: 0 = none; 1= moderate; 2 = strong. Views were compared between and within countries.

Results: 200 parents took part (England: 53; Germany: 45; Hungary: 52; Spain: 50). Differences existed between countries in the proportions reporting university education and being in employment. Taking all countries together, parent's ranking of categories of determinants for their impact on mental performance was: physical i.e. activity and sleep (mean 1.77), psychological i.e. mood and behaviour, for attention and learning elements only (1.69); school environment (1.57); food (1.33); social (1.11); biological (0.91). This ranking holds for each element of mental performance separately. Of determinants in the food category, parents thought regularity of meals had more influence on mental performance (mean 1.58) than what a child eats now (1.36), food at school (1.35), nutrition as a baby / infant (1.02).

Conclusion: Detailed understanding of parents' perceptions of what affects mental performance of children can help target and formulate communications for parents.

Acknowledgements: We are grateful to the schools that enabled us to undertake this study and to the parents who took part in the experiment. This study was supported by the European Communities 7th Framework Programme (NUTRIMENTHE Grant agreement number: 212652).

Key words: Mental performance; parents; child nutrition; Europe; card sorting.

PO 3342

DIET AND ACTIVITY RISK FACTORS FOR TYPE 2 DIABETES IN ALBERTA YOUTH: COMPARISON BETWEEN 2005 AND 2008

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Background and objectives: Unhealthy dietary and physical activity (PA) patterns of Canadian youth have been implicated in the increasing rates of early onset chronic diseases. To address this, many initiatives promoting healthy youth and healthy schools occurred in Alberta between 2005 and 2008. The purpose of this study was to examine differences in the prevalence of lifestyle risk factors for type 2 diabetes (T2D) between two province-wide samples of Alberta adolescents in grades 7 to 10, in 2005 and 2008.

Methods: The Web Survey of Physical Activity and Nutrition was used to assess dietary and PA patterns. Students completed the online survey during school time. Validated tools for dietary intake and PA were used. For each risk factor, dichotomous variables were constructed, designating participants as either at risk or not at risk, relative to cut-off values.

Results: In total, 4936 students participated in 2005 (mean age 13.6 yr) and 5091 students participated in 2008 (mean age 13.3 yr). Compared to 2005, mean BMI, energy intake, fat intake (% kcal), glycemic index (GI) and glycemic load (GL) were lower in 2008 ($P<0.05$); and carbohydrate (% kcal), protein (% kcal), fibre and vegetable and fruit intakes were higher in 2008 ($P<0.05$). When risk factor cut-offs were applied, in 2008, a lower proportion of students were: overweight, obese, consuming high GI, high GL, high fat, low fibre, low veg/fruit intake ($P<0.05$). There were no differences in magnesium intakes or PA levels between the two timepoints.

Conclusions: Overall positive improvements were observed between 2005 and 2008 as the proportion of adolescents having specific risk factors for T2D was lower for most variables. This may be due, in part, to the significant awareness and health promotion programming for this target population that took place during this time.

Key words: Adolescents, diet, activity.

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T4. Nutrition and Management of Diseases

PO1446

PROJECT TO FIGHT CHILDHOOD OVERWEIGHT WITH VIDEO GAMES. IN CHILD WITH SOCIAL DISADVANTAGE. ACTIVE ASSISTANCE TECHNOLOGY FOR HEALTH RELATED BEHAVIOR CHANGE

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Background and objectives: Information technology can help individuals to change their health behaviors. This is due to its potential for dynamic and unbiased information processing enabling users to monitor their own progress and be informed about risks and opportunities specific to evolving contexts and motivations. However, in many behavior change interventions, information technology is underused by treating it as a passive medium focused on efficient transmission of information and a positive user experience. Gaming has in children and adolescent's lives , we should embrace the opportunity to influence health behaviour through this avenue and use an evidence-based approach to do this in a thoughtful way. Exergaming (video games that are a form of exercise) can be used to motivate direct physical activity in combating overweight and obesity among children. Similarly, interactive educational video gaming can aid in developing self-care abilities and healthy behavioral skill building.

Methods: The study is an unrandomized trial with before-after design. We selected 15 overweight children aged 7 to 13 years, of parents with more than 5 years of unemployment, and we provided the games: Design a healthy child (American Diabetes Association), Design a healthy plate (American Diabetes Association), and finally 60 minutes PlayStation Eye Toy USB camera maximun day. DXJ3QKZ8K With free access to the games. After three months the weigh. Paired t, Pearson's Correlation Coefficient, or Partial Correlation test was used to analyze the findings. F.J. FERNANDEZ ROSADO

Results: The children's average age was 10.5 ± 2.7 years, 58% male body mass index (BMI, 27.91±2.55 kg/m2 vs 25.84±3.52 kg/m2 P=0.04)

Conclusions: Interactive educational video gaming and exergaming was significantly associated with weight reduction in children of parents long-term unemployment. We know that programs targeting individual or family households may have little impact without more comprehensive environmental changes that address social and economic disparities. A drop of water in the desert can be life.

Key words: Behavior change, health promotion, exergaming, interactive digital games, virtual environment. The author has no conflict of interest.

PO1815

ASSESSING THE EFFECTIVENESS OF INTUITIVE EATING TO PROMOTE WEIGHT LOSS (PILOT STUDY)

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Background and objectives: Obesity is an excess of body weight as a result of an excessive accumulation of fat that can result in increase morbidity and mortality. It has been identified as the leading cause of preventable deaths. The intuitive eating (IE) approach uses an individual's response to internal cues of hunger, satiety, and appetite and replaces calorie restriction (CR). Objective: To assess the effectiveness of CR and IE to induce weight loss in obese adults.

Methods: The study was a randomized controlled trial. The subjects were California State University, Long Beach students. The subjects engaged in physical activity 3 times per week for 30 minutes (6 weeks) and recorded their daily food intake in a food diary. Instructions were given for the CR and IE at the start and midpoint (3 weeks) of the study. Independent t-test was used to assess the differences between the groups and paired t-test compared the differences within the groups.

Results: The CR group loss significantly more (p=0.03) weight than the IE group. No statistical significance was observed between the groups' body mass index (p=0.60) and body fat percentage (p=0.51).

Conclusions: The CR approach appears to be more effective in promoting weight loss.

Key words: Obesity, calorie restriction, intuitive eating, weight loss.

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PO1817

PREVALENCE OF OVERWEIGHT AND OBESITY AMONG CHILDREN, ADOLESCENTS, AND YOUNG ADULTS, IN TONEKABONE, IRAN (2010-2012)

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Background and objectives: Obesity is associated with increased risks of chronic diseases. Obesity is now the most prevalent nutritional disease among children and adolescents in Iran. The purpose of this study was to describe the prevalence of overweight and obesity among girls in tonekabone a city in the north of Iran.

Methods: Participants in this cross-sectional study were 2971 girls (0-24 years old) and randomly selected in 4 clusters. weight and height at all samples and waist and hip circumference in subjects 14-24 years were measured by standard protocols. BMI (Body Mass Index) kg/m^2 and WHR (waist -hip ratio) were calculated. In children overweight and obesity were defined as at or above the 85th percentile but less than the 95th, and at or above 95th percentiles, respectively (AS BMI for age the growth charts for girls). In young adults, overweight and obesity were defined as follows: overweight BMI 25.0-29.9, obese BMI ≥ 30. WHR of 0.85 or greater in young adult subjects is indicative of android obesity. Statistical analyses were done by software SPSS version 15.

Results: The data indicates that prevalence percent of overweight and obesity in subjects have been follow, respectively: 1) in under 5 years: 2.9 ± 0.5 (n=1322)2) in 7-11 years: 10.7 ± 12.4(n=291) 3) in 12-14 years: 17.5 ± 4.5 (n=442)4) in 16-24 years: 38.3 ± 4.56 (n=916) . At all the Prevalence of overweight and obesity in subjects was 69.4% ± 21.96% in the other hand the Prevalence android obesity in young adult subjects have been 29.1%.

Conclusions: the large prevalence of overweight and obesity and Its association with other diseases and some forms of GI cancer make the picture of cancer in this region more in future. The knowledge on the prevalence of overweight and obesity and its determinants can help implement population-based preventive measures.

Key words:overweight-Obesity-Children-Adolescents-Iran

PO1818

DIABETES CAN REDUCE THE BENEFITS OF DIETARY POLYPHENOLS IN BLOOD

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Background and objectives: Studies show increased risk of common infections in diabetic patients. Diabetes is characterized by high levels of glucose in blood, which can react with plasma proteins through a non-enzymatic process. It is hypothesized that non-enzymatic modifications (glycation of plasma proteins) may be responsible for increased infection rates in diabetics. The objective of this study is to reveal the influence of glycation of plasma proteins in diabetics on the radical scavenging potential of polyphenols .

Methods: Blood was centrifuged to get plasma proteins from both diabetics type 2 (TPP) and healthy (HPP) volunteers. Using fluorescence spectroscopy we determined the binding affinity between plasma proteins and polyphenols. DPPH free radical, ABTS radical, and superoxide anion scavenging and ferric reducing antioxidant power (FRAP) assays were carried out to study the influence of plasma proteins on antioxidant potential of polyphenols.

Results: Glycation of plasma proteins in type II diabetes lowers the affinities for polyphenols. Both HPP and TPP masked DPPH free radical, ABTS radical, and superoxide anion scavenging potential of dietary polyphenols. However, plasma proteins hardly affected reducing power of polyphenols. Compared with HPP, TPP weakens the masking effect on DPPH free radical, ABTS radical, and superoxide anion scavenging potential of polyphenols.

Conclusions: TPP showed lower binding affinities for polyphenols in blood than that of HPP. There are more free polyphenols in diabetes. It will cause more polyphenols expose to free radicals in blood. Therefore, polyphenols in diabetics' blood tend to be oxidized and can not be efficiently delivered to other tissues, which reduces the benefits of polyphenols.

Key words: Diabetes, plasma proteins, dietary polyphenols, free radicals, antioxidant potential.

PO1819

DIETARY PATTERNS PREDICTING CHANGES IN OBESITY INDICES (BMI,WC,WHR) IN LONGITUDINAL TEHRAN LIPID AND GLUCOSE STUDY

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Background and objectives: To study the association between dietary patterns and obesity indices (BMI,WC,WHR) among Tehranian adults in a 6-year follow-up study.

Methods: Over a duration of 6 years, 141 adults were examined before and after this period for obesity indices. Dietary intakes were recorded at baseline by two 24 hour dietary recalls , as well as obesity indices at the beginning and the end of the course of study. Dietary intakes were converted into grams of intakes of food items and categorized into 16 groups. Reduced rank regression analysis (RRR) derived five patterns with total fat, polyunsaturated to saturated fat ratio, cholesterol, fiber and calcium intakes as response variables.Factors(dietary patterns) were generated retaining a corresponding factor loading of 0.17 on the food groups.The calculated factor scores were categorized in quintiles and changes in obesity indices were scrutinized within quintiles of these factor scores.

Results: The first pattern(traditional) showed high loadings on refined carbohydrates, whole grain , vegetables, red and processed meat, saturated / trans fat and eggs, showing significant high positive correlation with fat, cholesterol and calcium intake (r=0.478, 0.626, and 0.486, respectively; P<0.001). All obesity indices had increasing trend across quintiles of pattern score (P<0.05 for BMI and WHR, P<0.001 for WC). The fifth pattern (egg) had high loading for eggs, salty snacks, and fruits, and negative loadings for red and processed meat, saturated and trans fat, plant oil and dairy products, indicating increasing trends for WC (P<0.001) and WHR (P<0.05) after adjustment for potential confounders. Other patterns showed non-significant trends for obesity indices.

Conclusions: The results were indicative of two dominant dietary patterns correlated with increase in obesity indices in Tehran.

Key words: Dietary pattern, anthropometry, obesity, cohort.

PO1820

SCREENING FOR UNDERNUTRITION IN NEUROREHABILITATION USING 2 SCALES: NUTRITIONAL RISK SCORE 2002 , INNSBRUCKER NUTRITION SCORE AND CONSISTANT NUTRITIONAL MANAGEMENT

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Background and objectives: Poorer rehabilitation potential for stroke patients with neurogenic dysphagia and undernutrition was documented (FOOD Trial). In our setting with swallowing and nutritional management these patients exhibit remarkable improvement during neurorehabilitation (NR). We investigated the hypothesis that augmented nutritional strategy improves outcome and uncovers the underestimated rehabilitation potential of patients with neurogenic dysphagia.

Methods: 127 consecutive NR patients, therapy according to the principles of AHA, European NR Society. Assessment of nutritional status: Innsbruck Nutrition Score (INS): body mass index, loss of weight, creatinin quotient, oral food intake, clinical nutrition recommended if score 3-4, indispensable if score >5. Nutritional risk screening (NRS 2002): BMI kg/m2, unintentional loss of weight, decrease of food intake, severity of illness. If NRS 2002 scores 3-4 monitoring, >/= 5 nutrition intervention indicated. Improvement in NR: Delta values: Barthel Index (BI), basic (BADL), extended activities of daily living (EADL). Rivermead motor assessment (RMA). Statistics: Chi-square-, T-test, Mann-Whitney-test, Spearman´s-Rank.

Results: n=47: NRS 2002 score >/= 5, n=80: NRS 2002 3-4 . n=6 remarkably undernourished. Comparing INS and NRS 2002: highly significant association (r(126)= .688, p<.001) , high concurrent validity, perfect concordance between INS item "daily oral energy intake" and NRS 2002 cut off value (x>/=5). Controlling for heterogenity of diagnosis and nutritonal status patients were devided in subgroups. Table 2+3 . Cognitive deficits: whole sample 69%, patients with nutritional support 87.5%, without nutritional support 50.8%. 64/127 patients needed nutritional support (mealtime supervision, assistance, tube feeding, intravenous nutrition). Swallowing, nutritional, cognitive profile: same distribution in the diagnostic subgroups. Dysphagic patients improved significantly better under augmented nutritional strategies.

Conclusions: Nutritional and swallowing management facilitates better outcome in NR also in patients only at risk for undernutrition. INS and NRS 2002 show high concurrent validity in correlation analysis.

Key words: dysphagia, nutritional assessment and management.

PO1821

STROKE AND NUTRITION: A REVIEW OF STUDIES

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Background and objectives: Stroke is one of the leading causes of death and certainly the major cause of disability in the world. Diet and nutrient has an effect on the stroke. The aim of this study was to review studies on the relationship between nutrition and stroke.

Methods: In this study, the term fat, cholesterol, antioxidant and vitamins, salt, potassium, calcium, carbohydrate, vegetables and fruit, fish, meat, dairy, chocolate, tea, whole grain, sugar-sweetened beverages, mediterranean diet, DASH diet, western diet and stroke were searched in PubMed search engine. Studies included were observational studies, cohort studies, clinical trials, systematic reviews, and meta-analysis reviews.

Results: Our study revealed improvements in nutrition and diet. Nutrition and diet can reduce the incidence of stroke.

Conclusions: Nutrition and diet reduce the incidence of stroke, but more studies need to be done in this area.

Key Words:

PO1822

OBESITY AMONG EMPLOYEES OF MINYA UNIVERSITY, EGYPT

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Background and objectives: Obesity is a complex, multi factorial condition in which excess body fat results from an imbalance of energy intake and expenditure, and may put people at health risks. This study aimed to determine the magnitude of obesity, its risk factors and hazards among employees of Minya University, and to study the impact of some interventional approaches for control of obesity among them.

Methods: Interventional study, included 480 employees from Minya University. Socio-demographic characteristics and data related to knowledge, attitude and practice of employee about obesity, its risk factors and hazards were collected. Anthropometric measurements, vital signs, blood sugar and lipid profile were examined. Three types of interventions were approached for obese: dietary regime, exercise, or both. After intervention, anthropometric measurements, vital signs and blood examination were retested for the interventional group. Health education was done for obese employee.

Results: Obesity among employees of Minya University was 33.8%. It was more common among females, and increased with age. Central obesity among males and females were 32.8% and 38.4 % respectively. About 40.7% of clerical and administrative employee, 28.4% of faculty and 23.1% of the manual workers at Minya University were obese. Physical inactivity, eating snacks and eating more than three regular meals were significantly related to the development of obesity. Significant relation was also found between obesity and joint or back pain. Obese employees had higher systolic blood pressure. After our different interventional approaches cholesterol level decreased, HDL increased, and BMI decreased among obese. Diet plus exercise was better than diet alone, which in turn is better than exercise alone.

Conclusions: Obesity represented an increasing health problem among employees of Minya University. Intervention by dietary regime plus exercise was the best method to lose weight and to improve obesity complication.

Key words: Obesity, diet, exercise, health education.

PO1823

LOW-CARBOHYDRATE-SCORE AND THE RISK OF CORONARY HEART DISEASE

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Background and objectives: Low-carbohydrate diets have been advocated for weight loss and to prevent obesity, but the long-term safety of these diets has not been determine.

Methods: We evaluated data on 1500 women in the Nurses' Health Study who had completed a validated food-frequency questionnaire in Maamobi polyclinic in the Zongo settlement of Ghana. Data from the questionnaire were used to calculate a low-carbohydrate-diet score, which was based on the percentage of energy as carbohydrate, fat, and protein (a higher score reflects a higher intake of fat and protein and a lower intake of carbohydrate). The association between the low-carbohydrate-diet score and the risk of coronary heart disease was examined.

Results: During follow-up, we documented 1994 new cases of coronary heart disease. After multivariate adjustment, the relative risk of coronary heart disease comparing highest and lowest deciles of the low-carbohydrate-diet score was 0.94 (95% confidence interval [CI], 0.76 to 1.18; P for trend=0.19). The relative risk comparing highest and lowest deciles of a low-carbohydrate-diet score on the basis of the percentage of energy from carbohydrate, animal protein, and animal fat was 0.94 (95% CI, 0.74 to 1.19; P for trend=0.52), whereas the relative risk on the basis of the percentage of energy from intake of carbohydrates, vegetable protein, and vegetable fat was 0.70 (95% CI, 0.56 to 0.88; P for trend=0.002). A higher glycemic load was strongly associated with an increased risk of coronary heart disease (relative risk comparing highest and lowest deciles, 1.90; 95% CI, 1.15 to 3.15; P for trend=0.003).

Conclusions: Our findings suggest that diets lower in carbohydrate and higher in protein and fat are not associated with increased risk of coronary heart disease in women. When vegetable sources of fat and protein are chosen, these diets may moderately reduce the risk of coronary heart disease.

Key words: Coronary, multivariate adjustment, low-carbohydrate-diet.

PO1824

FIBER INTAKE AND STAGE OF CHANGE AMONG DIABETES TYPE 2 PATIENTS: A CROSS SECTIONAL STUDY

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Background and objectives: Increased consumption of fiber in the diet of diabetic patients is usually recommended to better control their blood glucose level. The transtheoretical model (TTM), which has positive results in diabetes consultations on healthy eating adherence, claims that people need different pieces of advice depending on their stages of readiness to change behavior. The aim of this study was to assess the stages of change for diabetes type 2 patients based on their dietary fiber intake.

Methods: This was a cross-sectional study among 126 individuals aged 30 to 65 years with type 2 diabetes by a randomly-selected sample of members of Iranian Diabetes Society in Tehran, Iran. First, three-day food record was used to assess fiber intake and stages of change were determined based on valid questionnaire and patient fiber consumption. Nutritional data were analyzed using Nutritionist IV software. Other data were analyzed using t-tests, chi square and ANOVA. P value less than 0.05 was considered significant.

Results: Mean daily fiber intake was 23.05 ± 7.76 grams (8 to 48.7 grams) in type 2 diabetic patients. Most patients were in the maintenance stage (52%) and lowest in action stage (5.6%). 8%, 12% and 22.4% of patients were in pre-contemplation, contemplation and preparation stages, respectively. There is no sex difference in fiber intake and stage distribution as well as no difference in age, diabetes duration, education, income and employment status. But fiber intake was higher in married patients than single or divorced ones (23.5 ± 7.66 vs 16.9 ± 6.86, P=0.014).

Conclusions: The findings of this study indicate that most type 2 diabetic patients were in the maintenance stage of fiber intake; it was higher than the minimum recommendation and didn't vary significantly with social economic status.

Key words: Stages of change, dietary fiber, type 2 diabetes.

PO1825

LIVER DISEASE FINDINGS IN CHILDREN AND ADOLESCENTS WITH TYPE 1 DIABETES

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Background and objectives: Liver findings in patients with type 1 diabetes (DM) are defined as elevated liver transaminase, hepatic glycogenosis, non-alcoholic fatty liver disease (NAFLD) and hepatomegaly.

Methods: Hepatobiliary ultrasonography (USG) and blood biochemical analysis were done in 93 girls and 95 boys (aged 2-18 yr) with type 1 DM. Their clinical data also were recorded.

Results: In 10 patients (%5), ALT levels were high (ALT≥;40). Hepatosteatosis was determined in 45 patients (%24) by USG. 7 patients with hepatosteatosis had elevated ALT levels and 7 patients with elevated ALT levels, hepatosteatosis were determined. Hepatic glycogenosis was observed in a patient with persistent elevated ALT level through biopsy. The frequencies of hepatosteatosis and elevated ALT levels were not different between patients with good-bad glycemic control. In obese patients, the frequencies of elevated ALT levels (%) and hepatosteatosis (%) were higher. While the daily insulin dosage was high in obese patients, a positive correlation was determined between body mass index (BMI) and daily insulin dosage. However, high BMI and ALT levels in patients with hepatosteatosis, triglyceride (TG), HDL-C, HbA1c levels showed no difference. On the other hand, body weight (BW), BMI, AST and TG levels in patients with elevated ALT levels were found to be higher and HDL-C levels were found to be lower.

Conclusions: Children with DM have higher frequency of hepatic disease findings, such as NAFLD and elevated ALT levels. Glycemic control is not directly effective on these findings. However, in obese diabetics, the high frequency of these findings and higher dosage of insulin usage suggest that nutrition and insulin, which are closely related with each other during the treatment of these patients, have an important role on these hepatic findings.

Key words: diabetes, NAFLD, hepatic glycogenesis, obesity, children.

PO1826

RELATIONSHIP BETWEEN NUTRITION INTAKE AND PERIODONTAL CONDITION IN FEMALE JAPANESE PERIODONTITIS PATIENTS

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Background and objectives: Periodontal diseases constitute a variety of inflammatory conditions affecting the health of the periodontium. It is the most common reason for adult tooth loss. We hypothesized that there was the relationship between dietary intake and periodontal condition.

Methods: Study design was a cross-sectional study. The subjects were 82 Japanese female periodontitis patients, aged 18 to 69 years (35% 14 years). A dietary survey was conducted three days using dietary records. Subjects were recruited and diagnosed through one periodontist. The periodontal conditions assessed were present teeth, percentages of teeth with periodontal pockets. The extent of periodontal disease was defined as percentages of teeth with probing depth (PD) of 4 mm or more (4PD%). Adjustment was made for cigarette smoking, race/ethnicity. For analyses, the study subjects were categorized into quintiles on the basis of the distribution of 4PD% subjects. The subjects were classified into three categories (4PD% < 16.5, the slight periodontitis group (SP group), n = 21; 31.6% 4PD% < 58.6, the moderate periodontitis group (MP group), n = 40; and 58.7% 4PD %, the progressed periodontitis group (PP group), n = 21). Analysis of differences of dietary energy adjusted intakes (g/1,000kcal) by periodontal status was assessed using one-way analysis of variance and Tukey¡¯s honestly significant difference test. Two-sided P values less than 0.05 were considered statistically significant. The protocol of the present study was approved by the Ethics Committee of Aichi Gakuin University.

Results: Protein intake were lower in PP group than those of the SP group.

Conclusions: There was a relationship between nutrition intake and periodontal condition in female Japanese periodontitis patients.

Key words: periodontal condition,¡¡ nutrition intake, Japanese patients.

PO1827

ATTENUATED ORAL FATTY ACID SENSITIVITY IS ASSOCIATED WITH ACUTE EXCESS ENERGY INTAKE

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Background and objectives: Excessive consumption of dietary fat is implicated with development of obesity. Attenuated oral and gastrointestinal sensitivity to the breakdown products of dietary fat, fatty acids (FA) may be associated with increased energy consumption. The objective was to determine the association between oral FA sensitivity and energy intake following consumption of a high fat meal.

Methods: Subjects (n=24; 14 males, 10 females, age 28±11.3 yrs, BMI 23.2±7.3) attended six laboratory sessions. Oral FA sensitivity was determined and subjects identified as hypersensitive (<3.8mM) or hyposensitive (>3.8mM) to oleic acid (C18:1). Subjects participated in a crossover study and were randomly assigned to a high fat, high protein, high carbohydrate or balanced macronutrient breakfast. Following this, subjects were required to consume a buffet-style lunch until comfortably full. The amount consumed (kJ and g) was measured, as was perceived satiety before and following meals.

Results: Fifty eight percent of subjects were orally hypersensitive and 42% of subjects hyposensitive to oleic acid (C18:1). Following the high fat breakfast only, FA hyposensitive subjects consumed significantly more energy (+2,100 kJ) and grams (+138 g) of food at lunch compared to FA hypersensitive subjects (P<0.01). There were no significant differences in perceived satiety or between consumption of lunch food by hyper and hypo-sensitive subjects for the other breakfasts (P>0.05).

Conclusions: Attenuated oral FA sensitivity is associated with excess energy consumption following a high fat meal and may be a causal factor in development of obesity.

Key words: Obesity, taste, fat, diet.

PO1829

BLOOD LEVELS OF HOMOCYSTEINE, OXIDATIVE STRESS AND INFLAMMATORY BIOMARKERS IN CHILDREN WITH ACUTE GLOMERULONEPHRITIS

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Background and objectives: Studies have documented a strong inverse association between plasma homocysteine (Hcy) and renal impairment. Hyperhomocysteinemia (HHcy) itself may further aggravate kidney dysfunction. One proposed mechanism of homocysteine-induced glomerular injury involves oxidative stress and inflammatory factors. The present study was, therefore, to determine blood Hcy, oxidative and inflammatory biomarkers during the cause of acute primary glomerular disease in children.

Methods: Twelve children (3 boys, 9girls; aged 4 to 16 years) with abrupt onset of acute glomerulonephritis (AGN with increased ASO titers); while fifteen age-and sex-matched normal children (5 boys, 10 girls) served as controls. Blood samples were collected from patients after an overnight fast at 0, 3, 7, 28 and 60 days after admission and at day zero from each control, for determination of serum oxidant (malondialdehyde), plasma/serum antioxidants (ferric reducing ability of plasma, vitamin C, vitamin E, uric acid and total thiol), and inflammatory biomarkers (hs CRP and ferritin).

Results: Results show that patients with AGN had significant increase levels of plasma Hcy as compared to controls, it gradually declined to normal values by day 28. The concentrations of MDA, FRAP, uric acid, vitamin E, hs CRP and ferritin were significantly higher in the patients than in the controls but the levels of total thiol were significantly lower. The values of all parameters steadily decreased to normal with time of follow up.

Conclusions: The present study has shown HHcy in children with AGN. The concentrations of plasma Hcy paralleled those of serum BUN and creatinine.There were apparent associations among plasma Hcy, renal function, oxidative stress and inflammatory biomarkers. Whether these associations have any clinical implications remain to be elucidated.

Key words: Homocysteine, oxidative stress, acute glomeruloephritis, inflammatory biomarkers.

PO1830

GENETIC INFLUENCES ON FAT ACCUMULATION PATTERN IN YOUNG JAPANESE FEMALES

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Background and objectives: Excessive fat accumulation is associated with a number of chronic health problems. Unlike Caucasians, a certain proportion of young Japanese females have a large proportion of body fat (%BF) even with low body mass index (BMI: kg/m2). The present study aimed to examine influence of genetic polymorphisms in fat accumulation pattern.

Methods: Seventy-four Japanese females (18 – 30 years old) completed anthropometry as well as body composition assessments using dual energy x-ray absorptiometry (DXA: Lunar Prodigy, GE Healthcare). Participants also provided their blood samples to analyze uncoupling protein 1 (UCP1) A-3826G and angiotensinogen 1 (AGT1) M235T gene polymorphisms. UCP1 polymorphism was split into G/G and non-G/G and AGT1 gene was categorized into T/T and non-T/T.

Results: Among the participants, 17.3% (n = 13) had G/G polymorphism whereas 64% (n = 48) possessed T/T polymorphism. Compared with the non-G/G group, the G/G showed a greater fat accumulation in the upper body ($p<0.05$). For AGT1, the T/T showed a greater fat accumulation in the abdominal region compared to their non-T/T counterparts ($p<0.05$). In addition, 92.3% of G/G groups had %BF greater than 30% and 45.8% of T/T group had abdominal %BF greater than 30%, which were significantly ($p<0.05$) greater than their counterparts. Furthermore, 90.9% of the G/G group and 42.5% of the T/T group with BMI below 23 kg/m2 had total and abdominal %BF above 30% respectively ($p<0.05$).

Conclusions: The present study indicated that UCP1 and AGT1 polymorphisms may contribute in fat accumulation pattern in young Japanese females and a development of "masked obesity" risk in this particular population.

Key words: Gene polymorphism; fat accumulation pattern; Japanese females; masked obesity

PO1831

A HOLISTIC APPROACH IDENTIFIES PRIORITY TARGETS TO REDUCE CHRONIC DIET-RELATED DISEASE PREVALENCE: AN EXHAUSTIVE REVIEW OF POOLED AND META-ANALYSES

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Background and objectives: In nutritional researches, analyzing the relationships between food groups, diet-related chronic diseases (DRCDs) and/or impaired metabolism is a common reductionist approach. However, to determine the sequential changes from deregulated metabolisms to diseases and to unravel solid associations between food group consumption and disease risks, there is a need for more holistic approaches. Our aim was to objectively assess the relationships between main food groups/beverages, DRCDs and deregulated metabolisms.

Methods: Exhaustive data were extracted from articles collected between 1950 and 2011. 2950 articles have been selected, analyzed and classified according to the studied associations: 10 DRCDs vs. 10 deregulated metabolisms, DRCDs vs. DRCDs, and DRCDs vs. 17 food groups/beverages. For each association, the number of articles was counted and main tendencies were unraveled. Priority was given to quantitative reviews.

Results: Diabetes and obesity are key diseases that lead to all other DRCD, while cancer, cardiovascular diseases, skeletal and muscle diseases are terminal ones. Liver diseases, kidney diseases, digestive diseases and mental illnesses are both consequences and causes of the others. All diseases have multi-factorial causes, and most result from impaired antioxidant/ inflammatory/acido-basic status, carbohydrate/lipid/one-carbon metabolism, neuron functioning, DNA transcription, blood pressure and/or digestive microflora. Grain products are promising foods for preventing DRCD risks, more than fruits and vegetables. Plant-based food groups are more protective than animal-based one. Our work also emphasizes the directions for future targeted researches.

Conclusions: Nutritional strategies focusing on obesity and diabetes prevention should be prioritized to reduce other major chronic diseases prevalence, and grain-based foods consumption should be encouraged. These data demonstrate that translational and in biblio researches are now necessary to face the exponential amount of nutritional data published every year and to search for trajectory associations among the system complexity.

Key words: chronic diseases, deregulated metabolisms, food groups, associations, risk factors.

PO1832

HYPOCHOLESTEROLEMIC AND ANTIOXIDATIVE EFFECTS OF EXTRACTS FROM THE INTERNAL ORGANS OF SEA CUCUMBER

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Background and objectives: Recent studies have shown that methanol extracts from fresh or dried sea cucumber body, especially those including internal organs exhibited radical scavenging properties against DPPH. The aims of the present study were to evaluate the antioxidative and hypocholesterolemic capacities of internal organs from sea cucumber in vitro and in vivo.

Methods: Firstly, several kinds of internal organ wastes from sea cucumber (Holothuria atra, Bohadschia argus, Metriatyla scabra) were finely cleaned, lyophilized, pulverized to powder and then extracted with cold water, hot water or methanol. Second, the internal organ powder was fed to hamsters for six weeks to study its antioxidative effect.

Results: Results showed that the extracts with cold water had better antioxidative activity in vitro. Animal studies showed that the diet containing 5% internal organs of sea cucumber significantly decreased serum LDL and hepatic TBARS (thiobarbituric acid-reactive substances) levels and increased the serum total antioxidant capacity (TAC). Diet containing 10% sea cucumber internal organs significantly decreased serum and LDL TBARS levels, total cholesterol, and increased the serum TAC.

Conclusions: The cold water extracts of internal organs from sea cucumber had better antioxidative activity in vitro, and might inhibit lipid peroxidation by improving antioxidant status in vivo. Moreover, diets containing 10% sea cucumber internal organs can significantly exhibit hypocholesterolemic effect in decrease serum total cholesterol.

Key words: antioxidative, hypocholesterolemic, sea cucumber.

PO1833

IS EARLIER START OF ENTERAL NUTRITION BETTER FOR POSTOPERATIVE COURSE IN ESOPHAGEAL CANCER PATIENTS?

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Background and objectives: Early enteral nutrition, defined as starting enteral nutrition (EN) within 72hrs after admission/surgery, has become popular, and starting within 24hrs has been more recommended recently, because earlier EN has reported to have more benefits for reducing mortality and decreasing the length of hospital stay. However, during 72hr period, whether earlier EN start should be better for postoperative patients is still unclear. We retrospectively examined whether earlier EN start is better or not for postoperative course in esophageal cancer patients.

Materials & Methods: Among 115 patients with thoracic esophagectomy for esophageal cancer at Niigata University Hospital during 2005-2010, the patients in whom started EN within 3 days after operation were entered. The patients were divided into 3 groups; the patients with EN started at postoperative day 1, day 2, or day 3 was categorized as Group 1, Group 2, or Group 3, respectively. Clinical factors such as days for first gas passage, the dose of postoperative albumin-drug used (D-alb), difference of serum albumin value between day 7 and pre-operation (α-alb), incidence of postoperative infectious complication (IPIC), and use of total parenteral nutrition were compared among the 3 groups. The statistical analysis was performed by Kruskal-Wallis test, Bonferroni test and Chi square test. The statistical significance was defined as $p<0.05$.

Results: There was no significant difference on days for first gas passage, α-alb or IPIC among the groups. D-Alb in Group 3 was significantly higher compared with Group 2 ($p=0.0164$), however, comparable with Group1. TPN use was more frequent in Group 3 compared with other groups ($p=0.0004$).

Conclusions: Earlier EN start as possible does not have further advantage for postoperative course, therefore, early EN start should be scheduled by the condition of patient in the range of 72hrs.

Key words: early enteral nutrition, esophageal cancer, TPN

PO1834

THE EFFECT OF FUNCTIONAL FOOD WITH INULIN ON METABOLIC SYNDROME

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Background and objectives: Lithuanian scientists and manufacturers has put together effort to develop food products in the functional food category, such as yogurt and sausages with probiotic cultures and fiber-rich bread and cakes, chicken eggs with omega-3 fatty acids, etc. Inulin is one of the most important ingredient of functional foods. It has been shown to reduce postprandial glycemia and insulinemia. Also inulin has been suggested to have beneficial effects on hypertriglyceridemia. The goal of this worh was to determine whether the addition of a moderate dose of inulin to a moderately high-carbohydrate diet would normalize the concentration of plasma lipids and carbohydrates, as well as have a beneficial effect on total metabolism status in subjects with metabolic syndrome.

Methods: Twenty five patients diagnosed with metabolic syndrome (46±8 yrs) were recruited for this study. Patients were recommended to modify their habitual diet by eating 125 ml of yogurt (included 5 grams of inulin) as a daily food supplement over a period of 28 days. The subjects were tested before and after 28 days of yogurt consumption.

Results: After the inulin supplementation, serum LDL-cholesterol decreased significantly ($p<0.05$, baseline vs. follow-up). Yogurt consumption had no effect on total cholesterol and triglyceride concentration. Inulin supplementation resulted in a significant decrease in serum malondialdehide concentration ($p<0.01$) as well as a significant reduction in body weight ($p<0.001$), body mass index ($p<0.01$), and both systolic and diastolic blood pressure ($p<0.001$ and $p<0.01$ respectively).

Conclusions: According to the findings of the current study, these changes are likely to have a beneficial impact on individuals with metabolic syndrome and improve their health.

Key words: functional food, inulin, metabolic syndrome.

PO1835

TOBACCO SMOKE AND SIDE-STREAM CIGARETTE SMOKE INDUCE THE RISK OF CARDIOVASCULAR DISEASE

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Background and objectives: Disease risk due to smoking is not limited to smokers only. Passive smoking exposure to environmental tobacco smoke is associated with adverse health effect. Side-stream cigarette smoke, a major component of secondhand smoke induces reactive oxygen species with promote oxidative stress. This paper summarizes the cardiovascular effects of tobacco smoke according to the results of the alternative level of biochemistry substance: Cholesterol (C), HDL-Cholesterol (HDL-C), LDL-Cholesterol (LDL-C), Triglyceride (TG), Malondialdehyde (MDA), Conjugate diene (CD) and Homocysteine (Hyc).

Methods: Studies were carried out on 150 smokers (50 industrial cigarette smokers, 50 passive smokers and 50 local tobacco smokers compared with 50 nonsmoking controls.

Results: Levels of C, LDL-C, TG and MDA were significantly lower in smokers than in controls. Whereas Hyc levels were significantly lower among smokers than controls. No significant differences of HDL- C and CD were found between both groups. For dietary intake assessment, smokers consumed significantly less energy from carbohydrate, fat compared to controls, while energy derived from protein did not differ between groups. Moreover, smokers consumed less dietary fiber and vitamins compared with controls. Increasing whole blood toxic trace elements in healthy smokers may be explained by low antioxidant trace elements and vitamins that lead to develop oxidative stress and cardiovascular disease.

Conclusions: Therefore public health should not only aim for smoking cessation, but also concern about diet in terms of vitamin and mineral content to protect the risk of cardiovascular disease.

Key words: tobacco smoke, side-stream smoke, cardiovascular disease.

PO1836

NUTRITION FOR THE BREAST CANCER PATIENT: THERAPEUTIC OPTIMIZATION BASED ON POPULATION-SPECIFIC FACTORS

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Background and objectives: Provided that the harmful actions of certain dietary and environmental elements during years on a human organism are partially responsible in the development of a cancer, it seems logic to think that those actions can go on working if patients do not modify their usual intakes. In the last years scientific studies are showing an improvement of disease-free and overall survival in breast cancer patients when certain nutritional guidelines involving diet and management of overweight are followed. Our purpose is to move in a tailored way the exposure of the putative risk and protective factors to the lowest possible risk level, in order to improve the prognosis.

Methods: We propose a risk profile, based on several items drawn from local case-control studies: intake of red and white meat, dairy foods, oils and fats, vegetables and fruits; fat-to-muscle ratio; serum vitamin D level and serum triglycerides/ HDL ratio, among other items. The assignment of a low, medium or high risk value is done depending on the variable nature and its association to the risk of breast cancer. Unlike some laboratory results, cut-off points used for classification might represent population-specific features.

Results: The profile change attempts to modify the 2/16-alpha-OH estrogen metabolites and omega-6/ omega-3 fatty acids ratios, the body composition, and other relevant nutritional features in order to improve the patients hormonal, metabolic and immunity status.

Conclusions: Methodology seems to be feasible elsewhere from a practical viewpoint. Each country or region could construct its own reference values, since some items (diet, anthropometry) may be population-specific. Because no studies indicate that a prudent diet is pejorative for health, we are trying to change inadequate nutritional patterns into an adequate one, in order to make feasible a subsequent change of the prognosis.

Key words: breast cancer, nutrition, risk factors, survival

PO1837

CURRENT GLYCEMIC CONTROL AMONG THE MIDDLE CLASS INDONESIAN DIABETIC SUBJECTS

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Background and objectives: Being the fourth most populous country in the world with diabetes, Indonesia is projected to have 21.3 millions of diabetic people in 2030. Better socioeconomic status, life style changes, particularly in dietary patterns have contributed a great deal to the incidence and risks of type 2 Diabetes in the country. Recently we have conducted a survey among the diabetic subjects to study their current glycemic control.

Methods: A cross sectional survey was conducted among the 121 office staff, known cases of diabetes, who were working at Telecommunication Company in Jakarta, Indonesia. This was a screening phase of an intervention study which will investigate the effectiveness of empowerment model to achieve glycemic control. Subjects were interviewed using a short structured questionnaire and anthropometry assessments such as weight, height and waist circumference were done. To assess their current glycemic control, HbA1C measurements was done.

Results: Among the subjects 86% (n=104) were men. The mean age was 49.2±4.2 year and 47.6±5.5 year for men and women respectively. 50.4% of them were diagnosed as diabetes within last 5 years. According to their BMI, 47.1 % and 40.5% of them were overweight and obese respectively. Waist circumference measurements showed 53.7% of them were above the cut off value. The mean value of HbA1C was 9.3%.

Conclusions: The finding showed that half of the cases were recently diagnosed in the last five years which suggests the increasing trend of diabetes among the middle class Indonesians. The poor glycemic control was reflected in their HbA1C values and timely actions are necessary to prevent further complications of diabetes.

Key words: Diabetes, HbA1C, Indonesia.

PO1838

NUTRITIONAL STATUS OF TUBERCULOSIS AND HIV CO-INFECTED PATIENTS ATTENDING ANTI-RETROVIRAL TREATMENT CENTER OF SCHOOL OF TROPICAL MEDICINE, KOLKATA, INDIA

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Background and objectives: Malnutrition is a common hallmark of HIV disease. It plays a synergistic role in immunosuppression initiated by HIV and is an independent risk factor for disease progression. Tuberculosis (TB) also weakens the nutritional status and increases morbidity and mortality. Thus, it is important to assess the nutritional status of HIV-infected and HIV-TB co-infected subjects. This cross-sectional study was aimed to compare the nutritional status of HIV-infected patients with or without active tuberculosis.

Methods: Antiretroviral Therapy (ART) naïve patients were randomly selected from ART centre of School of Tropical Medicine, Kolkata, India, following written, informed consent. The baseline Body Mass Index (BMI), Grip Strength (GS), Triceps Skin Fold (TSF), mid upper arm circumference (MUAC), serum albumin, hemoglobin, and CD4 count was documented. All subjects were evaluated for presence of Opportunistic Infections (OI). Active TB was diagnosed by the Revised National Tuberculosis Control Program (RNTCP) guideline of Government of India. Statistical analysis was done to compare the above baseline characteristics between HIV-TB co-infected and HIV mono-infected patients by using SPSS16.

Results: Active TB was diagnosed in 48 patients among 131 HIV positive patients and their median CD4 count, serum albumin, hemoglobin and BMI of active TB patients were 113 cell/μL, 3.25 gm/dl, 10 gm/dl and 16.14 Kg/m2 respectively while those of non-TB patients were 205 cell/μL, 4gm/dl, 11.5 gm/dl and 18.13 Kg/m2 respectively. All the TB infected patients were on TB treatment with RNTCP regimens. BMI (p=0.00), GS (p=0.04), TSF (p=0.00), MUAC (p=0.00), CD4 (p=0.01), hemoglobin (p=0.01) and serum albumin (p=0.00) were significantly higher in case of non-TB patients.

Conclusions: HIV-TB co-infected patients have a grossly compromised nutritional status and need immediate nutritional support in form of nutritional counselling and/or supplementation to improve their health status.

Key words: Nutritional status, tuberculosis, HIV.

PO1839

SATISFYING SUGAR CRAVINGS IN PEOPLE WHO ARE OBESE AND DIABETIC WITH SYNSEPALUM DULCIFICUM: UNDERUTILIZED AND NEGLECTED FRUIT SPECIE IN GHANA

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Background and objectives: Managing the dietary intake of sugar has been found to be one of the most cost effective ways of coping with obesity and diabetes. However, this means of preventing and coping with diabetes and obesity has been found to be difficult for both adults and children since the need to satisfy their cravings for sugar is paramount. Synsepalum dulcificum, an underutilized and neglected indigenous Ghanaian fruit has been used for centuries in Ghana to satisfy sugar cravings. The fruit is unsweet with a mild taste. However, after eating this fruit, any sour food subsequently consumed, turns extremely sweet. The sweetening effect can last for about one hour. This research was conducted to find out if Synsepalum dulcificum can serve as an alternative means of managing sugar craving in people especially those with obesity and diabetes.

Methods: The research used literature review to determine the essential analysis of this fruit and the possibility of serving as a sugar substitute.

Results: The results indicated that the sugar content in the fruit has been found to be insignificant. The sweetening effect of the fruit is attributed to the presence of Miraculin, which is used as a sugar substitute. The fruit has been tried in obese and diabetic patients without side effects. Cancer patients with unpleasant metallic taste in their mouth had it masked after eating the fruit.

Conclusions: It can be concluded that the fruit can serve as a means of satisfying sugar cravings in many people whilst managing their dietary sugar intake due to the insignificant sugar content. It is recommended that the fruit must be cultivated on a large scale. Also the consumption of the fruit must be promoted among people who are obese and diabetic.

Key words: Synsepalum dulcificum, fruit, sugar, obese, diabetes

PO1840

CHANGES IN CLINICAL STATUS, NUTRITIONAL AND BIOCHEMICAL BIOMARKERS IN PULMONARY TUBERCULOSIS PATIENTS RECEIVING ZINC SUPPLEMENTATION IN ADDITION TO CONVENTIONAL TREATMENT

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Background and objectives: In pulmonary tuberculosis impaired nutritional status including zinc status is common. Still, no previous studies have been performed in Bolivian patients in this regard.

Methods: We conducted an intervention study with twenty patients with pulmonary tuberculosis to evaluate the effects of zinc supplementation as an addition to conventional treatment. Changes in the clinical course, presence of tuberculosis bacilli in sputum, radiological improvements and nutritional status of patients were monitored. The patients were randomized into two groups given zinc (45 mg/day) or placebo for three months.

Results: During the supplementation period the concentration of zinc in plasma increased from 11(0.6) μmol/L to 14(1.5) μmol/L in the supplemented group and the mean increment was 22% compared with 6% in the placebo group. In the zinc-supplemented patients the frequency of thoracic pain decreased as early as in the second week and the cough, expectoration and night sweats deceased after of four weeks of therapy, but in the placebo group these symptoms remained for a longer time. Bacilli in sputum disappeared more rapidly in zinc-supplemented patients than in the placebo group. The concentrations of CRP, haptoglobin and orosomucoid in plasma were increased prior to the intervention and after 90 days they had diminished but the decrease was not significantly affected by zinc supplementation.

Conclusions: This pilot study indicates that addition of a daily supplement of 45 mg of zinc to conventional anti-tuberculosis therapy can accelerate the clinical recovery. It is necessary perform further studies with a larger sample size to confirm the findings.

Key words: zinc supplementation, pulmonary tuberculosis, symptom disappearance, sputum bacilli clearance.

PO1841

EFFECT OF VITAMIN E AND C SUPPLEMENTATION ON ELDERLY WITH MILD COGNITIVE IMPAIRMENT (MCI) IN ISFAHAN, IRAN

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Background and objectives: There are inconsistent results regarding the potential role of vitamin antioxidants in improving cognition function among elderly individuals. This study was carried out to investigate the effect of vitamins C and E on Mild Cognitive Impairment in Isfahan, Iran.

Methods: In a randomized, double-blind, placebo-controlled trial, 256 elderly with mild cognitive impairment received 300 mg of vitamin E plus 400 mg vitamin C per day (n=127) or placebo (n=129), for one year. Information on background characteristics and anthropometric measurements at baseline and food consumption through 3-Day Diet Recall every two months were collected. Some of the oxidative stress biomarkers were measured. Cognitive performance was evaluated by Mini Mental State Examination (MMSE) score. All measurements were performed at three time points on days 0, 180 and 360 post interventions.

Results: One year antioxidant supplementation resulted in reduced Malodialdehyde level (P<0.001) and elevation of Total Antioxidant Capacity (P<0.001) and red blood cell Glutathione (P<0.01) compared with control group. The serum 8-hydroxydeoxyguanosine levels did not show any difference between the two groups (P<0.4). After adjusting for the covariates effects, MMSE score showed, the difference within subject variable in both supplemented and control groups was significant (P<0.001). None of (P=0.88) the mean value of MMSE score in sixth and twelfth time points between supplemented and control groups (25.88±0.17 vs. 25.86±0.18 and 26.8±0.17 vs. 26.59±0.18) differed significantly.

Conclusions: Despite significant improvement in most of the oxidative stress biomarkers, long-term antioxidants supplementation was not observed to enhance cognitive performance in this study.

Key words: Supplementation, elderly, MCI, Vitamin E, Vitamin C.

PO1842

METABOLIC SYNDROME AND ITS DETERMINANTS IN A SAMPLE OF YOUNG IRANIAN CHILDREN WITH OBESITY

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Introduction: Childhood obesity increases the risk of metabolic syndrome (MetS) both in childhood and adulthood. The present study was determined the prevalence of MetS and its potential determinants in a representative sample of obese children .

Material and Method: This cross-sectional study was conducted in 2011 among 150 obese children, i.e. body mass index (BMI≥95th percentile) with seven years of age. They were randomly selected from 9 health centers in 3 districts of the north Tehran. Trained nutritionists completed a socio-demographic questionnaire by interviewing parents, and conducted the physical examination. Mets was defined based on modified ATP III criteria .

Results: The mean (SD) of weight, height, and BMI was 37.5 (6.3) kg, 127.2 (4.7) cm and 23.08 (2.9) kg/m^2, respectively. The prevalence of MetS was 13.4%, without significant difference in terms of gender. The most common component of MetS was abdominal obesity (79%). While 21.3% of children did not have any component of MetS, 42% of them had at least one component. Most children with MetS had a history of breastfeeding for less than 6 months. Waist circumference, systolic and diastolic blood pressure, fasting blood glucose, and triglyceride levels were higher in Mets compared to controls.

Key words: Metabolic Syndrome, Children, obesity, prevention

PO1843

SOCIOECONOMIC POSITION AND BODY MASS INDEX AMONG ADULTS: THE ROLE OF TAKEAWAY FOOD

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Background and objectives: Lower socioeconomic groups have a higher prevalence of overweight and obesity. However, we have little knowledge about why these inequalities exist. The aim of this study was to examine whether takeaway food consumption mediated (explained) the association between socioeconomic position and body mass index (BMI).

Methods: A postal-survey was conducted among 1500 randomly selected adults aged between 25-64 years in Brisbane, Australia during 2009 (response rate 63.7%, N=903). BMI was calculated using self-reported weight and height. Participants reported usual takeaway food consumption, and these items were grouped into 'healthy' and 'less healthy' choices. Socioeconomic position was ascertained by education, household income, and occupation.

Results: The mean BMI was 26.5 kg/m2 for men and 25.7 kg/m2 for women. Among men, none of the socioeconomic measures were associated with BMI. Contrary, women with Diploma/Vocational education (B=2.12) and high school only (B=2.60), and those who were white-collar (B=1.55) and blue-collar employees (B=2.83) had higher BMI compared with their more advantaged counterparts (all p<0.05). However, household income was not associated with BMI. Lower socioeconomic men and women consumed high levels of 'less healthy' choices; however, there were no clear patterns for 'healthy' choices. Frequent consumption of 'healthy' choices was significantly associated with higher BMI among women only. In contrast, frequent 'less healthy' takeaway food consumption was significantly associated with higher BMI for both men and women. The consumption of 'less healthy' takeaway food, but not 'healthy' choices, partly mediated the observed education or occupation differences in BMI among women.

Conclusions: Decreasing the consumption of 'less healthy' takeaway options may reduce socioeconomic inequalities in overweight and obesity among women but not men. However, reducing the consumption of 'less healthy' takeaway food may have an important role in the growing epidemic of overweight and obesity among all adults.

Key words: socioeconomic, obesity, mediation.

PO1844

TRANS FAT ENHANCED DOXORUBICIN INDUCED CARDIOTOXICITY IN MICE

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Background and objectives: This study examined the combined effects of trans fatty acid (TFA) diet plus doxorubicin upon cardiac oxidative and inflammatory stress. The influence of TFA and/or doxorubicin on cardiac activity and expression of associated factors was also evaluated.

Methods: Five-week-old male C57BL/6 mice were divided into two groups, one consumed normal diet, and the other consumed a diet prepared by shortening, rich in TFAs. After 8 week, normal diet or TFA diet groups were further divided into two sub-groups, and doxorubicin (25 mg/kg) or saline was given via one single i.p. injection. After 48 h, mice were killed with carbon dioxide. Blood and cardiac tissue were collected for analyses.

Results: TFA diet increased cardiac content of TFAs, but did not affect activity of lactate dehydrogenase (LDH) and creatine phosphokinase (CPK) in blood (P>0.05). Normal diet with doxorubicin treatment increased LDH and CPK activities (P<0.05), however, TFA diet plus doxorubicin treatment further elevated the activity of these two enzymes (P<0.05). This combination also markedly raised cardiac xanthine oxidase activity, caused greater production of reactive oxygen species, malonyldialdehyde, interleukin (IL)-6, IL-10, tumor necrosis factor-alpha and monocyte chemoattractant protein-1 in heart than TFA diet alone or normal diet with doxorubicin treatment (P<0.05). TFA diet increased nuclear factor kappa B (NF-kB) activity (P<0.05), but did not affect the expression of NF-£eB and mitogen-activated protein kinase (MAPK) (P>0.05). Normal diet with doxorubicin treatment augmented cardiac activity, mRNA expression and protein production of NF-kB, and enhanced MAPK expression (P<0.05). However, TFA diet plus doxorubicin treatment further up-regulated cardiac expression of NF-kB p65, p-p38 and p-ERK1/2 (P<0.05).

Conclusions: These findings suggest that TFA diet exacerbates doxorubicin-induced cardiac oxidative and inflammatory injury. TFAs should be eliminated for patients with doxorubicin therapy.

Key words: Trans fatty acid, doxorubicin, cardiac injury; NF-kB, MAPK.

PO1845

A SCIENTIFIC VALIDATION OF ANTIHYPERGLYCEMIC AND ANTIHYPERLIPEMIC ATTRIBUTES OF TRICHOSANTHES DIOICA FRUITS

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Background and objectives: Trichosanthes dioica had been considered as an effective and safe ethnotherapeutic in Indian traditional system of medicine. The objective of the study was to validarte the glycemic potential of T. dioica fruits.

Methods: Effects of variable doses of lyophilized powder of its aqueous extract were studied on blood glucose level (BGL), hemoglobin (Hb), total protein (TP), and lipid profile of normal, mild and severely diabetic animals. Body weight (bw) and urine sugar (US) were additional parameters studied.

Results: Dose of 1000 mg/kg decreases BGL of normal and mild diabetic rats significantly (P< 0.01) during fasting blood glucose (FBG) and glucose tolerance test (GTT) studies respectively. Four weeks long term study of severely diabetic rats with the same dose showed significant fall (P< 0.001) in FBG, postprandial glucose (PPG), total cholesterol (TC) and triglyceride (TG) levels. A significant increase (P<0.01) in high density lipoprotein (HDL) is of value addition. TP, Hb and bw also showed significant increase (P<0.05). Moreover, a significant reduction in US was observed from +4 to +1.

Conclusions: The scientific validation of ethnotherapeutics efficacy of T. dioica as an antidiabetic agent could be used for developing an oral drug managing diabetes and hyperlipidemia associated with it.

Key words: Trichosanthes dioica, antidiabetic, hyperlipemia, Wister rats.

PO1846

BMSO ALTERS WHITE ADIPOSE TISSUE PROTEIN PROFILES IN C57BL/6J MICE DISPLAYING DELIPIDATIVE, INFLAMMATORY AND BROWNING CHARACTERISTICS

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Background and objectives: We have previous shown the anti-adiposity effects of bitter melon seed oil (BMSO), which is rich in cis-9, trans-11, trans-13 conjugated linolenic acid (c9,t11,t13-CLN), in C57BL/6J mice. In this study, a proteomic approach was carries out to compare the protein profiles differentially expressed in the white adipose tissue (WAT) of mice fed a soybean oil based high fat diet with or without BMSO. Methods and

Results: Two-dimensional difference gel electrophoresis (pH4-7) revealed 32 statistically significant spot changes (>2-fold, P<0.05). Among them, 15 up- and 8 down-regulated proteins by BMSO were identified. Combined with histological analysis which shows BMSO resulted in macrophage infiltration and brown adipocyte recruitment, the proteomic data depict a WAT, affected by chronic BMSO administration, featuring a reduced caveolae formation, increased ROS insult, tissue remodeling/repair, and mitochondria uncoupling activity, as well as stabilized actin cytoskeleton, putatively related with an increased inflammation response.

Conclusions: This study provides an opportunity to find out some novel genes participating in the delipidative, inflammatory and browning of the WAT, and these changes may account for the BMSO-mediated anti-adiposity effect.

Key words: Bitter melon seed oil, proteomic analysis, white adipose tissue.

PO1847

SERUM VITAMIN D AND RISK OF ALZHEIMER'S DISEASE

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Background and objectives: Low vitamin D status has been suggested to be related to an increased Alzheimer's disease risk. The present study investigates whether serum vitamin D level predicts the occurrence of the disease.

Methods: The study was based on the Mini–Finland Health Survey. The study population consisted of 5010 men and women, aged 50-79 years of age and free from Alzheimer's disease. During a 17–year follow–up period, 151 incident Alzheimer's disease (ICD–10 code 290) cases occurred according to a population wide Hospital Discharge Register and death certificates. Serum 25(OH)D concentration was determined by radioimmunoassay from serum samples frozen at –20°C and stored at baseline of the study. Sociodemographic, lifestyle and metabolic factors were determined by questionnaires, interviews and measurements at baseline. The strength of association between serum 25(OH)D concentration and Alzheimer's disease incidence was estimated using Cox's model.

Results: Individuals with higher serum vitamin D concentrations showed a statistically significantly reduced risk of Alzheimer's disease in women. The relative risk between the highest and lowest quartiles of serum vitamin D was 0.38 (95%

CI 0.18-0.82) in women and 0.89 (95% CI 0.39-2.06) in men after adjustment for sex, age, marital status, education, alcohol consumption, leisure-time physical activity, smoking, body mass index, and month of blood drawn.

Conclusions: The results are in line with the hypothesis that low vitamin D predicts the development of Alzheimer's disease. Further studies are needed to confirm these findings.

Key words: Alzheimer's disease, cohort study, vitamin D.

PO1848

THE RISK OF METABOLIC SYNDROME IS ASSOCIATED WITH INCREASED OXIDATIVE STRESS IN SUBJECTS WITH COLORECTAL ADENOMAS

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Background and objectives: Several studies have shown that the risk of metabolic syndrome and increased oxidative stress are associated with the development of colorectal adenomas. However, the link between metabolic syndrome and oxidative stress in subjects with colorectal adenomas is unclear. The aim of this study was to determine the association between metabolic syndrome and oxidative stress in subjects with colorectal adenomas.

Methods: Seventy subjects with adenomatous polyps and 137 colorectal polyps-free control subjects were recruited.

Results: The prevalence of metabolic syndrome in subjects with colorectal adenomas and colorectal polyps free was 57.1% and 26.3%, respectively. Metabolic syndrome (OR, 2.22, 95% CI, 1.13-4.37) was significantly associated with the development of colorectal adenomatous polyps after adjusting for age, gender and serum creatinine. Oxidative stress indicators [malondialdehyde (beta = 0.71, $p < 0.05$) and oxidized low density lipoprotein-cholesterol (beta = 0.01, $p < 0.05$)] are significantly associated with the risk of metabolic syndrome in subjects with colorectal adenomas.

Conclusions: Increased oxidative stress might be a significant factor to the risk of metabolic syndrome in subjects with colorectal adenomas.

Key words: metabolic syndrome, colorectal adenoma, oxidative stress, malondialdehyde, oxidized low density lipoprotein-cholesterol.

PO1849

ASSOCIATION BETWEEN MATERNAL DIETS EVALUATED BY THE HEALTHY EATING INDEX SCORE AND BLOOD LIPIDS, LIPOPROTEIN, AND HOMOCYSTEINE LEVELS AT BIRTH

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Background and objectives: The Healthy Eating Index (HEI) score is a valuable tool to evaluate diet quality during pregnancy. To determine the relationship between first trimester diet quality and serum lipoprotein profile, arylesterase (AE) and homocysteine values at birth.

Methods: Cord-blood of the offspring of 35 women whose diets were 'adequate' or 'inadequate' according to their HEI-score (>70 or <=70, respectively).

Results: Low HEI-score diets did not differ in atherogenic index and contain less (g/1000 kcal) CHO (P=0.027), fibre (P=0.011), Mg (P=0.010), K (P=0.011), vitamin C (P=0.024), retinol (P=0.040), beta-carotenes (P=0.047), vitamin K (P=0.017) and more fats (P<0.001), cholesterol (P<0.001), Na/K (P= 0.019), vitamin B12/folate (P=0.017) ratios and contributed (%En) fewer CHO (P=0.005), more fats (P=<0.001) and SFA (P=0.002) than their high HEI-score counterparts. Mothers at the low HEI-score delivered infants with high total cholesterol (TC) (P=0.049); HDL-c (P=0.002) but low TC/HDL-c ratio (P=0.014).

Conclusions: The HEI score defines diet quality during the first trimester of pregnancy considering several diet-prevention aspects for degenerative diseases and appears associated to CVD markers at birth. More studies are needed to understand the importance later in life of such findings.

Key words: Pregnancy, neonates, HEI-score, neonatal-CVD markers.

PO1850

ANTHOCYANIN-RICH MAIZE PURPLE PLANT PIGMENT STIMULATED THE PROLIFERATION AND DIFFERENTIATION OF OSTEOBLASTIC MC3T3-E1 CELLS

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Background and objectives: Apoptosis of osteoblasts has been proposed as the common basis of osteoporosis, with oxi-

dative stress as the major cause. Supplementation with antioxidants may be beneficial in the treatment of this condition. Anthocyanin is known to function as antioxidant. There is no study available that reported the effect of anthocyanin treatment on osteoporosis. The aim of this study is to investigate the effect of maize purple plant pigment (MPPP) that is an anthocyanins-rich pigment (approximately 70% based on weight) extracted from maize purple plant on the proliferation and differentiation in osteoblastic MC3T3-E1 cells.

Methods: MPPP was added into the medium in a parallel treatment at (0, 0.001, 0.01, 0.1, 1, 10, 100 and 1000) μmol•;L^{-1} volume concentration, respectively. MTT assay was carried out to estimate the proliferation. Alkaline phosphatase (ALP) and collagen type I (CTX-I) concentration were measured in cells that were treated with MPPP at the concentration of (0.1, 1, 10) μmol•;L^{-1} for 72h.

Results: After incubation for 48h and 72h, the cells proliferation increased at the concentration of (0.001,0.01,0.1,1,10) μmol•;L^{-1}. There were no significant proliferation at high concentration of MPPP (100, 1000 μmol•; L^{-1}). After incubation for 24h, proliferation was observed at only one concentration (1 μmol• ;L^{-1}) of MPPP. MPPP increased significantly the ALP activity and CTX-I concentration of the cells in all levels of MPPP.

Conclusions: MPPP therefore stimulated the proliferation and osteoblastic differentiation of MC3T3-E1 cells and may have potential to prevent osteoporosis.

Key words: anthocyanin, MC3T3-E1, osteoblaste osteoporosis, antioxidant.

PO1851

EFFECTS OF CONSUMPTION OF A DRINK OF CASHEW (ANACARDIUM OCCIDENTALE) ABOUT GLUCOSE-INSULIN RESPONSE IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Background and objectives: Numerous plants with possible hypoglycemic activity have been described. Some of them are being widely studied with very positive results. Among them is the cashew (Anacardium occidentale). The goal of this work was to evaluate the effect of the consumption of a cashew drink on postprandial glucose-insulin response in type 2 diabetics.

Methods: we developed a drink of pseudo cashew juice 60% (v/v), sucralose, annatto, citric acid and sodium benzoate. The study was conducted on a sample of 10 adults proof intake control with 50 g of carbohydrates (white bread) and 250 mL of water. A week later the test was repeated with white bread and drink 250 mL of cashew. Blood samples were taken at 0, 60 and 120 minutes. The postprandial response was assessed by the positive incremental area, determined the area under the curve by the trapezoidal rule.

Results: cashew drink consumption decreased glucose at 120 min post-ingestion of food, 209.81 ± 60.25 mg/dL (test control) vs. 181.61 ± 48.26 mg/dL (try cashew), with significant decrease in glucose AUC ($p < 0.05$). Cashew juice significantly increased the insulin response at 120 min, 25.45 ± 9.16 mUI/mL (test control) vs. 36.38 ± 12.80 mUI/mL (try cashew) ($p < 0.05$).

Conclusions: consumption of drinking cashew improved glucose-insulin response of patients studied.

Key words: Anacardium occidentale, hypoglycemic effect, type 2 diabetes mellitus, blood glucose, insulin.

PO1852

EFFECTS OF THE CONSUMPTION OF A CASHEW BEREVAGE (ANACARDIUM OCCIDENTALE) ON THE GLYCEMYC AND INSULIN RESPONSE IN HEALTHY YOUNG ADULTS

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Background and objectives: For years there has been a tendency to make proposals on the development of new food products, and to evaluate the properties and benefits of their consumption through clinical trials. The aim of this work was to evaluate the effect of the consumption of a cashew drink (Anacardium occidentale) on postprandial glucose-insulin response in healthy subjects.

Methods: A beverage was made with the pseudo clarified juice of cashew 60% (v/v), non-caloric sweetener (sucralose), natural dye (annatto), citric acid (0.05%) and sodium benzoate (0.005%). A sample of 11 healthy young adults (18-25 years) males took the test of oral glucose tolerance, with a load of 75 g glucose in aqueous solution (OGTT-control). A week later the test was repeated with additional consumption of 250 ml of the cashew drink (OGTT-cashew). Three venous blood samples were taken at 0, 60 and 120 minutes, to analyze the levels of glucose with the glucose oxidase method (Wiener Lab) and insulin (DRG Diagnostics). The postprandial glucose-insulin

response area was estimated with positive incremental glucose and insulin, determined the area un der the curve (AUC) by the trapezoidal rule. We calculated rates of change of glucose (PVGx) and insulin (PVIx) during rehearsals.

Results: Under the conditions of the study, consumption of cashew drink significantly increased insulin response, 4140.82 ± 2306.63 ABC (OGTT-control) vs. 5788.36 ± 2028.21 (OGTT-cashew) ($p < 0.05$). Cashew juice induced a significant increase in serum insulin at 120 min, with a PVI of 110.99 ± 165.42 (OGTT-control) vs. 300.31 ± 248.87 (OGTT-cashew) ($p < 0.05$).

Conclusions: Consumption of the drink increases the insulin response with no apparent change in the glycemic response in healthy adults.

Key words: Anacardium occidentale, dietetic beverage, glycemic response, insulin response.

PO1853

ERYTHROCYTE LEVELS OF N-3 POLYUNSATURATED FATTY ACIDS AND BIOMARKERS OF INFLAMMATION AND OXIDATIVE STRESS IN PATIENTS WITH AND WITHOUT DEPRESSION

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Background and objectives: Associations between n-3 polyunsaturated fatty acids (PUFAs), inflammation, oxidative stress and the risk of depression have been suggested. We evaluated the hypothesis that erythrocyte n-3 PUFAs are inversely associated with biomarkers for inflammation and oxidative stress in Koreans with and without depression.

Methods: Study participants comprised 80 cases diagnosed with depression based on Center for Epidemiological Studies Depression Scale Korea version (CES-D-K) scores ≥ ; 25 and psychiatrist confirmation and 80 age- and sex-matched healthy controls without histories of depression.

Results: CES-D-K scores, the number of depressed patients, levels of inducible nitric oxide synthase (iNOS) and tumor necrosis factor (TNF)-α ; were negatively associated with Omega-3 Index (erythrocyte levels of eicosapentaenoic acid and docosahexaenoic acid) after adjusting for confounding factors. Levels of iNOS, superoxide dismutase, interferon-γ ;, and nitrotyrosine were significantly higher in depressed patients than in healthy controls. Concentrations of iNOS, TNF-α ;, thiobarbituric acid reactive substances, and nitrotyrosine were negatively associated with erythrocyte levels of n-3 PUFAs and saturated fatty acids, but positively associated with erythrocyte levels of n-6 PUFAs and trans fatty acids.

Conclusions: The erythrocyte omega-3 index and levels of n-3 PUFAs were inversely associated with biomarkers of inflammation and oxidative stress in Koreans with and without depression. (This work was supported by a grant from the Korea Research Foundation (2012R1A1A2040553) funded by the Korean government.)

Key words: Cytokine, depressed patients, erythrocyte, n-3 polyunsaturated fatty acids, oxidative biomarkers.

PO1854

HYPOCHOLESTEROLEMIC EFFECT OF MANGO GINGER (CURCUMA AMADA ROXB) ON HYPERCHOLESTEROLEMIC ADULT PATIENTS

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Background and objectives: Epidemiological studies strongly imply that hypercholesterolemia is a powerful risk factor for the development of cardiovascular diseases. Lowering lipids can be done through dietary or pharmacological therapy. From immemorial time, man depended on plants for all his medicinal needs. Plant based bioactive compounds are gaining popularity due to their multi-functional therapeutic property and is generally considered to be safe. Mango ginger (Curcuma amada Roxb.) is a perennial, rhizomatous, aromatic herb belonging to the family Zingiberaceae. Mango ginger rhizome is a unique spice abundantly used in Ayurveda and Unani system of medicine and also for culinary purposes in Asian Countries. Mango ginger powder exhibits anti-hypercholesterolemic property.

Methods: In this investigation, 70 subjects were screened, 16 adults of 20-55 years, suffering from hypercholesterolemia (200-240mg/dl) with no other medical complications, not on any medications, were selected by purposive sampling for supplementation and were categorized into two groups A (8 males) and B (8 females). The anthropometric measurements were assessed and blood samples were collected to evaluate lipid profile (CHOD-POD method). Ten grams of mango ginger powder was supplemented daily for 45 days. Data were analysed using t-test.

Results: Lipid profile of the selected samples before and after supplementation showed significance at one percent level.

Conclusions: The pilot study conducted confirms anti-hypercholesterolemic property of mango ginger powder. It can be considered as a part of dietary approach or as a functional food in lowering cholesterol in moderately hypercholesterolemic subjects, although, further studies have to be done in a larger population for a longer period. (Acknowledgement: University Grants Commission, New Delhi, India.)

Key words: Hypercholesterolemia, mango ginger, herb, supplement.

PO1855

A COHORT STUDY ON THE PREVALENCE OF OBESITY AND HYPERTENSION AMONG SHARPEVILLE ELDERLY IN SOUTH AFRICA (2005-2011)

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Background and objectives: Obesity, a global epidemic and risk factor for many cardio vascular diseases has become a public health concern in South Africa especially among the elderly. This study investigated the prevalence of obesity and its association with high blood pressure with a view to document the effect of weekly aerobic activity conducted among the elderly.

Methods: Anthropometric variables and blood pressure of 355 elderly aged 50-98 years were measured biennially from 2005 to 2011 using standard techniques. Data collected were analysed with SPSS, version 20.

Results: The mean body mass index (BMI) ranged from 29.8-31.1 kg/m2 and 28.5-24.2 kg/ m2. Prevalence of overweight and obesity (80.4-82.3% versus 73.5-42.8%) and central obesity (77.9-87% versus 42.8-28.6%) increased in women and reduced in men during the study period. Women had significantly higher (P=0.01) prevalence of obesity than men. The mean blood pressure reduced from 154/97 to 141/84 mmHg (p>0.05) in women and 169/113 to 154/86 mmHg (p>0.05) in men from 2005 to 2011. There was no significant difference in the mean systolic and diastolic blood pressure in men and women. Systolic blood pressure correlated strongly with weight (r2=0.730; p=0.001) and moderately with BMI (r2=0.386; p=0.001) and waist circumference (r2=0.465; p=0.001) Respondents with BMI >25 kg/m2 had significantly higher (p<0.05) systolic and diastolic blood pressure and are four times more likely to be hypertensive (OR, 4.510, 95% CI 1.30-15.71; p<0.05) than those with BMI<25 kg/m2. Prevalence of hypertension reduced in both men and women during the study period though the difference was not statistically significant (p>0.05).

Conclusions: Prevalence of obesity was found to be significant amongst the study population especially in women and was strongly associated with hypertension. Body weight reduction is important in lowering blood pressure.

Key words: Anthropometric indices, obesity, hypertension, elderly, South Africa.

PO1856

HIGHER HOMOCYSTEINE IS ASSOCIATED WITH THE INCREASED RISK OF COLORECTAL CANCER INDEPENDENTLY OF OXIDATIVE STRESS AND ANTIOXIDANT ENZYME ACTIVITY

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Background and objectives: Increased homocysteine concentration and oxidative stress and decreased antioxidant enzyme activities are thought to affect carcinogenesis. However, the association of homocysteine with oxidative stress status and antioxidant enzyme activities in patients with colorectal cancer is unclear. The purpose of this study was to determine the association of homocysteine with oxidative stress indicators and antioxidant enzyme activities, and further analyze the relation with the risk for colorectal cancer.

Methods: One hundred and sixty-eight patients with colorectal cancer and 188 healthy controls were recruited.

Results: There was no significant association of plasma homocysteine with oxidative stress indicators and antioxidant enzyme activities in either colorectal cancer patients or healthy controls after adjusting for potential confounders. Higher homocysteine exhibited significantly increased risk of colorectal cancer (OR, 1.28; 95% CI, 1.17¡ V1.40) after adjusting for potential confounders. The association between homocysteine and the risk of colorectal cancer remained significant (OR, 1.32; 95% CI, 1.18-1.47) after oxidative stress indicators and antioxidant enzyme activities were simultaneously adjusted.

Conclusions: Higher homocysteine is strongly associated with the risk of colorectal cancer independently of oxidative stress indicators and antioxidant enzyme activities.

Key words: homocysteine, oxidative stress, antioxidant enzyme activities, colorectal cancer.

PO1857

PROTEOMIC ANALYSIS OF POTENT LIPOLYTIC ACTION OF LACTOFERRIN IN RAT MATURE ADIPOCYTES

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Background and objectives: Lactoferrin (LF) is a multifunctional milk protein. In previous reports, we proved that enteric-coated LF decreased the visceral fat accumulation in a clinical trial. Animal studies revealed that ingested LF was delivered to mesenteric fat and in vitro experimentations showed that LF promoted the lipolysis of mature adipocytes. In this study, we analyzed protein expression profiles and their activation time using mature adipocytes to identify the underlying mechanism of lipolysis induced by LF.

Methods: Pre-adipocytes derived from mesenteric fat tissue of male rats were cultured and differentiated into mature form, and cells were collected at various time courses after addition of LF. Protein expression profiles were analyzed by proteomics.

Results: Proteomic analysis revealed that the expression levels of adenylate cyclase (cAMP synthase, AC) and hormone sensitive lipase (late-limiting enzyme of lipolysis, HSL) were significantly up-regulated by LF. Then we measured phosphorylation levels of key proteins, and found that HSL was phosphorylated by protein kinase A (PKA) within 5-15 minutes. The enzymatic activity of PKA was also activated in the same time-course. These results suggested that PKA activated by cAMP transduced phosphorylation signals in adipocytes, and activated HSL began the fat breakdown process. Proteins involved in Ras-Raf-ERK pathway also showed some distinct alterations. We detected the increased phosphorylation level of CREB, a downstream transcription factor of both cAMP and Ras-Raf-ERK pathway, which regulates the expression levels of AC and HSL. These results strongly explain increasing expression levels of AC and HSL.

Conclusions: In further finding of the crosstalk between Ras-Raf-ERK and cAMP pathway, LF may influence these networks both in phosphorylation and transcriptional regulation, and then these effects result in the promotion of lipolysis in mature adipocytes.

Key words: lactoferrin, lipolysis, adipocytes, proteomic analysis.

PO1858

EFFECT OF DIETARY AND PHYSICAL ACTIVITY INTERVENTION IN OVERWEIGHT AND OBESE THAI ADULTS

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Background and objectives: The healthy dietary pattern advice is beneficial to balance the energy and macronutrient intake while an increase of moderate-intensity physical activity is a strategy to improve lifestyle behavior.

Methods: A total of 60 overweight and obese Thai adults (BMI ≥ ; 23.0 kg/m2), aged 20-60 years, employees at Queen Sirikit National Institution of Child Health, was invited into one hour in nutritional knowledge sessions which focused on calorie restriction and healthy dietary pattern, and one hour in moderate-intensity physical activity sessions every month through 4 months. The measurement of body weight, waist circumference, dietary intake, physical activity, blood pressure, and blood biomarkers were collected at baseline and the end of intervention.

Results: The mean (+SD) age of all participants was 41.6+9.1 years and their mean BMI was 28.0+3.6 kg/m2 at baseline. After 4 months, the differences in body weight was -1.2+1.8 kg ($P<0.01$) and waist circumference was -4.2+4.6 cm ($P=0.02$). The change of their dietary pattern increased approximately 1 serving/day of vegetables intake and 0.6 serving/day of fruits intake, although it was non-significant (NS). Their consumption of rice and starchy foods decreased by 1 serving/day (NS), and by 2 servings/day of fat ($P<0.01$). These led to a reduction in energy intake by an average of 170 kcal/day ($P=0.02$) and 5% decrease energy from fat ($P<0.01$). The self-reported increase in moderate-intensity physical activity was 38.5+26.0 minutes/week (NS). Mean reduction in systolic and diastolic blood pressure was 9.6+8.1 mmHg (NS) and 4.6+6.4 mmHg (NS). Changes of total cholesterol, high and low density lipoprotein cholesterol, and fasting plasma glucose were -11.3 mg/dL (NS), 0.6 mg/dL (NS), -4.8 mg/dL (NS) and -7.0 mg/dL ($P=0.03$), respectively.

Conclusions: A healthy dietary pattern advice and moderate-intensity physical activity could achieve significant in weight management in overweight and obese Thai adults.

Key words: overweight, obese, dietary pattern.

PO1859

THE EFFECTS OF DIETARY POLYUNSATURATED FATTY ACIDS IN THE PREVENTION OF CORONARY HEART DISEASE

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Background and objectives: Dietary n-3 polyunsaturated fatty acids (PUFA) reduce coronary heart disease (CHD) complications, such as chronic arrhythmia and sudden cardiac death. Improved myocardial resistance to ischemia-reperfusion injury results in smaller myocardial infarction, which is a major factor in the occurrence of CHD complications.

Methods: We hypothesized that a specific dietary fatty acid profile (low in saturated and n-6 PUFA but high in plant and marine n-3 PUFA) may improve myocardial resistance to ischemia-reperfusion injury and reduce infarct size. To test this assumption, we used a well-defined rat model of myocardial infarction.

Results: In comparison to a diet that is high in either saturated or n-6 PUFA but poor in plant and marine n-3 PUFA, a diet that is low in saturated fats and n-6 PUFA but rich in plant and marine n-3 PUFA results in smaller myocardial infarct size ($P<0.01$). The effects of the 3 diets were also examined by analyzing the fatty acid composition of plasma, erythrocyte cell membranes, and the phospholipids of myocardial mitochondria. The results show a great accumulation of n-3 PUFA and a parallel decrease in arachidonic acid, the main n-6 PUFA, in plasma, cell membranes, and cardiac mitochondria ($P<0.0001$).

Conclusions: We conclude that improved myocardial resistance to ischemia-reperfusion may be one of the critical factors explaining the protective effects of dietary n-3 PUFA against CHD complications in humans. In addition to increasing n-3 PUFA intake, an optimal dietary pattern aimed at reducing cardiovascular mortality should include a reduction of the intake of both saturated and n-6 PUFA.

Key words: Coronary heart disease, ischemia-reperfusion injury, infarct size, n-3 fatty acids.

PO1860

TRENDS OF OBESITY, HYPERTENSION AND WEIGHT PERCEPTION OF SAHRAOUI ETHNIC GROUP IN SOUTHERN MOROCCO (2001-2011)

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Background and objectives: The prevalence of obesity is high among Sahraoui women and may contribute to elevated prevalence of cardiovascular diseases. We examined the trends in obesity prevalence, hypertension prevalence and weight perception among Sahraoui women.

Methods: Data were collected from regional surveys conducted in 2001 and 2011 in Southern Morocco. The sample was randomly selected among adult healthy urban women aged 15 years and older, non pregnant.

Results: The prevalence of obesity, overweight and hypertension increased from 2001 to 2011. The overall prevalence of obesity increased from 49% to 51,7%, abdominal obesity from 76% to 90.5% and overweight from 30,1% to 31,8%. The similar trend was observed for hypertension that is more prevalent among obese and overweight women compared to normal weight women. Body image perception and physical inactivity were key factors in this elevated prevalence. During the past 10 years, there was a significant increase in the percentage of women who want to lose body weight (4,9% to 33,7%) but the desire to gain weight remains very high even among normal weight women (69,7%). Obesity was negatively associated with time spent in walking and positively associated with time spent in some sedentary activities. Also, eating disorders seem to be an increasing problem among Moroccan Sahraoui women. In fact 22,9% of studied women reported having an eating disorder which is more common among overweight (21,9%) and obese (29,8%) compared to normal weight women (3%).

Conclusions: High prevalence of obesity and hypertension trends are for a raise, suggesting apparent needs for immediate attention in terms of prevention and health education among the studied population.

Key words: Obesity, hypertension, body image perception, Sahraoui population, Southern of Morocco.

PO1861

VEGETABLE AND FRUIT CONSUMPTION IS INVERSELY ASSOCIATED WITH COLORECTAL CANCER RISK IN CHINESE POPULATIONS

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Background and objectives: The associations between vegetable and fruit intakes and colorectal cancer risk have been examined in many epidemiological studies, but the results remained inconsistent. Few studies have been conducted in the Chinese population. This study aimed to examine the associations of vegetable and fruit intakes with colorectal cancer risk in Guangzhou, China.

Methods: A case–control study was conducted between July 2010 and October 2012 in Guangzhou, China. Six hundred and thirteen consecutively recruited colorectal cancer cases were frequency matched to 613 controls by age (5-year interval) and gender. A validated food frequency questionnaire was used to collect dietary information by face-to-face interviews. Multivariate logistic regression models were used to estimate the odds ratios (ORs) and 95% confidence intervals (CIs).

Results: Total vegetables and fruits intakes were found to be inversely associated with colorectal cancer risk. The adjusted ORs for the highest quartile comparing with the lowest quartile were 0.47 (95%CI 0.34-0.66, P for trend <0.01) for total vegetables and fruits, 0.58 (95%CI 0.41-0.80, P for trend <0.01) for total vegetables, and 0.57 (95%CI 0.41-0.79, P for trend <0.01) for total fruits. The inverse associations were observed in both men and women. When analyzed by cancer site, the adjusted ORs (95% CIs) comparing total fruit and vegetable intakes of the highest versus the lowest quartile were 0.48 (0.33 to 0.71, P trend <0.01) for colon cancer and 0.45 (0.29 to 0.70, P trend <0.01) for rectal cancer. Similar site-specific associations were observed for total vegetables and total fruits.

Conclusions: This study suggested that greater consumption of vegetables and fruits were associated with a decreased risk of colorectal cancer in Chinese populations.

Key words: vegetable, fruit, colorectal cancer, case-control study, China

PO1862

ALTERATION OF CARDIOVASCULAR DISEASE RISK BIOMARKERS IN PREPUBERTAL CHILDREN

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Background and objectives: The worldwide epidemic of childhood obesity in the last years has accelerated the occurrence, in the paediatric population, of disorders usually observed in adults. One of these disorders is the metabolic syndrome, which is driven by obesity and involves insulin resistance, dyslipidaemia and hypertension. A metabolic cluster score has been developed in order to have a valid tool to diagnose the "at risk" children with a continuous parameter. The objective of the present study was to evaluate the use of a metabolic syndrome cluster score, and to assess its association with biomarkers of inflammation and CVD risk.

Methods: 677 prepubertal Caucasian Spanish children, 295 obese, 146 overweight and 236 normal-weight aged 4–12 years were recruited. Metabolic syndrome features as well as inflammation and CVD risk biomarkers were measured. A metabolic syndrome cluster score was calculated, consisting on the average/5 of the standardized scores from the components of the metabolic syndrome.

Results: The metabolic score was different among normal-weight, overweight and obese children (-0.44±0.04, 0.28±0.05, 1.32±0.06, p<0.001, respectively). The percentage of the metabolic syndrome in the obese group was 9.4%. Metabolic syndrome components as well as leptin, CRP and PAI-1were significant different among groups, being higher in the obese group, except in the case of HDL-c, which was lower. Resistin, TNF-α, IL-6, MPO and sE-selectin were higher in the obese compared with overweight and normal-weight groups.

Conclusions: The use of the metabolic syndrome cluster score reflects better the degree of affectation in each individual than the common classification of the metabolic syndrome; letting us identify the "at risk" children, which have not been diagnosed with metabolic syndrome, but present metabolic alterations. This score is a helpful tool that can be used in the clinical practice to make an early diagnosis.

Key words: metabolic syndrome, child, risk factors.

PO1863

INFLAMMATION MARKERS CORRELATE WITH INSULIN SENSITIVITY PARAMETERS IN OBESE ADOLESCENTS

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Background and objectives: There is a general consensus that obesity is an eminently inflammatory process, since impairments in the secretion of certain inflammation markers, such as ceruloplasmin, leptin, adiponectin, have been observed in these patients. There is evidence that these inflammation markers correlate with parameters related to insulin resistance in obese adults. This study was conducted to ascertain if these correlations can be observed also in adolescents.

Methods: The study was conducted in a group of 12 obese (BMI > 30 Kg/m2 and percentile > 95) and 12 normal-weight (BMI = 20-25 Kg/m2 and percentile in the range 5-85) adolescents. Serum levels of adiponectin, leptin, ceruloplasmin and insulin levels were determined by commercial ELISA kits. Insulin and glucose concentrations were determined by immunoassay and the homoeostasis model assessment (HOMA2-IR) score was calculated using the HOMA Calculator software (Diabetes Trial Unit, Churchill Hospital, Oxford, UK).

Results: Ceruloplasmin and leptin concentrations were higher in the serum of obese adolescents while that of adiponectin was lower. Insulin concentrations and HOMA-2 values were higher in the obese group. Ceruloplasmin correlated with both parameters with a high level of significance . However, leptin levels did not correlate with either HOMA2-IR or insulin, and adiponectin correlated with HOMA2-IR but not insulin.

Conclusions: The inflammation parameters studied, as well as markers for insulin sensitivity were notably altered in obese adolescents. However, although we found a relationship between insulin resistance and some of these markers, only ceruloplasmin correlated with both HOMA-2-IR and insulin concentrations, revealing as a potential string marker of insulin resistance in obese adolescents. Acknowledgements: This work was supported by the City Hall of Guadix (Spain) and was funded by a grant from the Spanish Ministry of Science and Innovation (AGL2011-23810) and San Cecilio Hospital (Granada, Spain).

Key words: obesity, adolescence, inflammation, ceruloplasmin, insulin resistance.

PO1864

THE PREVALENCE OF OVERWEIGHT AND OBESITY AMONG 7-16-YEARS CHILDREN AND ADOLESCENTS AND ITS RISK FACTORS IN SOUTHERN CHINA

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Background and objectives: Several studies have suggested that the prevalence of overweight and obesity among children and adolescents in China has increased dramatically since 1990's. However, research focused on their risk factors is lacking. The aim of this work was to examine the prevalence of overweight and obesity among children and adolescents in Southern China, and to understand their risk factors.

Methods: A total of 2638 children and adolescents aged 7-16-years were selected randomly from cities and communities in Southern China. Parental information, as well as physical activity, diet (3-day 24h diet records) were questionnaired. The anthropometric measures were examined by ultrasonic height and weight instrument, skin-fold caliper and tape. Data were analyzed with logistic multivariate regression.

Results: The anthropometric parameters, i.e., height, weight, waist circumference, skin-fold thickness and hips were collected. The percentage body fatness was calculated according to Slaughter et al. Waist to hip ratio (WHR) was estimated. Their parents answered the family information and birth data. The primarily analysis suggested that the prevalence of overweight and obesity among children and adolescents in Southern China was in line with the reports of other studies from this country. Furthermore, the overweight in Chinese children was positively associated with gender, excessive total energy intake, less physical activity.

Conclusions: Our primary analysis provide that overweight and obesity among children and adolescents in Southern China is epidemic. The information about the risk factors, particularly in nutrients and food/food groups, will be examined in further analyses.

Key words: overweight, obesity, children, risk factor, China.

PO1865

HYPERTENSION, VITAMIN D STATUS AND BODY MASS INDEX IN AN URBAN SOUTH AFRICAN COMMUNITY

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Background and objectives: Hypertension, a major health concern, is affecting morbidity and mortality worldwide. A relationship exists between body weight and hypertension. Low levels of vitamin-D are associated with higher blood pressure levels and obesity markers. This study aims to assess vitamin-D status in a low-income, urban South African community, to determine the association between vitamin-D status, body mass index (BMI) and prevalence of hypertension.

Methods: Blood pressure, weight and height were measured by trained professionals, using calibrated equipment and standardized techniques. Blood samples were obtained through venous puncture after overnight fast. Serum concentrations of 25-hydroxyvitamin D (25(OH)D) was determined with chemiluminescent immunoassays.

Results: 339 adults were included, with a mean age of 44.3 (±10.6) years (range 25-63). 45% had a BMI reflecting normal/underweight, 23% overweight and 32% obese. 65.8% females and 18.4% males were overweight/obese. 63.4% of the study population either had blood pressure >140/90 mmHg or were currently using antihypertensive medication. Mean 25(OH)D concentration was 38.4 ng/ml (96 nmol/L), ranging from 8.7-82.2 ng/ml, indicating adequate status. Mean 25(OH)D concentrations were 37.0±10.6 ng/ml and 43.5±11.8 ng/ml for females and males, respectively. One participant had 25(OH)D concentration <12 ng/ml, indicating deficiency and 13 participants had 25(OH)D between 12-20 ng/ml, indicating inadequacy. Inverse relationships between BMI and vitamin-D status (p=0.01) and mean arterial blood pressure and vitamin-D (p=0.05) was found, but no correlation between vitamin-D and hypertension or mean arterial blood pressure when controlled for BMI.

Conclusions: More than half of this population was overweight/obese and hypertensive. Vitamin-D status was adequate, despite expected low vitamin-D intake. Latitude and sun exposure could have favored vitamin-D status. Results support an inverse relationship between vitamin-D and hypertension, but seem to depend on an accompanying increase in BMI.

Key words: hypertension, vitamin D, BMI, South Africa.

PO1866

BMI, WAIST TO HEIGHT RATIO, BODY ADIPOSITY INDEX AND WAIST CIRCUMFERENCE ARE ASSOCIATED WITH HYPERTENSION IN AN URBAN AFRICAN COMMUNITY

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Background and objectives: Hypertension is becoming more prevalent in low-income countries, increasing global disease burden. A strong relationship between body weight and hypertension exists. This study determines the relationship of various body adiposity indices (body mass index (BMI, kg/m2), waist-to-height ratio (WHtR), body adiposity index (BAI) and waist circumference (WC)) with blood pressure.

Methods: 339 Adults aged between 25 and 63 years from the Assuring Health for All in the Free State (AHA-FS) study were included. Calibrated equipment and standardized techniques were used to measure blood pressure, human immunodeficiency virus (HIV) and anthropometric measurements. Weight and height were measured to calculate BMI; WC and height to calculate WHtR; and height and hip circumference to calculate BAI.

Results: More than a third (39.8%) of the sample was HIV-positive. 63.4% had blood pressure values >140/90 mmHg or were using antihypertensive medication. Based on BMI, 44.8% of the study population were normal/underweight, 23% overweight, and 32.1% obese. The majority (58.6%) had a WHtR representing increased cardiovascular risk. Mean BAI was 34.1%, and 76.3% had an overweight/obese body fat percentage. A WC representing increased cardiovascular risk was measured in 44.3% females and 3.9% males. Significant positive correlations between mean arterial blood pressure and BMI (r=0.261; p<0.001), WHtR (r=0.357; p<0.001) and BAI (r=0.245; p<0.001) were found. WHtR seemed a stronger predictor of mean arterial pressure than BMI or BAI. HIV status was inversely correlated with all adiposity indices (p<0.001).

Conclusions: Findings support weight loss as first line intervention to prevent and treat hypertension and suggest WHtR as practical screening tool for hypertension risk.

Key words: Hypertension, BMI, weist to height ratio, body adiposity index, waist circumference.

PO1867

DIETARY FATTY ACIDS IN RELATION TO INFLAMMATORY MARKERS IN PATIENTS WITH CORONARY ARTERY DISEASE

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Background and objectives: Atherosclerosis, with its major manifestation, coronary artery disease (CAD) is a chronic inflammatory disease. Dietary fatty acids intakes favorably affect on inflammatory responses. This study was conducted to examine the association between dietary fatty acids and inflammatory markers, IL-6 (Interleukin 6) and hs-CRP (high sensitivityC-reactive protein), in CAD patients among Iranian population.

Methods: This hospital-based cross-sectional study was conducted in Chamran Heart Hospital, Isfahan, Iran in 2012. Patients aged ≥;45 years with first ever symptomatic CAD confirmed by angiography were included. A semi-quantitative food frequency questionnaire was used to assess the usual intakes of dietary fatty acids.

Results: After adjustment for potential confounders, saturated fat was statistically significantly related to hs-CRP (P=0.011) and IL-6 (P <0.001) concentrations. Intakes of Eicosapentaenoic acid (EPA)and decosahexaenoic acid (DHA) and monounsaturated fat (MUFA), were significantly related to plasma hs-CRP concentration (P= 0.002 and P= 0.001, respectively)) but not IL-6, albeit MUFA was modestly inversely related to IL-6 (P= 0.08). No significant relationships were observed for other fatty acids, α-linolenic acid and linoleic acid.

Conclusions: Our findings suggest that saturated fat, EPA+DHA and MUFA were significantly related to plasma inflammatory markers. The present results do not support the hypothesis that n-6 fatty acids antagonize the effects of n-3 fatty acids.

Key words: Fatty acids, coronary artery disease, high sensitivity C-reactive protein, interleukin-6.

PO1868

SESQUITERPENOIDS FROM INULA WISSMANNIANA HAND.-MAZZ. WITH THEIR INHIBITORY ACTIVITIES AGAINST LPS-INDUCED NO PRODUCTION IN RAW264.7 MACROPHAGES

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Background and objectives: Metabolic syndrome is a chronic, low-grade, systemic, inflammatory condition, of which inflammation maybe play a pivotal role from cell signal transduction mechanism. Sesquiterpenoids, a group of structurally diversified secondary metabolites, are major constituents of plants belonged to Inula genus, and their remarkable anti-inflammatory activities have attracted much attention. As a part of our ongoing research program for anti-inflammatory sesquiterpenoids derived from Inula species, we examined Inula wissmanniana Hand.-Mazz., a plant endemic to Yunnan province, PR China, with no phytochemical studies reported previously.

Methods: The air-dried plants of I. wissmanniana were chopped and percolated with 95% EtOH to give crude extract. After removing the fatty components, the residual crude extract was further partitioned with methylene dichloride to give a methylene dichloride soluble fraction. This fraction was further subjected to silica gel, Sephadex LH-20, and preparative HPLC column chromatography to give single compounds. The structures of all isolates were elucidated by combinative analyses of MS, NMR, and X-ray crystallography data. Moreover, all isolates were tested their cytotoxicities against RAW264.7 macrophages and their inhibitory effects against lipopolysaccharide (LPS)-induced NO production in RAW264.7 macrophages.

Results: The structures of all isolates were elucidated to be eight germacrane (five new) and thirteen eudesmane (seven new) derivatives. All isolates showed no toxicity at the dose evaluated (20 μM) on RAW264.7 macrophages, but most of them exhibited significant inhibitory effects against NO production in this cell line, with IC50 values ranged from 0.65 to 10.68 μM.

Conclusions: I. wissmanniana contained high content of sesquiterpenoids in germacrane and eudesmane frameworks. Most of the isolates exhibited their potential anti-inflammatory activities, which might be further applied to reverse metabolic syndrome.

PO1869

EFFECTS OF ORAL ADMINISTRATION OF QUERCETIN ON THE ANTICANCER EFFECT OF TRICHOSTATIN A IN A XENOGRAFT TUMOR MODEL

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Background and objectives: Our previous study consistently showed that quercetin enhances the anticancer effect of trichostatin A (TSA), an anti-cancer drug, in vitro and in xenograft mice given intraperitoneal doses of quercetin. However, whether oral administration of quercetin in xenograft mice exerts such an effect is unclear. In this study we compared the effects of quercetin administrated orally and intraperitoneally on the anti-tumor effect of TSA.

Methods: Nude mice were subcutaneously injected in the right flank with A549 cells at a dose of 5 x 106 cells. After three weeks, the animals were then randomly assigned to the following six groups (n=6/group) for 15 weeks: control, TSA, OL+TSA, OH+TSA, IL+TSA and IH+TSA for TSA alone or in combination with quercetin treatment. TSA was given twice a week (0.5 mg/kg) by intraperitoneal injection (IP), while quercetin was given 3 times a week by oral gavage (OL and OH, 20 and 100 mg/kg, respectively) or by IP (IL and IH, 2 and 10 mg/kg, respectively).

Results: We found that only IH+TSA rather than TSA alone significantly inhibited tumor growth in tumor-bearing nude mice. Consistently, only IH +TSA significantly increased the total concentration of quercetin in the tumor tissue of mice. Despite showing a slight anti-tumor effect, TSA alone increased lymphocyte DNA damage and plasma lipid peroxidation in nude mice compared with the control group. In contrast, quercetin administration both orally and intraperitoneally decreased the adverse effects of TSA.

Conclusions: These results indicate that compared with IP, the enhancing effect on the anti-tumor effect of TSA was lower when quercetin was administrated orally. However, quercetin administrated both orally and intraperitoneally similarly diminished TSA-induced adverse effects in nude mice. Further studies are warranted to investigate the effect of quercetin administrated orally at higher doses.

Key words: quercetin, trichostatin A.

PO1870

PROTECTIVE EFFECTS OF AQUEOUS EXTRACT FROM HOUTTUYNIA CORDATA ON ACETAMINOPHEN-INDUCED HEPATOTOXICITY IN C57BL/6J MICE

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Background and objectives: Houttuynia cordata is used in folk medicine for diuresis, detoxification, antiviral, antibacterial and antileukemic therapy. This study examined the protective effects of H. cordata aqueous extract (HAE) against acetaminophen (APAP)-induced hepatotoxicity in mice.

Methods: Five-week old male C57BL/6J mice were divided into three groups (ten mice per group): normal (N), control (C), and HAE+APAP groups. The HAE+APAP group were supplement with 8% (w/w) HAE in drinking water for five weeks. Both C and HAE+APAP groups were followed by APAP (350 mg/kg body weight) intraperitoneal injection. After 24 hours, mice were sacrificed and oxidative stress and inflammation biomarkers in liver were measured. Acetaminophen treatment significantly elevated both alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities; however, the pre-intake of HAE significantly protected liver against the subsequent acetaminophen-induced elevation of ALT and AST activities. The pre-intake of HAE also significantly diminished acetaminophen-induced GSH (glutathione) depletion, and MDA (malondialdehyde) formation via restoring the SOD (superoxide dismutase), catalase and GPX (glutathione peroxidase) activities in liver. Moreover, the levels of IL-6 (interleukin-6), TNF-α (tumor necrosis factor-α), MCP-1 (monocyte chemotactic protein-1) and CYP2E1 (cytochrome P450 2E1) in liver from mice with HAE intake were significantly decreased.

Conclusions: These results support that H. cordata may be considered as a preventive agent for acute liver injury.

Key words: Houttuynia cordata, acetaminophen, hepatotoxicity, inflammation.

PO1871

SHORT TERM MICRONUTRIENT-ANTIOXIDANT SUPPLEMENTATION HAS NO IMPACT ON GASTRIC ATROPHY IN ZAMBIAN ADULTS: A RANDOMISED CONTROLLED TRIAL

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Background and objectives: We set out to investigate the possibility preventing gastric cancer by reversing atrophy, using micronutrient-antioxidant supplementation.

Methods: Archival samples from a randomised controlled trial, (Kelly et al, Trans R Soc Trop Med Hyg. 2008;102:194-9) were used in this study. In this trial, 500 healthy volunteers were randomly allocated to either a micronutrient-antioxidant supplementation or placebo. The supplements contained vitamins, A, B1, B2, B6, B12, C, D3, E, niacin, folic acid, iron, zinc, copper and selenium, in quantities 1.5-2 times the daily requirements. We analysed 215 archival samples, from subjects who had taken either supplementation or placebo for a median of 19 (range 14 to 27) months. Gastric atrophy was determined using pepsinogen 1 to 2 ratio of less than 3.0 and compared between the two groups. Also analysed were the effect of HIV infection, age, body mass index (BMI), smoking, alcohol intake and gastric pH.

Results: Gastric atrophy was found in 8 (7.8%) of 103 subjects on supplementation, and 7 (6.3%) of 112 on placebo (RR 1.24; 95%CI 0.47-3.3; P=0.22). HIV infection was diagnosed in 5 participants with atrophy and 61 without (RR 1.07; 95%CI 0.37-3.2; P=1.0). The lack of effect of supplementation on atrophy was not changed after stratification for HIV status (M-H OR 2.0; P= 09.20). Gastric atrophy was found to be more prevalent in those above the age of 40 years, P=0.02 (CI 0.09-0.84). BMI, smoking, alcohol intake showed no impact on gastric atrophy.

Conclusions: An average of 19 months of micronutrient-antioxidant supplementation has no impact on gastric atrophy in Zambian adults. The high gastric pH seen in HIV patients cannot be attributed to gastric atrophy.

Key words: Gastric cancer, atrophy, micronutrient-antioxidant.

PO1872

THE EFFECT OF DIETARY INTERVENTION ON FOOD INTAKE, WEIGHT AND BIOCHEMISTRY PROFILE AFTER KIDNEY TRANSPLANTATION

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Background and objectives: In the chronic posttransplantation phase, nutritional goal is achievement of healthy weight and normal biochemistry profile. The purpose was to assess the impact of the follow-up of dietary intervention on food intake, biochemistry profile and weight after kidney transplantation.

Methods: We provided 55 kidney transplant recipients (27 men, 28 women, from 2009 to 2010 in a general hospital, Korea) with individualized nutritional counseling, at the 1-month after the kidney transplantation procedure. A follow-up 3-day food record was provided to subjects for return before the next visit, in approximately 5 to 6 months. Subjects who completed and returned follow-up food intake records were listed in Group A (n=21); whereas, those who did not were in Group B (n=34). Food records were analyzed using Computer Aided Nutritional analysis program (Version 3.0). The statistical analyses were performed using PASW(Version 20).

Results: The mean age was 44.98 ± 11.15 years. At the 6-month after KT, total calorie intake decreased significantly (1741.71 ± 358.71kcal vs 1514.43 ± 236.74kcal, p=0.022) in Group A. Although there was no significant effect, intakes of fat (51.99 ± 17.64g vs 38.25 ± 11.77g) and cholesterol (310.85±174.5mg vs 265.40±101.08mg) decreased in Group A. At the 12-month after KT, Triglyceridemia in the group A were significantly lower than that of group B (100.52±34.26 vs 128.70±61.12 mg/dl, p=0.025). Although there was no significant effect, Group A post-acute phase weight gain (1.62±2.16 vs 5.39±5.79kg), Creatinine (1.14±0.24mg/dl vs 1.21±0.29mg/dl), Total cholesterol (168.35±33.6l vs 173.43±26.05mg/dl), and LDL(98.97±26.06 vs 99.29±19.01mg/dl) were all lower than that of group B, at the 12-month after KT.

Conclusion: The follow-up of dietary intervention for kidney transplant recipients may be beneficial in controlling post-acute phase excessive weight gain and achieving normal biochemistry profiles.

Key words: dietary intervention, kidney transplantation

PO1873

BENEFICIAL EFFECT OF LOW INTAKE OF ALCOHOL ON HIGH-FAT DIET FED RATS AND SENESCENCE-ACCELERATED MICE(SAMP1)

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Background and objectives: There is accumulating epidemiological evidence suggesting beneficial effect of low intake of alcohol on the development of diseases including cardiovascular disease, diabetes, etc. However, there are very limited animal studies on the effect of low intake of alcohol. This study was aimed to elucidate the effect of low intake of alcohol on the rats fed a high-fat diet and on the SAMP1 (senescence-accelerated prone-1) mice.

Methods: In experiment 1, growing male SD rats (5 week old) were fed a high-fat diet (30% beef tallow) for 12 weeks. Alcohol was given with drinking water containing 1% and 2% ethanol. In experiment 2, male SAMP1 mice (9 week old) were fed a commercial stock diet for 18 weeks. Alcohol was given with drinking water containing 1% or 2% ethanol.

Results: In experiment 1, the food intake and growth were unaffected by intake of ethanol. Serum levels of glucose and lipids were also unaffected. Compared with control, the intake of 1% and 2% ethanol caused a significant reduction in serum ALT activity, ammonia and urate. Serum LDH activity was lower in the 1% ethanol group ($P < 0.05$), but not in the 2% ethanol group. In experiment 2, to evaluate the degree of senescence, we scored the changes of aging, including behavior and appearance such as skin, hair and eyes. These score data in large part retarded the ageing process of the SAMP1 mice by ethanol, especially 1% ethanol intake ($P < 0.05$).

Conclusions: This animal study provides evidence for the beneficial influence of low intake of alcohol in rodents.

Key words: alcohol, high-fat diet, SAMP1 mice.

PO1874

THE ASSESSMENT OF OBJECTIVE SCORE OF NUTRITION ON DIALYSIS (OSND) IN TURKISH HEMODIALYSIS PATIENTS

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Background and objectives: The objective of this study was to determine the nutritional status of Turkish hemodialysis patients by objective score of nutrition on dialysis (OSND).

Methods: The study included 185 hemodialysis patients (72 women, 113 men) with a mean age of 52.8±15.88 years. Anthropometric measurements and some biochemical parameters were analyzed. Body Mass Index (BMI) was calculated by using dry weight of the patients and evaluated by ERA/EDTA guidelines. Nutritional status was assessed by objective score of nutrition on dialysis (OSND). OSND results in a score from 5 (severely malnourished) to 32 (normal). The score results were categorized in three status. A score 28-32 indicates normal nutritional status of the patients, 23-27 indicates moderate nutritional risk and <22 indicates an unsatisfactory nutritional status of hemodialysis patients. All data was evaluated by SPSS 11.5 for Windows.

Results: In this study, the mean durations of chronic renal failure and going on dialysis were 83.5±81.02 months and 8.9±7.45 years, respectively. The mean BMI value of the patients was 23.9±4.77 kg/m2. The 36.2% of the patients were overweight and obese, 53.5 % of them were normal, 10.3% of them were underweight. The mean score of OSND was 22.02±4.11. The percentages of the patients with low, moderate and normal nutritional status were 49.7%, 44.3% and 11.0%, respectively. There was a significant positive correlation between BMI and OSND score ($r= 0.574$, $p=0.000$). There was no significant relation between OSND score and gender ($\chi^2= 2.674$, $p=0.263$). But the patients over than 65 years have higher OSND score than the patients below than 65 years and it is statistically significant ($\chi^2= 6.608$, $p=0.037$).

Conclusions: As a conclusion, OSND, new tool for nutritional assessment, can be used to assess the nutritional status of the hemodialysis patients and correlate with BMI and age.

Key Words: Hemodialysis, nutrition, OSND, BMI.

PO1875

CHANGES IN GREEN BEANS POTASSIUM CONTENT BY SOAKING AND COOKING: IMPLICATIONS IN CHRONIC KIDNEY DISEASE MANAGEMENT

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Background and objectives: Diabetes Mellitus and Glomerulonephritis are the most common causes of chronic kidney disease (CKD). In order to prevent associate complications, like hyperkalemia and cardiovascular disease, dieticians should recommend a low potassium diet. So that vegetables with high potassium content, as green beans, are frequently limited in this type of diet. However vegetables are a good source of nutrients and fiber and should be included in a healthy diet.

The aim of this study is to quantify potassium content reduction from fresh and commercial frozen green beans by soaking and by different cooking methods normal cooking (NC) and double cooking (DC), in order to incorporate them in CKD patients' diet.

Methods: Green beans were soaked during 12 hours at refrigeration temperatures and cooked using natural mineral water. Potassium was extracted from the ash of dried samples and determined through flame photometry. The method was validated using a certified reference material and AOAC parameters.

Results: Both procedures: soaking and cooking reduced significantly potassium content. Soaking was effective in potassium leaching in both types of green beans, but percentage of loss was significantly higher in frozen ones, 86,97±11,16 versus 14,89±4,97. Soaking and cooking had an additive effect in potassium reduction, but the difference between NC and DC was no statistically significant in any case. Cooking after soaking in fresh green beans reduced approximately 50% of total potassium content while frozen ones gave the greatest losses, 97,22±0,39% The best result obtained was 2,80±0,36 mg K / 100g edible portion, in frozen green beans after soaking and NC.

Conclusions: These results can provide tools to dieticians to prevent hyperkalemia incorporating these vegetables in their diets, making them more attractive and varied and as consequence healthier.

Key words: Chronic kidney disease, potassium, green beans, cooking.

PO1876

SYSTEMATIC REVIEW OF EFFECTS OF DIETS WITH EITHER LOW OR HIGH GLYCEMIC INDEX ON CARDIOVASCULAR AND METABOLIC RISK FACTORS

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Background and objectives: This systematic review and meta-analysis investigated long-term randomized controlled trials (RCTs) applying glycemic index-related diets in the management of obesity and type 2 diabetes mellitus emphasizing on the potential benefits of low glycemic index/load on risk factors of cardiovascular disorders.

Methods: Electronic searches for RCTs with a running time of at least six months were performed in MEDLINE, EMBASE and the Cochrane Library with no restrictions to language and calendar date. In all intervention studies, participants had to be subjected to a diet defined to be of low glycemic index/load in comparison to a control diet of high glycemic index/load. Outcome parameters were biomarkers of cardiovascular disease and glycemic control as well as anthropometric data. Random effects meta-analyses were performed to determine the weighted mean differences with 95% confidence intervals using the software package Review Manager 5.0.25 of the Cochrane Collaboration.

Results: A total of fourteen studies (n= 2344 participants) fulfilled the objectives and were included in the present meta-analyses. Weighted mean differences (WMD) in change of C-reactive protein [-0.43 mg/dl, (95% CI -0.78 to -0.09), p=0.01], and fasting insulin [-5.16 pmol/L, (95% CI -8.45 to -1.88), p=0.002] were significantly more pronounced following low glycemic index/load diets, respectively. In addition, low glycemic index/load diets were associated with a significantly more decreased fat-free mass when compared to their high glycemic index/load counterparts [WMD: -1.04 kg, (95% CI -1.73 to -0.35), p=0.003]. Following a sensitivity analysis excluding subjects with type 2 diabetes, changes in C-reactive protein and fasting insulin remained significant more distinct in the low glycemic index/load groups.

Conclusions: The data of this systematic review provide evidence for a favorable effect of low glycemic index/load diets in the primary and secondary prevention of obesity-associated diseases.

Key words: cardiovascular risk factors, glycemic index, glycemic load, meta-analysis.

PO1877

COMPARISON OF LONG-TERM LOW-FAT VS. HIGH-FAT DIETS ON GLYCEMIC CONTROL AND CARDIOVASCULAR RISK FACTORS IN SUBJECTS WITH ABNORMAL GLUCOSE METABOLISM: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background and objectives: The long-term effects of dietary macronutrient composition on metabolic profiles in patients with abnormal glucose metabolism had to be established. This meta-analysis aimed to elucidate the effect of replacing dietary fat with carbohydrate on glycemic control and cardiovascular risk factors.

Methods: We searched systematically in MEDLINE, EMBASE and the Cochrane Trial Register for long-term randomized trials (≥;12 months) that investigated the effects of two kinds of prescribed diets (a low-fat (LF) diet and a high-fat (HF) diet); in these studies, energy and protein intake did not differ significantly between the two dietary groups. Study specific weighted mean differences were pooled using a random

effect model by the Cochrane software package Review Manager 5.0.25.

Results: Fourteen studies that included 2003 patients met our inclusion criteria. The HF diet significantly decrease triacylglycerols weighted mean difference (WMD) [-17.50 mg/dl (95% CI -21.70 to -13.31), p < 0.00001], diastolic blood pressure [WMD: -1.30 mmHg (95% CI -1.82 to -0.95), p < 0.00001], respectively, increase HDL cholesterol [WMD: 1.88 mg/dl (95% CI 0.48 to 3.29), p= 0.009] and adiponectin [WMD: 1.10 μg/ml (95% CI 0.87 to 1.33), p < 0.00001] compared with the LF diet. In addition fasting glucose [WMD: -7.31 mg/dl (95% CI -13.19 to -1.43), p = 0.01] were reduced significantly in T2D subjects following a HF diet. Meta-regression revealed that increases in TC and HbA1c were associated with higher amounts of carbohydrates, whereas increases in HDL-cholesterol were associated with higher intakes of MUFA and total fat content.

Conclusions: Our findings suggested that replacing carbohydrates with fat could influence positively cardiovascular risk factor and should therefore recommend by international Diabetes Associations.

Key words: low fat, high fat, glycemic control, meta-analysis, abnormal glucose metabolism.

PO1878

EVALUATION OF THE NUTRITIONAL STATUS AND DIETARY PATTERNS OF PERSONS LIVING WITH HIV/AIDS ON HAART IN NGAOUNDÉRÉ, CAMEROON

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Background and objectives: Nutritional priorities vary, and dietary recommendations may be less straightforward in HIV-infected individuals as HIV treatment and outcomes continue to evolve. This study sought to determine macronutrient intake in HIV-infected adults and investigate the relationships between duration of treatment, nutrient intake, and BMI of patients receiving Highly Active Antiretroviral Therapy (HAART), at the AIDS outpatient clinic of the Ngaoundéré Regional Hospital.

Methods: The study included 195 HIV patients on HAART (48 men, 147 women), aged 18-60 years and screened for malnutrition. Of these 51 had a 24-hour dietary recall (24HDR), 36 of who completed three 24HDR assessments, at one month intervals. Nutritional status was evaluated using body mass index (BMI), and dietary pattern evaluated using a structured face-to-face food frequency and multiple 24-hour diet recall questionnaires. Energy requirements were calculated using the Harris-Benedict equation.

Results: The prevalence of malnutrition measured by BMI was 12.8%. Ninety-two percent of participants consumed diets that were inadequate and met less than 70% of recommended energy intake. Average energy intake was 1315.7±302.1 kcal (requirements, 2490.6±335.8kcal) with mean dietary intakes of carbohydrates, proteins and fats each significantly half of the recommended intakes (p-values each <0.001). The correlation between energy intake and BMI was significant (p<0.005) and strongly negative (r= -0.876) for energy intakes less than 1000kcal. Half of patients with BMI less than 18.5kg/m2 were indifferent about their current weight while 50% with BMI > 25 were conscious of being overweight/obese. None of the respondents was able to approximate his/her ideal weight.

Conclusions: Energy intake in HIV positive individuals on HAART is significantly lower than dietary requirements, an observation which compromises adequate energy and nutrient intake required for optimal HAART. Nutrition counselling is needed in this population to ensure nutrient dense foods are consumed.

Key words: Energy intake, energy requirements, HIV/AIDS, BMI.

PO1879

SAFETY AND EFFICACY OF FORTIFICATION VERSUS FORTIFICATION PLUS SUPPLEMENTATION WITH IRON IN AFRICAN PREGNANT WOMEN: A RANDOMISED CONTROLLED TRIAL

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Background and objectives: There are concerns that supplemental iron can lead to increased burden of malaria. More African governments are adopting mandatory flour fortification with iron in addition to universal iron supplementation in pregnancy. The safety of the high iron intake resulting from these policies is not established. The aims of this study were: to

compare the presence of malarial infection in parturient women who received a combination of iron-fortified foods with iron supplements versus iron-fortified foods only; to assess intervention effects on neonatal iron stores at 1-month of age; to assess intervention effects on the maternal prevalence of iron deficiency anaemia at 1-month after delivery; and to assess intervention effects on maternal intestinal pathogens at 1-month after delivery.

Methods: The study was a double-blind, randomised, placebo-controlled intervention trial with two parallel groups. It was conducted in Nyanza province, Kenya, from September 2011 and is projected to end in April 2013. Pregnant women with a gestational age of 16-23 weeks (n=470) received fortified flour and were randomly allocated to daily supplements with iron (60mg Ferrous fumarate) or placebo. Flour was fortified to a target level of 20 mg iron as NaFeEDTA per kg flour. Currently, the final 40 participants are presenting for their last assessments.

Results: The main outcome measure was maternal Plasmodium infection at parturition as assessed by dipstick tests and PCR. Secondary outcome measures were: maternal iron status at 1-month after delivery, neonatal iron stores at 1-month of age as assessed by plasma ferritin concentration; and maternal intestinal pathogens at 1-month after delivery. Data analysis and publication of results is in progress.

Conclusions: This is the first study to investigate the safety and efficacy of iron interventions in pregnant African women in malaria endemic region. The design implications, methods and ethical considerations will be presented at ICN.

Key words: Iron-supplementation, fortification, malaria, pregnancy.

PO1880

THE OVERVIEW OF PREVALENCE OF OVERWEIGHT/OBESITY AMONG CHILDREN AND ITS RISK FACTORS IN CHINA

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Background and objectives: The aims of this study were to summarize the overweight/obesity prevalence among Chinese children and to review its potential risk factors.

Methods: Literature published in 2000-2012 and focused on overweight/obesity among Chinese children aged 7-18-years was assessed by systematic review.

Results: The prevalence of overweight/obesity among Chinese children increased dramatically. This increase grew rapidly over the course of time: the rates in 1985, 1995, 2000, 2005 and 2010 were 0.10%, 3.20%, 5.11%, 6.55%, and 8.03%. This trend was more relevant for boys. Furthermore, the prevalence in cities was higher than that in communities and was higher in younger group. The risk factors related to overweight/obesity among Chinese children were: parental overweight/obesity, male gender, birth weight and rapid weight gain during pregnancy. Physical inactivity (doing homework>2h/d, watching TV or playing computer>2-4h/d), diet (higher daily energy intake, higher percentage energy of protein and fat, and higher intakes of thiamine, niacin, and selenium, or lower percentage energy of carbohydrate, calcium per body weight), and unbeneficial eating and sleeping behaviors were important environmental factors. The related social factors included family residence, family economic status, family's knowledge about obesity and the feeding concept. However, the relevance of parental education, children's learn-segment and type of school, family type (single parent, parents or family-living-together), activity motivation, and nutrient intakes such as Zn, Fe, vitamins B2, C and E needed further studies.

Conclusions: The prevalence of overweight/obesity among Chinese children increased rapidly, characterized with time, gender, region and age group. Moreover, it's related to inheritance, environmental factors, and society status.

Key words: overview;,overweight/obesity, children, risk factor, China.

PO1881

IMPACT OF CARICA PAPAYA MEAL ON SERUM CHOLESTEROL AND SOME OXIDATIVE STRESS ENZYMES IN RATS

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Background and objectives: Health benefits of Carica papaya have been studied by different researchers, with most studies focusing on the use of extracts from different solvents. The objective of this study was to investigate the effect of consumption of whole unripe fruit on some serum parameters.

Methods: A five by three experiment was designed, consisting of Control (fed commercial diet), Group A (fed 80% commercial diet + 20% peeled papaya) and Group B (fed 80% commercial diet + 20% unpeeled papaya). The experimental animals were all handled in compliance with international guidelines as prescribed by the Canadian Council on the Care and use of Laboratory Animals. Feeding period lasted twenty-eight days. At the end of the feeding experiment the animals observed overnight fast and were sacrificed. Blood and liver tissues were collected and processed for analysis. Standard procedures were used for parametric analysis.

Results: Body weight increased (29.82-38.81) % across groups. Groups A (0.95 ± 0.05) mg/dl and B (1.99 ± 0.05) mg/dl showed potentials to significantly (P<0.05) reduce serum cholesterol compared to control (2.38 ± 0.05) mg/dl. Group B animals had their mean globulin (466.72 ± 76.01) mg/dl reduced (P<0.05) compared to control (814.97 ± 56.41) mg/dl. Catalase activity in serum of Groups A (40.11 ± 0.75) Umin-1 and B (47.30 ± 3.37) Umin-1 animals increased significantly (P<0.05) compared to control (28.08 ± 2.55) Umin-1. A reduction (P<0.05) in liver catalase activity (64.40 ± 2.06) Umin-1 was observed in Group B compared to others. The triacylglycerides in the test groups were statistically same compared to control.

Conclusions: Consumption of peeled unripe papaya appears safe as it demonstrates potential to reduce the risk of vascular malady due to cholesterol lowering effect in addition to not containing the phyto-toxic principles that inhibit liver catalase activity.

Key words: Unripe papaya, lipids, catalase.

PO1882

OMEGA-3 FATTY ACIDS IMPROVE OXIDATIVE STRESS IN WOMEN WITH POLYCYSTIC OVARY SYNDROME

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Background and objectives: Fish oil has beneficial effects in a number of disease states. It was reported that levels of long chain polyunsaturated fatty acids [eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)] were decreased in infertile women. Objectives of this study were to determine the effects of omega-3 fatty acids supplementation on some oxidative stress markers such as serum total antioxidant capacity (TAC), malondialdehyde (MDA) and paraoxonase 1 (PON1) activity in women with polycystic ovary syndrome (PCOS).

Methods: This double-blind randomized controlled clinical trial was conducted on 61 overweight or obese PCOS patients; aged 20-35 yr. Thirty of the subjects had taken 4 g/day omega -3 fatty acids and 31 were given placebo over 8 weeks. Fasting blood samples, anthropometric measurements and 3-day, 24-hour dietary recalls were collected at the baseline and at the end of the trial.

Results: Dietary intake of n-3 LC PUFA from usual diet was low in studied subjects (0.23 mg/day). Omega-3 fatty acids supplementation significantly decreased serum levels of MDA (P=0.01) and increased serum PON1 activity (P=0.038) compared with placebo. Changes in serum TAC levels and anthropometric measurements were not statistically significant in any groups at the end of the study (P>0.05).

Conclusions: Low dietary intake of n-3 LC PUFA is prevalent in women with PCOS. Supplementation with omega-3 fatty acids improved some indices of oxidative stress in PCOS patients and might contribute to the improvement of metabolic complications in these patients.

Key words: Omega-3 fatty acids, polycystic ovary syndrome.

PO1883

NUTRITIONAL PATTERN AND VISCERAL OBESITY ASSOCIATION IN MIDDLE AGE EGYPTIAN WOMEN

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Background and objectives: Adipose tissue pathogenicity differs according to adipose tissue localization, visceral or subcutaneous. Visceral fat is highly active tissue from metabolic point of view. The aim of this study was to explore the association between nutritional patterns, eating behaviors and visceral obesity in middle age Egyptian women.

Methods: Study includes 549 volunteers, obese women (body mass index (BMI) > 30) with mean age 40.80±10.47 years, and mean BMI 36.17±7.23 Kg/m2, they were enrolled in a program for losing weight in National Research Center. All were subjected to: full medical examination, blood pressure, 24 hour dietary recall, food frequency questionnaire and anthropometric measurements including weight, height and calculated BMI. Visceral obesity was determined by ultrasound. The sample was divided into 3 groups according to level of visceral adiposity.

Results: revealed that 6.2, 63.4 and 30.4 percent of the obese women have visceral adiposity <3mm, 3-7mm, ≥ ;7mm were classified as group (1), group (2) and group (3). Highly significant difference was recorded between group (3) and the other groups regarding BMI and systolic and diastolic pressure. Dietary results showed significant difference between group (1) and the other two groups in level of daily consumption of saturated fatty acids, and numerical difference in total energy, carbohydrate and cholesterol. Mean values of vitamins B did not reveal much difference, while vitamin D in group (3) showed the least value. Minerals content of diet revealed that group (3) consumed significant higher amount of sodium and significant lower level of potassium. Group (2&3) showed high percent in

frequent intake of bread, meat, chicken, fish and sweets, and less frequency of milk, legumes, fruits and vegetables.

Conclusions: Unhealthy eating behaviors is considered a factor inducing visceral obesity, may be crucial for obesity related comorbidities. Acknowledgements: All participants; for their help and National Research Centre for funding.

Key words: Visceral obesity, nutrients, eating behavior.

PO1884

OXIDATIVE DAMAGE, AGEING AND DEGENERTIVE DISEASES IN WNIN OBESE RATS

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Background and objectives: Obesity is a debilitating nutritional disorder and has a direct bearing on health and longevity, as exemplified by both animals and humans. WNIN/Ob and WNIN/GR-Ob, obese mutants which were developed from WNIN rat colony have shown characteristic traits of obesity in terms of physical, physiological and clinical morbidity. These mutants survive 1-1½ years, where as normal rats life span is 3-3½ years. The present study summarizes the observations on the life expectancy of these animals along with incidence of diseases(s) noticed during the observed period. It was also ascertained, whether these animals suffer from oxidative damage.

Methods: Ageing markers like plasma protein carbonyls, and lipid peroxidation in both phenotypes at three different time points studied. Additionally, a selected set of rats from Ob/Ob and GR-Ob strains were observed from birth, till the end of their natural death, in terms of food intake, body weights and any deviations from normal health at the time of death.

Results: The plasma malanoldialdehyde and protein carbonyl levels in both the mutants were significantly higher at all the age levels tested compared to lean controls. There was a significant difference in the average life span of both the obese mutants compared to their lean littermates. In general, drop in food intake was noticed in obese rats, as they crossed 400-450 days and about 50% animals showed abdominal and mammary gland tumours, and few with testicular tumours. About 10-12% of animals showed cataract around 400 days of age.

Conclusions: These initial data indicate that both the mutants are ageing faster compared to lean controls, making them vulnerable to degenerative diseases much earlier in life and this could be due to oxidative damage that is occurring , on account of their obesity status.

Key words: Obesity, ageing, protein carbonyl, tumours, cataract.

PO1885

THE EFFECTIVENESS OF NUTRITION EDUCATION AMONG OUTPATIENTS WITH TYPE 2 DIABETES MELLITUS IN JUMPANG BARU MAKASSAR HEALTH CENTER, INDONESIA

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Background and objectives: Diabetes Mellitus (DM) is a problem despite high prevalence of obesity in many parts of the world are increasing rapidly. One major factor is the lack of knowledge in conducting therapy in patients with diabetes mellitus diet that can lead to increased blood sugar levels.The aim of this study was to determine the influence of nutrition education on knowledge, dietary compliance, and glucose control among outpatients with type 2 DM in Jumpandang Baru Makassar Health Center.

Methods: This research was a pre-experimental study designed with one group pretest-posttest. Sampling was conducted using purposive sampling technique with samples 27 people. Data analysis was performed with the Mc Nemar test.

Results: Showed there were not influence (P = 0.125) but have been increasing their knowledge were 85,2% to 100%, there were influence in diet improved adherence (P = 0.035) and there were influence of control of blood sugar levels Outpatient Type 2 DM (P = 0.000).

Conclusions: Nutrition education can increase knowledge so as to improve dietary compliance and to maintain blood sugar levels. Outpatient Type 2 DM are suggested to the Outpatient DM Type 2 f or more set up their blood glucose. they should been assisted the physical activity (Sport) and the drug compliance. The researchers recommended further research with a nutrition education control group to find out more about the difference between people are given nutrition education and not given to nutrition education.

Key words: Diabetes mellitus, nutrition education.

PO1886

OXIDATIVE STRESS, PROBIOTICS AND CARDIOVASCULAR DISEASES

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Background and objectives: Both health-supporting effects of possible probiotics and impact of high-grade oxidative stress (OxS) concerning pathogenesis of diseases have a large number of articles in the PubMed database. Interestingly, quite scarce data describe influence of probiotics on human body OxS status yet. However, an accumulation of data about physiologically relevant antioxidative lactic acid bacteria (LAB) is growing. Nowadays, limited clinical trials have been conducted on the effect of antioxidative LAB on OxS-driven cardiovascular disease (CVD)-related markers. Thus, it is important to analyze possibilities of antioxidative LAB to influence on OxS status in human body with a special focus on CVD. New approaches in global CVD risk reduction are needed.For the prevention of CVD risk the antiinflammatory agents and antioxidants are considered as a possible "third great wave"' (Bhatt, 2008). Thus, it is necessary to find out possible candidates as adjuvant components of CVD prevention complexes.

Methods: It is rational that LAB with multivalent biopotency, including especially biovaluable antioxidative potency/properties may have a great impact to be possible candidates for applying in CVD prevention/al-levation complexes.

Results: Our presentation analyzes possible mechanisms of action of some LAB on both common and novel markers of CVD.

Conclusions: We will analyze results on clinical trials showing that antioxidative LAB with multivalent biopotency may have impact concerning strategy of prevention of pathogenesis of CVD.

Key words: Oxidative stress, lactobacilli, cardiovascular diseases.

PO1887

DOSAGE EFFECTS OF QUERCETIN ON HIPPOCAMPUS-DEPENDENT LEARNING AND MEMORY IN MICE FED WITH HIGH FAT DIETS

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Background and objectives: Effects of quercetin (Q) on cognition remains unclear because previous studies showed contradictory results under different conditions. This study was designed to investigate the dosage effects of quercetin on cognitive impairment induced by high-fat diets (HFD).

Methods: Male KM mice were randomly assigned to five groups fed respectively with basic diet (C), C added with 0.005% quercetin (CQ), HFD (20% fat), HFD with 0.005% quercetin (HFDQ1) and 0.01% quercetin (HFDQ2) for 12 weeks. Plasma and hippocampal malondialdehyde (MDA), total antioxidant capacity, activity of CAT, SOD, GSH/GSSG and hippocampal-dependent learning and memory related gene expression were examined. Morris water maze was used to evaluate the cognition.

Results: compared with C£¬and HFDQ1£¬HFDQ2group , the escape latency were increased and time percentage spent in the target quadrant were decreased (P<0.05) during the morris water maze test in HFD and CQ group. Administration of high dose quercetin may contribute to improving antioxidant capacity and attenuate HFD-induced learning and memory defects. The expression of hippocampal cAMP-responsive element binding protein (CREB) and brain-derived neurotrophic factor (BDNF) were decreased significantly (p<0.05) in HFD and CQ groups, accompanying with higher content of carbonyl compound and MDA in mice brain. The level of MDA was significantly negativity correlated with the expression of CREB and BDNF (P<0.05). It should be noted that quercetin could induce significant cognitive impairment in mice under normal diet conditions.

Conclusions: appropriate dosage of quercetin supplement can improve cognition damaged by high-fat diets via prevention of oxidative stress and augment expression of hippocampal BDNF and CREB. Acknowledgments: This study was supported by the 12th 5-Year Plan for for Science and Technology Development (No.2012BAD33B05), China.

Key words: Quercetin, hippocampal, high-fat diets, BDNF, CREB, learning, memory.

PO1888

ELEVATED PLASMA MALONDIALDEHYDE AND ADVANCED OXIDATION PROTEIN PRODUCTS IN ADULTS WITH DYSLIPIDEMIA

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Background and objectives: Dyslipidemia has become a leading global health problem owing to its strong association with a cardiovascular disease. Malondialdehyde (MDA) and advanced oxidation protein products (AOPP) induced by oxidative stress are involved in the progression of dyslipidemia. The aim of this study was to estimate oxidation products in plasma of adults with abnormal blood lipid.

Methods: Recruitment of participants for this study was carried out at the Jiangnan University hospital. A total of 778 subjects aged 40-49 years old were divided into five groups according to the Chinese guidelines on prevention and treatment of dyslipidemia in adults. Group I (n=110): total cholesterol (TC) <5.18 mmol/L, triglycerides (TG) <1.70 mmol/L and high density lipoprotein cholesterol (HDL-c) <1.04 mmol/L; Group II (n=261): TC >5.18 mmol/L and TG<1.70 mmol/L; Group III (n=204): TG>1.70mmol/L and TC<5.18 mmol/L; Group IV (n=139): TC>5.18 mmol/L and TG>1.70mmol/L; Group V(n= 64): high density lipoprotein cholesterol (HDL-c) <1.04 mmol/L. Plasma lipid profiles, reduced glutathione (GSH), MDA, AOPP and dityrosine (DTyr) were assayed.

Results: No significant difference was observed in plasma GSH level across the five groups. However, a marked increase in the plasma MDA content was found in the dyslipidemia groups (Group II, III, IV and V). When the dyslipidemia groups were compared, Group II had a significantly lower MDA content. Similarly, this tendency toward increased AOPP and DTyr level was also indicated for dyslipidemia groups. Plasma MDA values showed a positive correlation (adjusted for age and sex) with TG, TC, AOPP and DTyr.

Conclusions: These findings are consistent with an increased level of MDA and oxidation protein products in subjects with dyslipidemia. Acknowledgements: The present study was supported by the 12th Five-Year Plan for for Science and Technology Development (No. 2012BAD33B05).

Key words: Dyslipidemia, malondialdehyde, advanced oxidation protein products, human.

PO1889

INTER-RELATIONSHIP OF OXIDATIVE STRESS MARKERS AND THYROID HORMONES IN PREDICTING METABOLIC SYNDROME IN ADULT MEN

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Background and objectives: Oxidative stress and thyroid dysfunction are associated with metabolic syndrome, a known risk factor for cardiovascular diseases and type II diabetes. The aim of this study was to examine the inter-relationship of oxidative stress markers and thyroid hormones in Chinese men with metabolic syndrome and its components.

Methods: Men aged 30 to 60 years with hypertension (n= 411), dyslipidemia (n=325), hyperglycemia (n=238) and metabolic syndrome (n=100) were compared with healthy controls (n=154). Anthropometric measurements, blood pressure, fasting plasma lipids, thyroid stimulating hormone (TSH), free triiodothyronine (FT3), free thyroxine (FT4), total antioxidants (T-AOC), oxidized low density lipoprotein cholesterol (oxLDL), malonyladehyde (MDA), dityrosine, advanced oxidation protein products (AOPP) were measured. Metabolic syndrome (MS) was defined according to NCEP-ATP III criteria.

Results: Significantly ($p<0.05$) higher plasma levels of oxLDL, MDA, dityrosine and AOPP were found in men with metabolic syndrome and its components than controls. TSH was high in hypertension, dyslipidemia, hyperglycemia and MS; FT3 in dyslipidemia and MS while FT4 was elevated in hypertension and dyslipidemia. Subclinical hypothyroid men with MS showed a significant ($p<0.05$) increase in all the oxidative stress markers and lower T-AOC (9.23 ¡À 2.53 U/ml) compared to euthyroids (10.61¡À2. 02 U/ml). Oxidative stress markers and thyroid hormones concomitantly associated with metabolic syndrome and its components with MDA and TSH appearing as strongest predictors.

Conclusions: Lipid peroxidation and elevated thyroid stimulating hormone levels are strong biomarkers of metabolic syndrome in Chinese adult men. Acknowledgments: The study was supported by the 12th 5-Year Plan for for Science and Technology Development (No.2012BAD33B05), China.

Key words: Metabolic syndrome, oxidative stress markers, thyroid hormones.

PO1890

THE ALLEVIATING EFFECT OF FERMENTED WHEY PRODUCT TO THE MALE PATIENTS WITH LOWER URINARY TRACT SYMPTOMS

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Background and objectives: After the age of 50, the prostate begins to increase in size. This is known as benign prostatic hypertrophy (BPH). Consequently, when the prostate enlarges the urethra is compressed and this causes difficulty in urinating including hesitancy, dribbling, reduced force of the urinary stream, and occasional bleeding or infection. The aim of our study was to evaluate the efficiency of consuming fermented whey product (FWP) to several biochemical parameters as well as to the lower urinary tract symptoms (LUTS).

Methods: The tested product was fermented whey based drink, pasteurized after fermentation. Patients (30) were selected from outpatient department of MediTa clinic. Inclusion/exclusion criteria were: moderate LUTS (IPSS score range 8-19) on the basis of International Prostate Symptome Score and clinical investigations: PSA <10 ng/ml; urinary flow 5-15 ml/sec; prostate volume <80 mL; post-voided urine (<300 mL).

Results: During consumption of the FWP IPSS score decreased in average 41%, whereas irritative and obstructive symptoms changed in parallel. LUTS symptoms changed in correlation of uCRV, Hb1c, oxLDL, IL-10 and 8-isoprostanes in urine. Statistically significant changes in biochemical parameters were seen only in study group.

Conclusions: LUTS may have several causes. Compression of urethra by enlarged prostate explains LUTS in BPH patients. During the OxS the peroxidation of cell membrane phospholipids and generation of 8-isoprostanes, the prostaglandin-like compounds, that can cause LUTS. We can conclude that consuming FWP may improve LUTS as well as OxS and inflammatory markers in patients with IPSS (8-19).

Key words: LUTS, OxS, fermented whey.

PO1891

THE EFFECT OF NUTRITIONAL THERAPY ON QUALITY OF LIFE IN STABLE CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Background and objectives: COPD (Chronic Obstructive Pulmonary Disease) patients should be considered at high risk for reduced quality of life because of systemic inflammation. The aim of this study was to determine the effect of nutritional therapy on quality of life in COPD.

Methods: Participants of the study were 21 male, stable COPD patients, ages between 40-65 years (mean 58.8±4.75) without any systemic disease. Nutritional status was assessed by food-frequency questionnaire and Subjective Global Assessment. Daily nutrition intakes were calculated by nutrition information system (BEBIS) computer program for Turkey. Healthy nutrition and omega-3 supplemented (1g/day) dietary theraphy of COPD educations provided by dietitians. Quality of life (QOL) evaluated by Short Form-36 (SF-36) questionnaire, a general measure of quality of life in chronic diseases. Before and after dietary education, results of SF-36 subgroup scores compared with nutritional intakes and nutritional status(SGA) of the patients. Data evaluated by SPSS 13.0 for Windows.

Results: Patients‘ daily energy intake was lower before the intervention. Daily mean dietary carbohydrate intake was 263.1±58.18 g (52.8% of total energy) before intervention and 230.8±70.26 g (48.6% of total energy) after intervention ($p<0.05$). The percentage of dietary fat from total energy was 32.9±5.30% before the intervention, this ratio increased to 36.7±6.79% after the intervention ($p<0.05$). Omega-3 and omega-6 consumptions of the patients were increased after the dietary management ($p<0.05$). According to SF-36 questionnaire, after dietary management physical and mental component scores were increased ($p<0.05$). Before and after dietary intervention, the percentages of well-nourished patients were 90.5%, moderately-malnourished patients was 9.5% by SGA classification. Moderately-malnourished patients had low physical health score ($p<0.05$).

Conclusions: According to these results, the effect of nutritional therapy education is very important for COPD patients either on survival or quality of life.

Key words: COPD, quality of life, diet, SF-36.

PO1892

NUTRITIONAL SUPPORT WITH OMEGA-3 RICH DIETS IMPROVE INFLAMMATION, RESPIRATORY FUNCTIONS AND EXERCISE CAPACITY IN STABLE COPD

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Background and objectives: COPD (Chronic Obstructive Pulmonary Disease) is a major cause of chronic morbidity and mortality. However, none of the currently available agents are capable of slowing the relentless progression of disease. Therefore, this study was planned to determine the nutritional status of COPD patients and to investigate the effects of nutritional support with low carbohydarate, omega-3 rich diet on inflammation and respiratory functions.

Methods: The study was conducted on 21 male patients ages between 40-65 years old without any systemic disease at Ataturk Chest Diseases and Thoracic Surgery Education and Research Hospital. Nutritional status of the patients was assessed by food-frequency questionnaire, three-d 24-h dietary record and Subjective Global Assessment. BMIs calculated and graded as position papers on COPD published by the American Thoracic Society (ATS) and the European Respiratory Society (ERS). Six Minute Walking Test, BORG scale and respiratory functions were assessed. Biochemical parameters, anthropometric measurements of the patients were also determined. Omega-3 rich diets were personalized.

Results: The mean age and mean duration of COPD of the patients were 58.8±4.75 and 4.7±4.46 years, respectively. Before and after dietary management, anthropometric measurements and biochemical parameters of patients were similar. According to SGA results, before and after management, the percentages of well-nourished and moderately-malnourished patients were also similar. After dietary intervention, patients' mean BORG dyspnea scale results were decreased ($p<0.05$). The mean walking distance of the patients before and after dietary intervention were 395.9±53.65 m and 420.8±48.07 m respectively ($p<0.05$). Before and after dietary management, FEV1/FVC were 64.1±11.61% and 67.8±9.37% respectively ($p>0.05$). There was a significant negative correlation between dietary omega-3 and BORG dyspnea scale($r=-0.623$, $p=0.003$).

Conclusions: COPD patients should be considered at high risk because of systemic inflammation. For these reasons, accurate and efficient medical nutrition therapy is important.

Key words: COPD, omega-3 fatty acids, inflammation, dyspnea.

PO1893

LIVER ENZYMES AND CARDIOMETABOLIC RISK FACTORS IN EUROPEAN ADOLESCENTS; THE HELENA STUDY

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Background and objectives: High levels of alanine aminotransferase (ALT) and gamma glutamyltransferase (GGT), as well as low aspartate aminotransferase to ALT ratio (AST/ALT) are considered useful noninvasive early surrogate markers of non-alcoholic fatty liver disease and are associated with the risk of all-cause mortality. The aim of this work was to explore the associations of liver biomarkers with cardiometabolic risks and their clustering.

Methods: ALT, GGT and AST/ALT were measured in 1084 adolescents (52.8% females) aged from 12.5 to 17.5 years from nine European countries. We also measured waist circumference, blood pressure, triglycerides, high density lipoprotein-cholesterol and insulin. A continuous cardiometabolic risk (MetS) score was computed as the mean of the standardized outcomes scores (MetS Z-score). High MetS was defined as the coexistence of at least three of four adverse (>1SD) cardiometabolic risk factors.

Results: High ALT and GGT levels and low AST/ALT ratio were associated with adiposity and with the number of adverse cardiometabolic risk factors in both males (all P<0.001) and females (all P<0.05). High GGT levels and low AST/ALT ratio were associated with high MetS Z-score in males and females (all P<0.001). Higher ALT was associated to higher MetS Z-score in males (P<0.001), but not in females. Additionally, ROC analyses showed a significant discriminatory accuracy of AST/ALT ratio in identifying the low/high MetS in male and female adolescents (both P<0.01). The AST/ALT ratio thresholds were: 1.00 for males 12.5-14.9y, 0.74 for males 15-17.5y, 0.86 for females 12.5-14.9y and 0.87 for females 15.17.5y.

Conclusions: Higher GGT and lower AST/ALT ratio are associated with higher cardiometabolic risk factors and their clustering in male and female European adolescents, while the associations of ALT were gender-dependent. Our results suggest the usefulness of evalauting AST/ALT ratio as a screening test in the assessment of adolescents with high cardiometabolic risk.

Key words: Liver enzymes, cardiometabolic risk, adiposity.

PO1894

INFLUENCE OF WEIGHT STATUS ON CARDIOVASCULAR AND LIPID PROFILE IN MOROCCAN OLDER ADULT WOMEN

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Background and objectives: Overweight and obesity, which are highly related to cardiovascular disease (CVD), has become one of the main public health problems in Morocco. We aimed to analyze the association of weight status with cardiovascular and lipid profile in Moroccan older adult women.

Methods: The study comprised 151 women from the North of Morocco with an age ranged 45-65 years (52.5±0.6). Fatness was assessed by bioelectric impedanciometry and anthropometry. We measured resting heart rate, blood pressure, and plasma fasting glucose, total cholesterol, LDL-cholesterol, HDL-cholesterol and triglycerides. The association between weight status and the study outcomes was examined by one-way analysis of covariance after adjusting for age. Pairwise comparisons with Bonferroni's adjustment were performed to identify between which groups the differences were significant. Chi Squared test was used to analyze differences on metabolic syndrome (MS) prevalence.

Results: Women presented a BMI equal to 30.2 and an 81% of the sample was overweight or obese. Resting heart rate was 75.9 beats per min. Systolic blood pressure was 132 mmHg and diastolic 72.1 mmHg. Plasma biochemical analysis showed a fasting glucose concentration of 110.6 mg/dL. Total cholesterol was equal to 191.8 mg/dL, composed by 48.8 mg/dL of HDL-cholesterol and 120 mg/dL of LDL-cholesterol. Plasma triglycerides were 115 mg/dL. A 57% of the sample presented MS. Systolic as well as diastolic blood pressure increased across weight status categories (both, P<0.01). Plasma triglycerides and the prevalence of MS also increased as weight status increased (P<0.05 and P<0.001, respectively). Pairwise comparisons showed differences mainly between the normal-weight vs. obese group.

Conclusions: The prevalence of MS risk factors increased as weight status increased. Nutritional and exercise programs focus on a better cardiovascular and lipid profile are mandatory in this population.

Key words: Weight status, metabolic syndrome, obesity, Moroccan.

PO1895

PREVALENCE OF OVERWEIGHT/OBESITY IN RELATION TO HEIGHT FOR AGE IN CAMEROONIAN CHILDREN.

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Background and objectives: In developed nations, taller children exhibit a greater propensity to overweight/obe-

sity. This study tests the hypothesis that the prevalence of overweight/obesity is greater in taller children. Specifically, it explores the relationship between childhood height for age and two measures of body fatness – body mass index (BMI) and waist circumference (WC).

Methods: A cross sectional study of 557 children(287 boys and 270 girls, mean age of 9.0 ± 1.8 years) from the North West Region of Cameroon. Height, weight and WC were measured and BMI calculated. Variables were converted to standard deviation scores (SDS) using the WHO 2007 references for height, weight and BMI and UK 1990 references for WC. Cases were divided into quartiles of height SDS, then BMI and WC SDSs compared across quartiles using 1-way Anova with post-hoc Bonferroni test. Prevalence of overweight/obesity (BMI for age > +1 SDS) and abdominal overweight/obesity (WC for age > 91st percentile) within each quartile determined. Odds ratios (OR) used to assess association between overweight and non-overweight after logistic regression analysis.

Results: Significant increase in mean BMI (-0.08 to 0.65) and WC (-0.11 to 0.87) SDSs with increasing quartiles of height SDS. Prevalence of overweight/obesity and abdominal overweight/obesity increased from the first quartile (0.7 – 5.0%) to the fourth quartile (30.2 – 33.1%) of height SDS. Children with a higher height SDS had a more than three times higher OR for overweight/obesity than their shorter peers ($p < 0.001$).

Conclusions: This study confirms that a higher height for age was associated to a higher frequency of overweight/obesity measured by BMI SDS. This is replicated when WC SDS is used as a measure of adiposity. However, more objective monitoring of height through longitudinal studies is needed to substantiate this suggestion.

Key words: Height, waist circumference, BMI, children.

PO1896

OXIDANT AND ANTIOXIDANT STATUS IN CHRONIC RENAL FAILURE PATIENTS

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Background and objectives: Oxidative stress (OS) has been identified as a risk factor for cardiovascular diseases (CVD). In chronic renal failure (CRF) patients, OS is a disturbance of balance between pro-oxidant and antioxidant systems, leading to CVD. The aim of this cross sectional study was to evaluate the redox status in patients with different stages of CRF.

Methods: 154 patients were divided into 6 groups according to the classification of the National Kidney Foundation (2003). CRF stage 1 (n=28), CRF stage 2 (n=28), CRF stage 3 (n=28), CRF stage 4 (n=18), Hemodialysis (HD; n=40) and peritoneal dialysis (PD, n = 12). Oxidant state was evaluated by analysis of thiobarbituric acid reactive substances (TBARS; Quintanilha et al., 1982), lipid hydroperoxide (LPO) and carbonyls (Cayman Chemical's EIA kit). Antioxidant defense was evaluated by analysis of enzymes activities: superoxyde dismutase (SOD), glutathione peroxidase (GPx), glutathione reductase (Gred) (Colorimetric photometric method; Fluka, Suisse) and Catalase (Cayman Chemical kit).

Results: TBARS and LPO were elevated in HD and decreased in PD and CRF groups ($p < 0.001$). Carbonyls were increased in PD (1.30±0.16 mmol/mg; $p < 0.001$) compared to HD and to CRF groups. SOD (49.01±3.03U/g Hb) and GSH-Px (3.99±1.39U/g Hb) activities were decreased in HD compared to CRF groups and PD ($p< 0.001$). Moreover, Gred was decreased in HD (0.98±0.20U/g Hb) compared to CRF groups and PD ($p < 0.001$). Decrease in Catalase activity was noted only in HD (47.99±5.89U/g Hb) compared to CRF groups and PD ($p < 0.001$).

Conclusions: HD and PD aggravate oxidative stress generated by uremia. HD accentuates lipid and protein oxidation, while PD aggravates protein oxidation. However, the activity of antioxidant enzymes was altered by both dialysis treatments.

Key words: Oxidative stress, antioxidants enzymes, CRF, hemodialysis, peritoneal dialysis.

PO1897

RESVERATROL INHIBITED FAT INDUCED DYSBACTERIA IN SYSTEM MIMICKING COLON FERMENTATION

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Background and objectives: The growth of both Gram-positive and, to a lesser extent, Gram-negative bacteria is inhibited by fatty acids by hindrance of nutrient transportation and

accumulation of hydrogen peroxide in the cell. This might be a reason for high fat diet to change colon bacteria composition. This study was aimed to explore the influence of triglyceride and resveratrol, a typical antioxidant, on colon bacteria composition in a fermentation model in vitro.

Methods: Fresh feces were sampled from a 30-year old healthy man, bacteria were immobilized polysaccharide gel beads and were inoculated in colon mimicking culture medium (CMCM) for 48 h. Gel beads harvested and were then incubated in following medium: i) CMCM, ii) CMCM containing monoglyceride (8g/L) or medium containing 0.06% of resveratrol. Lactobacilli, Escherichia coli and enterococcus were detected by plate count on selective medium, total-AOC, hydrogen dioxide and hydroxy radical scavenging ability (HRSA) were also analyzed.

Results: Lactobacilli showed decreasing trend after monoglyceride treatment. Escherichia coli and enterococcus showed increasing trend. Ratio of G+/G- bacteria decreased significantly while HRSA decreased significantly also. Resveratrol addition significantly increased ratio of G+/G- bacteria. It led to significant decrease of hydrogen dioxide and increase of HRSA and T-AOC in fermenting system. T-AOC showed significant positive and negative correlation with lactobacilli (R=0.77, P=0.04) and enterococcus (R=-0.91, 0 P=.04), respectively. hydrogen dioxide was significantly positive related with Escherichia coli (R=0.93, P=0.02). HRSA showed significant negative correlation with enterococcus (R=-0.60, P=0.03).

Conclusions: Resveratrol can prevent monoglyceride induced decrease of G+/G- bacteria ratio and production of oxygen free radical.

Key words: colon, fermentation, resveratrol, lactobacilli, hydrogen dioxide.

PO1898

SERUM URIC ACID LEVELS OF SECONDARY SCHOOL-AGE STUDENTS IN NORTHERN AND SOUTHERN REGIONS OF THAILAND

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Background and objectives: Hyperuricemia is commonly associated with hypertension, metabolic syndrome, and other risk factors of cardiovascular disease. In our study we found that the secondary school-age students in Northern and Southern regions of Thailand had high prevalences of obesity, hypertriglyceridemia, and hypercholesteroldemia. The aim of this study was to investigate the serum uric acid levels and its relationship with cardiovascular risk factors in those secondary school-age students.

Methods: The cross-sectional study by Waisaihealth Program, involved 816 Thai northern, and 873 Thai southern secondary school-age students aged 11-19 years. Their nutritional and uric acid status were assessed by Tanita BC- 418 MA body composition analyzer, serum uric acid, serum triglyceride and serum LDL cholesterol levels.

Results: Serum uric acid levels ranged from 2.8-11.9 mg/dL and 2.7-10.9 mg/dL in northern students and southern students, respectively, no significant difference between two regions. Mean±SD of serum uric acid level in northern female adolescents (4.9±1.0 mg/dL) was significantly lower than those in southern female adolescents (5.1±0.9 mg/dL). In obese and hypertriglyceridemic adolescents from northern and southern regions had significantly higher mean serum uric acid levels than those in normal weight adolescents.

Conclusions: Our data indicated that obese and hypertriglyceridemic adolescents are prone to hyperuricemia. Thus these abnormalities can result in cardiovascular disease in their older age. Different dietary habits and life style among regions had effects on serum uric levels.

Key words: Serum uric acid, hyperuricemia, adolescent, obesity.

PO1899

GLUTAMINE ADMINISTRATION MODULATES LUNG γδT CELL EXPRESSION IN SEPTIC MICE

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Background and objectives: Sepsis is a common clinical syndrome with high mortality rates. Acute lung injury is the most frequent complication of sepsis. Previous study reported that γδT cells play a major role in linking innate and adaptive immune systems and are instrumental in reducing lung damage associated with inflammation. Glutamine (GLN) has been considered as an essential amino acid during catabolic conditions due to its immunomodulating properties. This study investigated the effects of GLN administration on regulating lung γδT cells in polymicrobial sepsis.

Methods: Mice were randomly assigned to normal group (NC), septic saline group (SS), and septic GLN group (SG). All

mice were fed with chow diet. Sepsis was induced by cecal ligation and puncture (CLP). The SS and SG groups were respectively injected with saline and 0.75 g GLN/kg body weight once via tail vein 1 h after CLP. Mice were sacrificed 6, 12, and 24 h after CLP. Their lungs were collected for further analysis.

Results: Compared to normal mice, sepsis resulted in higher lung γδT cell and neutrophil percentages and higher cytokine expressed by γδT cells. The SG group had higher lung γδT cell percentage and lower neutrophil numbers. Apoptotic rates of lung γδT cells were lower, whereas neutrophils were higher than those of the SS group. Moreover, interleukin (IL)-17A, interferon-γ, and IL-10 expressed by γδT cells, and CXCR2 expressed by neutrophils decreased in the SG group. Also, GLN reduced IL-17A, IL-1β, and IL-23 concentrations and myeloperoxidase activity in lung tissues.

Conclusions: Our results suggest that GLN administration after initiation of sepsis affects lung γδT cell percentage and cytokine secretion, and prevented apoptosis of γδT cells and neutrophil infiltration to the lungs.

Key words: sepsis; acute lung injury; γδT cell; glutamine; Interleukin 17

PO1900

DISCOVERY OF A LOW GLYCEMIC INDEX POTATO AND RELATION BETWEEN IN VITRO STARCH DIGESTION AND GLYCEMIC RESPONSE

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Background and objectives: Potatoes are the world's third largest food crop and most extensively consumed root vegetable. Nutritional studies on potatoes using in vivo and in vitro approaches to classify digestibility and availability of carbohydrates indicate that cooked potatoes contain mostly rapidly digested starch and have a high glycemic index (GI). Finding a low GI potato and developing a screening method for finding low GI cultivars is both a health and agricultural priority. Our aims were to screen commonly used and newly introduced cultivars of potatoes, in a bid to discover a low GI potato and to describe the relationship between in vitro starch digestibility of cooked potatoes and their in vivo glycemic response.

Methods: Seven commercial potato cultivars sourced from growers in Tasmania and South Australia, were tested for their GI according to International Standard Organisation (ISO) guidelines. In vitro enzymatic starch hydrolysis and chemical analyses, including amylose content were performed for each potato cultivar and correlations sought with the respective GI values.

Results: The potato cultivars showed a wide range of GI values (53 - 103). The cultivar Carisma was classified as low GI, Nicola (GI = 69) as medium GI and the other five cultivars were classified as high GI according to ISO classification. The GI values were strongly and positively correlated with the percentage in vitro enzymatic hydrolysis of starch from the cooked potatoes. Content of total starch, amylose, and dietary fibre were not correlated to in vitro starch digestibility or GI of the cooked potatoes.

Conclusions: A low GI potato cultivar (Carisma, GI = 53) was identified. Under the conditions of our experiments, in vitro methods were a reliable predictor of GI classification for potatoes.

Key words: glycemic index, potatoes, in vitro digestion, amylose.

PO1901

ANDROGRAPHOLIDE SUPPRESSES TNF-α-INDUCED OXIDATIVE STRESS BY MODULATING CELLULAR ANTIOXIDATION IN HUMAN ENDOTHELIAL CELLS

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Background and objectives: Andrographolide, the major bioactive component of Andrographis paniculata, has been demonstrated to have various biological properties including anti-inflammation, anti-oxidation, and anti-hepatotoxicity. Oxidative stress is considered to be a major health risk in aging, inflammation, cancer, atherosclerosis, and diabetes mellitus. Previous studies have shown that NADPH oxidase is a major source of reactive oxygen species. Many phytochemicals were shown to up-regulate the expression of antioxidant genes associated with endothelial cells.

Methods: In this study we used EA.hy926 endothelial-like cells as cell model, and used Western blotting, real-time PCR, spectrophotometer, shRNA, and peroxide formation to explore the antioxidative activity of andrographolide.

Results: The results showed that andrographolide induces heme oxygenase-1 (HO-1) and glutamate cysteine ligase modifier subunit (GCLM) gene expression, and superoxide dismutases (SOD-1), and glutathione reductase (GSR) gene expression as well as enzyme activity in a time-dependent manner.

The mechanism underlying up-regulation of HO-1 and GCLM by andrographolide is associated with ERK or PI3K/Akt pathways. Nrf2 and AP-1 were demonstrated to play a crucial role in modulating HO-1, GCLM, SOD-1, and GSR gene expression by using shNrf2 and shJUN. Cellular GSH level is increased by andrographolide, and andrographolide-induced increase in GSH level is blocked by shGCLM. TNF-α induces the activation of NADPH oxidase subunits, p47 and p67. In addition, TNF-α-induced oxidative stress is attenuated by andrographolide. Further, shp47 abolished TNF-α-induced p65 nuclear translocation and ICAM-1 gene expression.

Conclusions: Taken together, andrographolide attenuates TNF-α-induced oxidative stress is at least in part through enhancement of cellular antioxidative capacity. These results implicate that andrographolide is an antioxidant candidate based on its antioxidant status-enhancing effect.

Key words: andrographolide, antioxidation, TNF-α, NADPH oxidase, human endothelial cells.

PO1902

DIETARY QUERCETIN ATTENUATES OXIDANT-INDUCED ENDOTHELIAL DYSFUNCTION AND ATHEROSCLEROSIS IN APOE KO MICE FED A HIGH-FAT DIET

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Background and objectives: There are several lines of evidence to suggest that quercetin, a polyphenol derived in the diet from fruits and vegetables, contributes to cardiovascular health. Endothelial dysfunction is an early risk factor in the development of atherosclerosis. The aim of this study was to investigate the effects of quercetin supplementation on endothelial function and the development of atherosclerosis in mice fed a Western high fat diet (HFD)

Methods: Wild-type (WT) C57BL6 and ApoE KO mice were randomly assigned to receive either (i) high fat diet (HFD), or (iii) HFD supplemented with 0.5% w/w quercetin (Q) for 14 weeks.

Results: Compared with animals fed the HFD, the HFD supplemented with quercetin attenuated the development of atherosclerosis in the ApoE KO mice. The HFD+Q diet significantly improved endothelium-dependent relaxation of aortic rings isolated from WT, but not ApoE KO mice, while the HFD+Q attenuated hypochlorous acid-induced endothelial dysfunction in aortic rings from both the WT and ApoE mice. Mechanistic studies revealed that the HFD+Q significantly improved oxidative stress, urinary nitrite levels, endothelial NO synthase activity and increased heme oxygenase-1 (HO-1) protein expression in aorta. Separate experiments demonstrated that quercetin did not protect against oxidant-induced endothelial dysfunction in arteries obtained from heterozygous HO-1 KO mice.

Conclusions: Quercetin protects mice fed a high fat diet against oxidant-induced endothelial dysfunction and ApoE KO mice against atherosclerosis. These effects are associated with improvements in NO bioavailability and critically related to arterial induction of HO-1.

Key words: quercetin, endothelial function, atherosclerosis, HO-1.

PO1903

EFFECTS OF DIFFERENT AMOUNTS AND TYPES OF DIETARY FATTY ACIDS ON BODY WEIGHT, FAT ACCUMULATION AND LIPID METABOLISM IN DIET-INDUCED OBESE HAMSTERS

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Background and objectives: The aim of this study was to assess the effect of different amounts of a special mix oil on body weight, fat accumulation and lipid metabolism of hamsters with diet-induced obesity (DIO).

Methods: This special mix oil contains 60% monounsaturated fatty acids (MUFAs) and the polyunsaturated-to-saturated fatty acid ratio is adjusted to 5 (P/S ratio = 5). Male Golden Syrian hamsters were randomly assigned to the control group (n=12) and obesity group (n=30) which were given low-fat diet (5% w/w soybean oil) and high-fat (35% w/w) respectively during DIO period for 9 weeks. After DIO period, the obesity hamsters were randomly subdivided into three subgroups (n=10/group) switched to a low-fat, moderate-fat and high-fat diet: the 5% (w/w) experimental mix oil (OB-M5) group, 15% experimental mix oil (OB-M15) group and 20% experimental mix oil (OB-M20) group for 8 weeks. The control hamsters continued on a low-fat diet. Consumption of food was measured daily, and body weight was measured weekly. Serum insulin and leptin concentrations were assessed. Hepatic and adipose tissue fatty acid metabolic enzymes were determined using enzyme activities analysis.

Results: After the DIO period, the obesity group significantly increased in weight and weight gain compared with the control group. No differences were observed in weight, weight

gain, epididymal and retroperitoneal fat weights in all groups after 8 weeks dietary intervention. **Conclusions:** Experimental mix oil (MUFAs 60%, P/S ratio = 5) seemed to be beneficial in preventing moderate and high fat intake caused weight and adipose tissue weight gain by preventing insulin concentration, fatty acid synthase(FAS) and lipoprotein lipase(LPL) enzymes activity increased in DIO hamsters.

Key words: monounsaturated fatty acids, polyunsaturated to saturated fatty acid ratio, diet-induced obesity.

PO1904

ESTIMATE OF A MINERAL COMPOSITION FOR AN ORAL FOOD COMPLEMENT TO HOSPITALIZED ONCOLOGIC PATIENTS

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Background and objectives: Sometimes hospitalized patients have insufficient alimentary ingestion. This study analyzed the mineral composition of an artisanal oral food complement (OFC) through the data of food consumption of oncologic patients who received oral diet, separately or associated to the OFC.

Methods: The mineral composition, determined by ICP OES, and the food consumption of patients under regular, blend and soft diets were evaluated in six non-consecutives weekdays, without repetition of the menu, being that patient with increased nutritional necessities also received OFC. The levels of Ca, P, Na, K, Mg, Mn, Zn, Cu and Se consumed by the patients were calculated deducting the weight from the leftover of the sent weight , using an electronic scale. Results were compared to the nutritional recommendations (RDA), with statistical analysis by ANOVA and Tukey tests ($P<0.05$).

Results: A total of 163 patients participated: 77.3, 16.6 and 6,1% under regular, blend and soft diet, respectively, being that 23.0, 30.7 and 40.0% received OFC with their diet. The average acceptances of the diets was of 70.0% and OFC 89,7%. There were fewer acceptance for the meal following the OFC, lunch (49.7 versus 56.8%) and dinner (64.9 versus 57.6%). The adequacy of the consumption was similar among patients with or without OFC, except for the Ca which recommendation was reached by the patients with OFC ($p<0.001$). The mineral content to achieve RDA using OFC was estimated to be 700 mg Ca; 0.1 mg Cu; 0.2 mg Fe; 2600 mg K; 200 mg Mg; 0.4 mg Mn; 2.9 mg Zn; 0.02 mg Se, without P and Na.

Conclusions: Mineral supplementation to patients becomes necessary to comply with RDA. The administration of mineral supplements is recommended in these patients given the fact that there is no interference with the patient's meals acceptance.

Key words: dietotherapy, food analysis, food consumption, nutritional supplement.

PO1905

NUTRITIONAL EVALUATION OF DAILY INTAKE IN ALZHEIMER'S PATIENTS

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Background and objectives: Changes in nutritional status, primarily characterized by meaningful weight reduction, are reported during the course of Alzheimer's disease (AD). The aim of the present study was to evaluate the daily intake of a group of elderly subjects with Alzheimer's dementia and a control group.

Methods: 100 subjects were included in this study. 24 patients (17 females and 7 males), aged 76±4 years (mean±SEM), with AD at initial phase (ADI) and 24 patients (18 females and 6 males), aged 77±3 years with AD at moderate phase (ADM). All patients were selected from Alzheimer's associations of the Region of Murcia, Spain. Furthermore, 52 control subjects (C) (40 females and 12 males), aged 79±4 years, without dementia were included. It was performed a nutritional evaluation of daily intake by means of a 24 h questionnaire and it was done for three not consecutive days, including a holiday. The nutritional survey data were processed with Dietsource 3.0 software. Anthropometric variables, including weight, height and body mass index, were measured. Statistical analysis was performed with SPSS 17.0 software.

Results: The weight of ADM (64.84±1.90 kg) was significantly lower ($p=0.002$) than the weight of C (74.87±2.46 kg), as well as the caloric intake (1776 kcal/24h vs. 2106 kcal/24h) ($p=0.006$). It was observed that, with advance of the disease, this caloric intake was lower (ADI=2020 kcal/24h; ADM=1776 Kcal/24h) ($p=0.04$). In ADM, daily intake of folic acid (268±22.79 µg), selenium (44.02±7.03 µg) and zinc (7.20±0.53 mg) was lower than the intake of these micronutrients in C ($p<0.05$).

Conclusions: It is necessary to perform a nutritional education to the family or caregivers of Alzheimer's patients to improve their nutritional status, especially in the moderate stage of the disease, to avoid associated complications.

Key words: Alzheimer's disease, daily intake, nutritional evaluation.

PO1906

AN UNDIGESTED GLIADIN PEPTIDE ACTIVATES INNATE IMMUNITY AND PROLIFERATIVE SIGNALLING IN ENTEROCYTES: ROLE IN CELIAC DISEASE

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Background and objectives: Upon ingestion of gliadin, the major protein component of wheat and other cereals, the celiac intestine is characterized by the proliferation of crypt enterocytes with an inversion of the differentiation/proliferation program. Gliadins, and A-gliadin peptide P31-43 in particular, act as growth factors for Celiac Disease (CD) crypt enterocytes. The effects of gliadin on proliferation and activation of innate immunity are mediated by growth factors (EGF) and innate immunity mediators (IL15). We studied the molecular bases of the proliferative and innate immune response to gliadin peptides in enterocytes.

Methods: CaCo-2 cells have been used to study EGF, IL15 and P31-43 induced proliferation. Silencing mRNAs and blocking EGFR- IL 15-antibodies have been used to study proliferation in CaCo-2 cells and intestinal biopsies from CD patients and controls.

Results: In CaCo-2 cells IL15 and EGF cooperate to induce proliferation in intestinal epithelial cells at both the transcriptional and post transcriptional levels and the relative receptors can interact to activate each other signalling. We have also found that P31-43 effects on CaCo-2 cell proliferation and downstream signalling are mediated by cooperation between EGF and IL15. Only when used in combination, blocking EGFR and IL15 antibodies, can reduce the increased crypts enterocytes proliferation in intestinal biopsies from CD patients.

Conclusions: EGFR/IL15R-alpha cooperation regulates intestinal epithelial proliferation induced by EGF, IL15 and gliadin peptide P31-43. Increased proliferation of crypt enterocytes in the CD intestine is mediated by EGF/IL15 cooperation.

Key words: Celiac Disease, EGF, IL15, intestinal proliferation.

PO1907

ADHERENCE TO THE MEDITERRANEAN DIET AND RISK OF BLADDER CANCER IN THE EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION

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Background and objectives: There is growing evidence on the protective effect of the Mediterranean dietary on cancer. To our knowledge though, no epidemiological study to date has investigated the influence of the Mediterranean diet on bladder cancer. Therefore, we evaluated the association between adherence to the Mediterranean diet and risk of urothelial cell bladder cancer (UCC) in the European Prospective Investigation into Cancer and Nutrition (EPIC).

Methods: 477,312 participants (29.8% male), mostly aged 25-70 years, were recruited from 10 European countries between 1991-2000 and included in this analysis. Information from validated dietary questionnaires was used to develop a relative Mediterranean diet score (rMED) which represented each participant's level of adherence to a Mediterranean dietary pattern, including 9 key components. Multivariable Cox regression models were used to assess the effect of the rMED on UCC risk. The models were stratified by sex, center and age at recruitment and adjusted for energy and tobacco smoking (status, intensity, duration and time since quitting).

Results: After an average follow-up of 11 years, 1,425 participants (70.9% male) were diagnosed with a first incident UCC (430 classified as aggressive/ high risk tumours and 413 as non-aggressive/low risk tumours). There was no evidence of a statistically significant association between the rMED and risk of UCC overall (HR: 0.84 (95% CI 0.69, 1.03)) or in aggressive (HR: 0.88 (95% CI 0.61, 1.28)) and non-aggressive tumours (HR: 0.78 (0.54, 1.14)) for a high versus low rMED score. There was also no evidence of interaction by smoking, body mass index, European region or age at diagnosis.

Conclusions: In EPIC, there is no evidence that adherence to the Mediterranean diet is associated with risk of UCC. These findings reflect the weak evidence for associations between questionnaire-derived dietary factors and bladder cancer risk.

Key words: Mediterranean diet, bladder cancer, cohort.

PO1908

DIABETES KNOWLEDGE EVALUATION IN TYPE 2 DIABETIC PATIENTS

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Background and objectives: Knowledge about medications, diet, exercise, home glucose monitoring, foot care, and treatment modifications is necessary to effectively self-manage diabetes. The aim of this study was to assess the knowledge among our type 2 diabetic patients and to identify knowledge deficits and features that are associated with this knowledge.

Methods: A cross-sectional sample survey of patients' knowledge of diabetes was carried out by administering a 23-item diabetes knowledge questionnaire adapted to Spanish language to collect information.

Results: 90 patients were evaluated, mean age 6.,1+/-11.7 years, 57.1% men. Mean duration of diabetes was 12+/-8.66 years, mean time of attendance in our endocrinology department 3.45+/-3.47 years. 35.7 % presented chronic complications disease-related; 70% HTA, 73% obesity and 83.3% dyslipemia. 30 % were treated with oral hypoglycemic agents (OHA), 10% insulin treated and 60% with combined treatment. Mean BMI was 33.8 +/-4.8, and mean HbA1c 7.55+/-1.05%. 51.9% of the patients answer correctly more than 75% of the questions and 48.1% more than 50 %. None of the patients answered correctly less than 50%. The number of right answers was statistically significant regarding age (mean 58.8±12.9 years in more than 75% of right answers vs 65.1±10.1 years in 50-75% of right answers, PO,05), but there were no significant differences depending on years of evolution (12.7± 10.2 vs 10.3±6.3), BMI (33.5±5.5 vs 33.7± 4.9), HbA1c (7.4±1.2 vs 7.8±0.7%) or time of endocrinology clinic attendance (4±4.1vs2.7±2,5 years). There were also no statistically significant differences depending on sex, chronic complications or previous educational programms. Insulin treated patients answered correctly more than 75% in 100% of cases vs patients treated with OHA (41,2%, PO,026).

Conclusions: In our group of DM2 patients, most of them had appropriate diabetes related knowledge. Patients with better scores had less mean age, and are insulin-treated.

Key words: Diabetes, knowlegde, nutrition.

PO1909

ASSOCIATIONS BETWEEN FTO GENE POLYMORPHISM, DIET, PHYSICAL ACTIVITY, AND BODY MASS INDEX IN LITHUANIAN ADULT POPULATION

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Background and objectives: Single-nucleotide polymorphism rs9939609 in FTO gene is significantly associated with body mass index (BMI). Moreover, lifestyle factors, including diet and physical inactivity, are important contributors to weight gain. The aim of this study was to assess the effect of FTO gene polymorphism, energy and nutrient intake, physical activity, and gene-environmental interactions on BMI in Lithuanian adult population.

Methods: A cross-sectional health survey was carried out in random sample of Lithuanian population aged 25–64 years. The data from 1026 subjects (424 men and 602 women) were analysed. Single-nucleotide polymorphism rs9939609 was assessed using a real-time polymerase chain reaction. 24-hour recall and food frequency questionnaire were used for evaluation of dietary habits. BMI was calculated using measured height and weight. Multiple linear regression models were fitted to test the effects of FTO genotype, diet, physical activity as well as gene-environmental interactions on BMI.

Results: Men and women with TT genotype had the lowest mean values of BMI, while individuals carrying AA genotype had the highest BMI. Compared to the carriers of TT genotype, the likelihood of obesity was significantly higher for the carriers of AA genotype (odds ratio was 1.69, 95% confidence interval 1.29-2.21). No significant association was found between rs9939609 and dietary intake or physical activity. Multivariate linear regression analysis showed that FTO genotype, percentage of energy from fat, and physical activity were significant determinants of BMI. Our data did not reveal any statistically significant interactions between FTO genotype and energy intake as well as nutrient intake on BMI. However, high level of physical activity attenuated the effect of the FTO polymorphism on BMI (p for interaction 0.02).

Conclusions: No interaction of rs9939609 with energy and nutrient intake on BMI was found. Physical activity can modulate the effect of FTO on BMI.

Key words: obesity, gene-environmental interactions.

PO1910

USE OF WAIST TO HEIGHT RATIO IN ASSESSING METABOLIC DERANGEMENTS AMONG NORMAL AND OVERWEIGHT/OBESE INDIVIDUALS

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Background and objectives: Although BMI is used to assess obesity it does not always relate to central obesity, the main metabolic risk factor. Waist circumference(WC) to height ratio(WHtR) is a simple index of central obesity. This study looks at its usefulness in detecting metabolic derangements in 5-15 year old Sri Lankan children.

Methods: A cross sectional descriptive study conducted in Colombo district. Height, weight and WC were measured. FM assessed using InBody-230 BIA machine (Boispace Co Ltd, South Korea) and validated against Sri Lanka body composition equations. BMI and WHtR were calculated. BMI was classified based on IOTF cutoffs. After a 12hour fast, blood was drawn for fasting blood glucose(FBS) and lipid profile. Standard OGTT was performed with random blood sugar(RBS) at 2hours. Metabolic derangements(MetD) were defined as; WC for age >90th centile (UK standards); FBS>100mg/dl or RBS>140 mg/dl; HDL-C<40mg/dl; triglyceride>150mg/dl; and SBP/DBP >+2SD for age (UK standards). Metabolic syndrome(MetS) was diagnosed by a high WC with >2 MetD. ROC were drawn to determine best WHtR that predicts MetS as well as >2 MetD.

Results: 920 children (547boys) were studied. 13.3% were obese/overweight and 38.5% had a normal BMI. 13.6% had central obesity. Those with normal BMI, but central obesity had higher total and LDL cholesterol and triglyceride levels(p>0.05). WHtR detected more cases with abnormal, cholesterol and HDL than BMI, but triglyceride, LDL and ALT cases detected were similar by both. WHtR to detected MetS was 0.51(sensitivity-1.00; specificity-0.83) in boys and 0.49(sensitivity-0.83; specificity-0.83) in girls. To detect >2 MetD was 0.42(sensitivity-0.6; specificity-0.62) in boys and 0.45(sensitivity-0.62; specificity-0.62) in girls.

Conclusions: Internationally accepted BMI and WHtR have similar efficacy in detecting MetD. Cutoffs developed for MetS is similar to international cutoffs, but to detect >2 MetD is quite low.

Key words: Waist height ratio, Sri Lankan children, central obesity.

PO1911

SELENIUM DEFICIENCY IN ASYMPTOMATIC HIV-INFECTED ADULTS

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Background and objectives: Selenium is particular relevant in HIV infection because it might modulate immune cells. The aim of this study was to evaluate selenium status in asymptomatic HIV-infected outpatients.

Methods: Descriptive, cross-sectional study which included 106 HIV-infected adults. Samples of whole blood were collected from fasting patients. Clinical data were obtained from medical records. Plasma selenium was determined in hemolysis-free plasma by flame atomic absorption spectrometry. A calibration curve was performed, using commercial standards. Reference values were taken from international bibliography (60–160 µg/L). The Ethics Committee of the University of Buenos Aires approved the study. All participants gave informed consent before recruitment. Student´s t-test, ANOVA or Wilcoxon Rank Sum analysis were applied to analyze differences between means. Pearson´s correlation coefficient was used to measure the relationship between selenium and other parameters. Values were considered statistically significant for p<0.05. Software used was SPSS17.0.

Results: 69.8% males, mean (SD), age 38,6 (8,5) years old. 80% under antiretroviral treatment. Media (SD) CD4 count of 461.7 (235.0) cells/mm3, median (IQR) viral load <50 (<50-433000) copies/mL. Although nutritional status evaluated by BMI seemed to be well [24.3 (4.1) kg/m2], 63.3% of the patients presented selenium under reference value. Selenium median (IQR) was 49.3(31.9-68.75) µg/L. It is interesting to point out that patients with less than 200 CD4/mm3 had a significantly lower selenium mean (SD) than patients with more than 200 CD4/mm3 [32.3 (15.0) µ/L vs. 57.0 (26.1) µ/L with 200-500 CD4/mm3, p<0.001; vs. 51.6 (27.2) µ/L with >500 CD4/mm3, p=0.034]. On the other hand, viral load and selenium had a statistical direct correlation (Pearson coefficient 0.248; p=0.018).

Conclusions: The results show a great number of patients with selenium deficiency, which seems to have a relation with HIV parameters. Nutritional counseling to improve nutrient adequacy should be performed from the diagnosis of HIV. Partially supported by UBA (Grant 20020100100044).

Key words: HIV, selenium,deficiency, adult, CD4.

PO1913

BODY FAT AND INFLAMMATION IN CUBAN SCHOOL CHILDREN

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Background and objectives: Body fat excess is associated with insulin resistance and inflammation. The aim of this study was to identify this association in school children.

Methods: Case-control study in 2012 with 51 overweight (OW) (mean age 107 months) and 51 normal children, paired by age, sex, and socioeconomic status, and submitted to measurements of body fat by deuterium dilution, inflammatory citoquines, insulin, ferritin, transferrin receptors, glucose, serum lipids, haemoglobin, energy expenditure, blood pressure, and dietary intake. Comparisons were carried out means Odd ratios, Mann Whitney tests, main component and multivariate analysis and logistic binary regression.

Results: OW children with 1.7 times more body fat showed higher levels of C-Reactive Protein (CRP), insulin, triglycerides, blood pressure, physical activity, and higher intake of refined cereals, canned fruits, soft drinks, fast foods, dietary energy, carbohydrate, polysaccharides, animal fat, methionine, and sodium; the essential fatty acids intake was lower and the sugar intake double as recommended and not different between groups. Most OW children had both parents OW (OR=7.955, P=0.0000) and mothers with higher BMI at pregnancy. Children born by caesarea showed a 2.4 higher risk to be OW at school age (p=0.0031, IC: 1.04–5.56). Four factors explained 72% of the sample variance: the association between adiposity, higher fast foods and fat intake and higher levels of CPR and insulin.

Conclusions: Fat accretion in school children was strongly associated to inflammation, hyperinsulinemia, and high intake of fast foods, refined cereals, total energy, carbohydrates, sodium, and animal fat. Overweight was more related with food intake, BMI at pregnancy and parents´ overweight, than with a sedentary life style.

Key words: body fat, school children, inflammation, citoquines.

PO1914

THE MEDITERRANEAN DIET IMPROVES THE LOW-DENSITY LIPOPROTEIN PARTICLE SIZE PHENOTYPE IN MEN WITH METABOLIC SYNDROME

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Background and objectives: Studies have indicated that individuals with small, dense low density lipoprotein (LDL) particles are at increased risk of cardiovascular disease. The impact of the Mediterranean diet (MedDiet) on various electrophoretic characteristics of LDL particles has not been extensively studied to date. The objective of the study was to investigate the effect of the MedDiet without weight loss (-WL) and with weight loss (+WL) on various features of the LDL particle size phenotype in men with metabolic syndrome (MetS).

Methods: The diet of 19 men with MetS (NCEP-ATP III, age 24-62 years) was first standardized to a typical North American control diet that they consumed for 5 weeks under isoenergetic feeding conditions (all foods and beverages provided). Subjects were then fed a MedDiet for 5 weeks also under isoenergetic conditions (MedDiet-WL), after which they underwent a 20-week weight loss period in free-living conditions (average weight loss -10.2 ± 2.9% body weight, P<0.01). This was followed by consumption of the MedDiet (5 weeks) under isoenergetic conditions (MedDiet+WL). Features of the LDL size phenotype were determined at the end of each isoenergetic feeding period by polyacrylamide gradient gel electrophoresis.

Results: MedDiet-WL led to a significant increase in LDL-peak particle diameter (LDL-PPD, +0.7%) and in the proportion of medium size LDL (LDL255-260 Å, +11.1%) and reduced the proportion of small dense LDL (LDL<255 Å, -11.7%) vs. the control diet (all P<0.05). MedDiet+WL was associated with a further increase in LDL-PPD (0.2%, P<0.05) but had no further impact on the proportion of small dense LDL compared with MedDiet-WL.

Conclusions: Data from this controlled feeding study suggest that consumption of MedDiet, even in the absence of weight loss, beneficially alters the atherogenic properties of LDL particles in high risk men with MetS.

Key words: Mediterranean diet, metabolic syndrome, weight loss, LDL particle size.

PO1915

ARTHROSPIRA PLATENSIS AS NUTRITION SUPPLEMENT FOR ADULTS INFECTED BY THE HUMAN IMMUNODEFICIENCY VIRUS

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Background and objectives: Supplements are often used to improve the nutritional status of HIV patients. Arthrospira platensis (Asp), also known as Spirulina, is a cyanobacteria rich in proteins and micronutrients. There is a paucity of data describing the immune modulating activity and nutritional properties of Asp. This gender-oriented study describes the influence on a sensitive pre-High Active Anti-Retroviral therapy (pre-HAART) population.

Methods: A three month pilot-Randomized Controlled Trial (RCT) compared the supplementation between five gram/day of Asp with a placebo containing the same amount of protein and calorie in HIV infected women. The study was conducted in Yaoundé, Cameroon. The disease predictors were CD4 T-cells and viral load. Common nutritional markers were also assessed. Statistical analyses carried out non-parametric tests and the size effect of each interaction was calculated.

Results: There were no differences observed on the immune and virological markers during the pilot-RCT. Nutritional markers were improved. Both groups registered a weight increase of 0.65 Kg, $p<0.05$ for the placebo and 0.5 Kg, $p>0.05$ for Asp. The cholesterol decrease was significant for the Asp group -0.14 g/l, $p<0.05$. The hemoglobin and erythrocyte count did not significantly improve. The antioxidant serum status differ significantly $p<.001$ with a large size effect $r=.51$ between the groups, +56 µM for Asp and -22 µM for the placebo.

Conclusions: The observed stabilization of the immune markers under Asp supplementation can be considered encouraging. The increase of antioxidant capacity and the lower cholesterol levels should be a focus in future research. Moreover, we would recommend further research on natural nutritional interventions in larger doses and on a larger population. Nutritional intervention with a natural local product can improve the pre-HAART phase as prevention against complications in the chronic HIV infection.

Key words: HIV, pre-HAART, supplement, spirulina, natural product, antioxidant.

PO1916

EFFECTS OF MESEMBRRYBRYANTHEMUM FORSSKALEI HOCHST SEEDS IN STREPTOZOTOCIN-INDUCED DIABETIC RATS

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Background and objectives: The aim of present investigation was to study the effects of Mesembryanthemum forsskalei Hochst (Samh) seeds in streptozotocin-induced diabetic rats.

Methods: Thirty rats were administrated streptozotocin to induce diabetes and 6 rats were used as untreated diabetic control. Diabetic rats were fed with 5, 10 and 15% Samh seed alone or in combination with fatty diet i.e. 2% cholesterol for 6 weeks. Effects of Samh seed on blood glucose levels, lipid profiles and enzyme activities of diabetic rats were examined. In addition, total cholesterol (TC), triglyceride (TG) and high density lipoprotein-cholesterol (HDL-C) were determined. In addition, liver lipid profile, lipid peroxide production malondialdehyde (MDA) and reduced glutathione (GSH) were measured in diabetic rats' liver, and levels of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) were also determined.

Results: Diabetic rats treated with 15% Samh seed diet had significantly decreased levels of TC (40%), TG (46%) and HDL-C (31%) respectively. There was no significant effect in glucose levels in 15% Samh seeds treated rats for 6 weeks. A decrease in enzymes levels, AST (58.2%), LDH (1.6%), ALT (24.3%) and ALP (5.38%) in 5% Samh seeds diet treated rats were observed and were found near to untreated control. The samh seed diet supplemented with cholesterol significantly increased ($P<0.05$) levels of liver peroxide production MDA, TC and TG in diabetic rats compared to the samh diet not supplemented with cholesterol. However, the samh seeds significantly decreased ($P < 0.05$) GSH levels.

Conclusions: Findings from the present study demonstrated that non fatty Samh seeds diet could have hypoglycemic and antihyperlipidemic effects in diabetic rats and could be useful means for the treatment of diabetic patients.

Key words: Samh seeds. streptozotocin, diabetes, hypoglycemic, antihyperlipidemic.

PO1917

ADVANCED GLYCATION END-PRODUCTS IN THE DIET AND RELATION WITH GLYCATED HAEMOGLOBIN LEVELS IN DM2 INDIVIDUALS

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Background and objectives: Nutritional Intervention is recognized as a key component controling type 2 Diabetes (DM2). Intake of food with high content of Advanced glycation end-products (PGA) has been related with a poor metabolic control in DM2 individuals. to the aim of this work was to determine the correlation between PGA intake and Glycated haemoglobin (HbA1c) in DM2 individuals.

Methods: Modified Intake frequency surveys were conducted to 41 individuals in 18 to 60-year-old age group, within all the categories of nutritional status, HbA1c between 6% and 10% no more tan 3 months old. The variables studied covered the PGA and HbA1c dietetic intake. Data was tabulated in SPSS software Version 17, applying descriptive statistics for characterizing the sample and the diet. Quantitative variables were analyzed with Pearson correlation test, considering significant a p<0,05.

Results: 59% of the individuals studied were female, 83% revealed overnutrition; the average of HbA1c was 7,5 ±1,6%. A possitive relation, weak but significant between PGA intake of the diet and HbA1c (r=0,368 p=0,01) was obtained.

Conclusions: According to the current research, the nutritional recommendations in DM2 individuals should include food counseling intended for decreasing PGA intake in the diet.

Key words: Type 2 Diabetes Mellitus, diet, end-products of advanced glycation, glycated haemoglobin.

PO1918

ANTI-HYPERGLYCEMIC EFFECT OF VANILLIC ACID IN HIGH-FAT DIET INDUCED PREDIABETIC RATS

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Background and objectives: High fat diet (HFD) fed rats, as one of the insulin resistant animal models, was widely used for understanding the mechanisms of diabetes. Phenolic compounds are widely present in considerable amounts in fruits, vegetables, and beverages in the human diet. Although studies indicated the anti-hyperglycemia effect of phenolic acid, however, there was no report for vanillic acid regarding to anti-diabetes. In this study, animal model was performed to investigate the effect of vanillic acid on anti-hyperglycemia and lipid metabolism in HFD-induced prediabetic rats.

Methods: The male Sprague-Dawley rats fed with HFD (60% fat) for 12 weeks were orally administered with vanillic acid (30mg/kg b.w.) during the last 4 weeks. The fasting blood glucose, insulin and triglyceride levels were determined. The protein expressions of lipid metabolism related enzymes, insulin signal transduction and inflammation factors were analyzed by western blotting.

Results: The fasting blood glucose of HFD rats (111.7¡Ó9.2 mg/dl) significantly reduced after treated with vanillic acid (94.5¡Ó1.9 mg/dl) during the last 4 weeks. The treatment of vanillic acid also reduced triglyceride levels in HFD rats. The protein expressions of adipose triglyceride lipase (ATGL) is increased, whereas the fatty acid synthase (FAS), acetyl CoA carboxylase (ACC) is decreased, suggesting the increase of lipolysis and decrease of lipogenesis, respectively, in HFD rats administered with vanillic acid. The increasing levels on IR, IRS-1, Akt, PI3K, Glut4 revealed improvement of adipose insulin signaling in HFD rats administered with vanillic acid. The expressions of NF-kB, COX-2, MCP-1 and ICAM-1 are decreased, indicating the alleviation on inflammation in HFD rats administered with vanillic acid.

Conclusions: The above observations suggest the potential of vanillic acid for developing into health food on preventing prediabetic syndromes.

Key words: vanillic acid, anti-diabetes, western blotting, insulin signaling.

PO1919

RELATIONSHIP BETWEEN MRNA LEVELS OF LEUKOCYTE ZINC TRANSPORTERS AND INFLAMMATORY MARKERS IN THE OBESE KOREAN WOMEN

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Background and objectives: Obesity, a chronic inflammation state, has been associated with altered zinc metabolism. Two families of zinc transporters, the ZnT (SLC30) and the Zip (SLC29) family, are known to be involved in the regulation of zinc metabolism. In the current study, we examined the gene expression levels of leukocyte zinc transporters between obese (BMI=28.3±3.0, n=35) and non-obese (BMI=20.7±1.0, n=20) young women aged 18-28 yr, using quantitative real-time PCR.

Methods: Inflammatory markers such as high sensitivity C-reactive protein (hs CRP), tumor necrosis factor-alpha (TNF-α), and interleukin-6 were measured in serum.

Results: Zinc intake and serum zinc concentration did not differ between two groups, but inflammatory markerswas significantly higher in the obese than in the non-obese (P<0.05). Among all zinc transporters examined, the Zip1 mRNA was most abundantly expressed in the leukocytes. The mRNA levels ofmany zinc transporters(ZnT4, ZnT5, ZnT9, Zip1, Zip4, and Zip6)were significantly lower in the obese than in the non-obese (P<0.01). The mRNA levels of ZnT4 and ZnT5 were negatively correlated with serum hs CRP concentrations (r=-0.35, P=0.008; r=-0.35, P=0.009) in the young women.The mRNA levels of two transporters were negatively correlated with serum TNF- α (r=-0.44, P=0.0009; r=-0.40, P=0.002). In addition, the Zip1 mRNA level was significantly correlated with serum hs CRP (r=-0.28, P<0.05) and TNF- α (r=-0.35, P=0.009) in young women.

Conclusions: Our study results suggest that inflammation state inobesity may be related with zinc metabolismthrough changes in the gene expressions of various zinc transporters.

Key words: obesity, zinc transporter, inflammatory marker

PO1920

VITAMIN B6 ELEVATES EXPRESSION OF IGFBP1, AN ANTI-TUMOR FACTOR, IN HEPG2 HEPATOMA CELLS

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Background and objectives: There is growing epidemiological evidence suggesting that vitamin B6 (B6) is a protective factor for several cancers. Our studies have also shown the protective effect of dietary B6 on colon carcinogenesis in rodents. Recent studies have suggested that the anti-tumor effect of B6 is ascribed to lowering cell proliferation, inflammation and angiogenesis. However, the detailed mechanisms remain yet unknown. Recently, our DNA microarray study has shown that B6 (pyridoxal: PL) treatment markedly elevated gene expression of IGFBP1 (IGF binding protein-1) in HT29 colon cancer cells. IGFBP1 is mainly produced in the liver, and has been thought to be a protective factor against cancer and cardiovascular disease (CVD). Thus, we hypothesized that the anti-tumor and anti-CVD effect of B6 is at least in part ascribed to higher expression of IGFBP1. This study was conducted to investigate the effect of B6 on the expression of IGFBP1 in HepG2 hepatoma cells.

Methods and results: This study demonstrated that 500 μM PL markedly induced IGFBP1 gene expression in HepG2 cells. Remarkable elevation of IGFBP1 protein by PL addition was not only observed in cell lysates, but also in medium of HepG2 cells. Treatment with ERK inhibitor suppressed the induction of IGFBP1 by PL. PL treatment elevated phosphrylated c-Jun protein, being a down-stream factor of ERK and involved in the promoter activity of IGFBP1.

Conclusions: This study provided evidence that B6 can induce expression of IGFBP1, anti-tumor and anti-CVD factor, by mechanisms involving ERK and c-Jun in hepatoma cells.

Key words: vitamin B6, cancer, cardiovascular disease, IGFBP1, hepatoma cells.

PO1921

EFFECTS OF RICE PROTEIN ON GLUCOSE HOMEOSTASIS AND DIABETIC NEPHROPATHY IN OBESE DIABETIC ZDF RATS

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Background and objectives: Obesity is a risk factor of various diseases, e.g., diabetes, hypertension, and cardiovascular diseases. Especially, diabetes causes diabetic nephropathy and remarkably impairs the quality of life of the patients. It was reported that soy protein had beneficial effects on glucose homeostasis and diabetic nephropathy in diabetic animals. However, we have limited reports that dietary proteins have some beneficial effects on them. Therefore, we attempted to clarify whether rice protein (RP), a new vegetable protein material, has beneficial effects on glucose homeostasis and diabetic nephropathy in obese diabetic Zucker Diabetic Fatty (ZDF) rats.

Methods: Six week old male ZDF rats were fed 20% RP or casein (C) diets for 8 wk. Fasting blood glucose (every week), insulin, adiponectin, and other blood parameters were measured. Urinary albumin excretion, one of the standards for the diagnosis of kidney disease, was measured at 0, 2, 4, 6, 8 wk. In addition, renal glomeruli was morphologically observed to assess the damages of renal glomerular tissues.

Results: There was no significant difference in the fasting blood glucose levels between two groups. However, hemoglobin A1c was significantly suppressed in the RP group, compared with the C group. From these results, it is suggested that RP may improve glucose homeostasis. Urinary albumin excretion was significantly suppressed by RP at 8 wk. In addition, the mesangial matrix score, an index of glomerular tissue damage, was significantly suppressed by RP. From these results, it is suggested that RP has renoprotective effects in ZDF rats.

Conclusions: RP improves glucose homeostasis and delays the progression of diabetic nephropathy in obese diabetic rats.

Key words: Rice protein, ZDF rat, diabetes, obesity.

PO1922

EFFECTS OF SEVEN SELECTED COMPOUNDS IN TRADITIONAL ANTI-DIABETIC CHINESE HERB MEDICINE ON TH1/TH2 CYTOKINE SECRETIONS USING MOUSE PRIMARY SPLENOCYTES

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Background and objectives: Type 1 diabetes (T1D) is a Th1-skewed autoimmune disease with chronic inflammation. To find potential compounds for anti-T1D, seven compounds in traditional anti-diabetic Chinese herb medicine, including baicalein, baicalin, berberine, emodin, geniposide, palmatine and wogonin, were selected to assay their effects on Th1/Th2 cytokine secretions in vitro.

Methods: The selected compounds were purchased at the highest available purity. Cell viabilities of mouse primary splenocytes treated with selected compounds at different concentrations for 72 h were determined using 3-(4,5-dimethylthiazol-2-diphenyl)-2,5-tetrazolium bromide assay. Non-cytotoxic optimal concentrations were further adopted to treat mouse primary splenocytes for 48 h. Cell culture supernatants were collected to determine Th1 (IFN-γ, IL-1β, IL-2, and TNF-α) and Th2 (IL-4, IL-5, IL-6, and IL-10) cytokines using sandwich ELISA.

Results: The results showed that seven selected compounds exhibited differential cytotoxicities on the splenocytes. The IC50 of baicalein, baicalin, berberine, emodin, geniposide, palmatine, and wogonin were 98.6, 68.7, 28.9, 22.8, 54.5, 50.5, and 27.2 μM, respectively, indicating that emodin has the strongest cyto-toxicity, but baicalein shows the weakest toxicity on splenocytes. Based on the IC50, non-cytotoxic optimal doses of individual selected compounds were determined. Moreover, baicalein and baicalin treatments at 0 to 25 μM significantly ($P < 0.05$) increased IL-6 and IL-10 secretions by the splenocytes. Berberine and emodin treatments at 0 to 6.25 μM significantly inhibited IFN-γ secretions dose-dependently, but increased IL-10 productions. Baicalein, baicalin, berberine and emodin significantly increased Th2/Th1 cytokine secretion ratios, suggesting that these selected compounds have a Th2-inclination property.

Conclusions: Among seven selected compounds, baicalein, baicalin, berberine and emodin exhibited a Th2-inclination property. However, berberine and emodin treatments at appropriate concentrations may have the strongest potential for anti-inflammation and anti-T1D, via inhibiting Th1 cytokine secretions, but increasing Th2 cytokine productions.

Key words: anti-inflammatory effects; berberine; emodin; primary splenocytes; Th1/Th2 cytokines

PO1923

RICE PROTEIN AMELIORATES PROGRESSION OF DIABETIC NEPHROPATHY IN NON-OBESE DIABETIC GK RATS

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Background and objectives: The increase of type 2 diabetes mellitus (T2DM) patients is becoming a serious problem all over the world. T2DM is associated with various complications such as diabetic nephropathy. Diet therapy is an important treatment to delay the progression of diabetic nephropathy. Rice is a staple food as a major source of not only energy but also protein in Asian countries. Therefore, to evaluate the quality of protein on diabetes and diabetic nephropathy, we focused on the effect of rice protein (RP), a new vegetable protein material, in non-obese diabetic Goto-Kakizaki (GK) rats.

Methods: Seven week old male GK rats were fed 20% RP or casein (C) in high-sucrose (30% sucrose) diets for 6 or 15 wk. Diabetes-related parameters in the blood, urinary albumin and phosphorus excretion, and gene expressions in the kidneys of inflammatory cytokines and heme oxygenase 1 (Hmox1), the enzyme related to the antioxdative potency, were measured, and renal histology was evaluated.

Results: RP did not show to improve fasting blood glucose, plasma insulin, and plasma adiponectin levels at 15 wk. However, RP significantly suppressed urinary albumin and phosphorus excretions compared with C. In morphological observation of kidney tissues, the expansion of mesangial matrix in renal glomeruli was significantly suppressed by RP. In addition, at as early as 6 wk, the gene expression of MCP-1 was not significantly increased in the RP group, but increased by C. The gene expression of Hmox1 in the RP group was higher than that of the C group at 6 wk.

Conclusions: These results strongly suggest that RP could delay the progression of diabetic nephropathy through suppression of inflammation and an increasing antioxidative potency.

Key words: Rice protein, Goto-Kakizaki rat, diabetic nephropathy.

PO1924

ANTIOXIDANT CAPACITY AND MINERAL CONTENTS OF FIVE SPECIES OF CUCURBITACEAE SEEDS FROM CAMEROON

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Background and objectives: Phytochemical compounds and minerals of Cucurbit seeds have antioxidant and antiradical activities that could help fight cancer. This work analyses some secondary metabolites, the total antioxidant capacity and antiradical ability of oils, the levels of phenols and minerals in the seeds of Lagenaria siceraria, Cucumeropsis mannii, Cucurbita maxima, Cucurbita moschata and Cucumis sativus, collected from different agro-ecological zones in Cameroon.

Methods: The phenol content was assayed using the Folin-Ciocalteu reagent, the total antioxidant capacity by the Ferric reducing antioxidant power method, the antiradical ability with respect to 1,1-Diphenyl-2-Picrylhydrazyl radical and the mineral composition by atomic absorption spectrophotometry.

Results: The results showed that saponins, tannins, flavonoids, alkaloids, phenols and triterpenes were present in all the seeds, except C. mannii which did not contain saponins. The total phenol content varied from 299 (C. mannii) to 735 mgEAG/100g dw (C. maxima). The total antioxidant capacity was high, ranging from 50 (C. moschata) to 97.78 mgEq catechin/g dw (C. sativus). L. siceraria seed oil had the highest antiradical activity (0.083 ml/mg), while C. moschata (0.034ml/mg) and C. maxima (0.030 ml/mg) oils had the least. These seeds were rich in macro minerals, especially C. moschata with highest levels of phosphorus (810.26), potassium (681.38) and magnesium (586.21mg/100g dw). C. sativus and C. mannii seeds had the highest calcium levels (90.06 and 87.80 mg/100g dw respectively). For trace elements, iron and zinc were predominant, with highest levels in C. moschata seeds (5.06 and 5.46 mg/100g dw respectively). These seeds also contained copper (0.11-0.59 mg/100g dw) and manganese (1.69-2.81 mg/100g dw).

Conclusions: These seeds have potential as anticancer agents and could also be added in diets to reduce mineral deficiencies (especially C. moschata seeds).

Key words: Antioxidant, antiradical activities, minerals, Cucurbitaceae.

PO1925

THE WEIGHT OF ALGERIAN CHILDREN IS MOVING TOWARDS OBESITY

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Background and objectives: The nutritional transition in Algeria develops like most southern countries. The presence of thinness and obesity is a real problem for care in these countries unprepared for this change. Overweight has been reported since 2002 among Algerian school children since the data fluctuate significantly. Our aim is to understand the evolution of the situation in a large city in Algeria.

Methods: Cross-sectional surveys of school children aged 6-18 years from Constantine (Algeria) were carried out in 2004 (4018), 2006 (2481), 2007 (1388) and 2011 (2048). Anthropometric measurements of weight (kg), height (cm) were collected in a standardized way. BMI is calculated and percentage of obesity, overweight and thinness are presented according frequently used classification (IOTF, 2000, 2007).

Results: Data show that all children are exposed to overweight and obesity and it appears a increase : 5.6% in 2004; 4.8% in 2006, 5.6% in 2007 and 11.1% in 2001. The high percentage of overweight occurred in girls ($p < 0.05$). Instead thinness seems stable: 5.2% in 2004, 6.7% in 2006, 7.4% in 2007 and 5.6% in 2011. According to the IOTF references, overweight (including obesity) school children living in disadvantaged areas are all affected by overweight than others. The observed rates are at levels similar to those reported in other parts of the country and at intermediate levels to those reported in Europe.

Conclusions: These data make it possible to think that Algerian school children weight status confirm a process of transition. An unbalanced diet rich in sugar and fat must be the predisposing factor, particularly due to snacking. Adoption of preventive measures targeting young people in schools is urgent.

Key words: obesity, schoolchildren, Constantine, Algeria.

PO1926

DIETARY PATTERNS AND LIPID LEVELS IN A LITHUANIAN ADULT POPULATION

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Background and objectives: Nutrition plays an important role in the development of dyslipidemias. Dietary patterns might have a greater effect on dyslipidemias than any single food item. The aim of the study was to evaluate relationship between dietary patterns and lipid levels in Lithuanian adult population.

Methods: A cross-sectional health survey was carried out in randomly selected sample (N=1739) of Lithuanian population aged 25–64. Food frequency questionnaire was used for evaluation of dietary habits. Factor analysis was employed in order to reduce the number of food items. Serum lipids were determined using enzymatic methods. Multiple linear regression models were fitted to test the effect of dietary patterns on lipid levels controlling for age and body mass index.

Results: Mean value of serum total cholesterol was 5.60 (1.16) mmol/l in men and 5.51 (1.14) mmol/l in women. The factor analysis extracted four main factors, which accounted for 49% of the total variance in food intake in both genders. In men, 'Vegetables and fruits' factor (i.e. fresh vegetables, fruits, and boiled vegetables) was inversely associated with total cholesterol level ($r = 0.192$; $p=0.017$). 'Light food' factor (i.e. poultry, fish, porridges, and cereals) contributed negatively to total cholesterol and low-density lipoprotein cholesterol level. Higher score of 'Heavy food' factor (i.e. meat and meat products, and potatoes) was related to a higher level of triglyceride ($r = 0.147$; $p=0.046$). The negative association was found between 'Snacks' factor (i.e. cheese and confectionery) and the level of high-density lipoprotein cholesterol ($r = 0.092$; $p=0.003$). In women, 'Light food' factor was inversely related to the level of low-density lipoprotein cholesterol ($r = 0.129$; $p=0.042$).

Conclusions: The present study identified four main diet patterns that were associated with lipid levels in a Lithuanian adult population. The interventions aimed at reducing the prevalence of dyslipidemias should focus on identified dietary patterns.

Key words: dietary patterns, lipids.

PO1927

GLYCEMIC INDEX, GLYCEMIC LOAD, AND FIBER INTAKE AND RISK OF ADENOCARCINOMAS AND SQUAMOUS CELL CARCINOMAS OF THE ESOPHAGUS

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Background and objectives: Glycemic index (GI) and glycemic load (GL) have been investigated as etiologic factors for some cancers, but epidemiological data on possible associations between dietary carbohydrate intake and esophageal cancer are scant. We examined the association between GI, GL, and other dietary carbohydrate components and risk of esophageal cancer accounting for established risk factors.

Methods: We analysed data from a population-based Australian case-control study (2002-05) comprising 299 adenocarcinoma (EAC), 245 squamous cell carcinoma (ESCC), 337 gastro-oesophageal junction adenocarcinoma (EGJAC) and 1507 controls sampled from a population registry. Dietary information was obtained using a 135-item FFQ; GI and GL were derived from an Australian GI database. Multivariable logistic regression models, including adjustment for sex, were used to derive Odds Ratios (ORs).

Results: All three case groups tended to have a lower intake of fiber and protein, and higher intake of fat, total energy, and alcohol (ESCC only) compared to controls. GI was unrelated to all histological types. GL was not associated with risk of EAC and EGJAC, but was inversely associated with risk of ESCC (adjusted model, p trend=0.0006). We observed a 48% reduced risk of ESCC in the highest versus the lowest (reference) quartile. Further, mean intake of total carbohydrate and starch was related to similarly large risk reductions of ESCC. Mean fiber intake was strongly and inversely associated with risk of EAC, EGJAC and ESCC (all p trend <0.001). Risk reductions for all subtypes were of similar magnitude (28%-37% per 10g/day increment of fiber intake).

Conclusions: This study suggests a reduced risk of esophageal SCC with higher GL level, but provides no evidence for the role of GI in the development of any of the esophageal cancer types. Increased fiber intake appears to be comparably protective for all histological types.

Key words: esophageal cancer, glycemic index/load.

PO1928

CALCIUM INTAKE IN PATIENTS WITH MUSCULOSKELETAL DISEASES

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Background and objectives: Calcium intake deficiency is associated with bone diseases. Musculoskeletal diseases (MD) are one of the main public health problems and the third leading cause of work disability (Tornero et al, 2002). The aim of the study was to establish the correlation between intake and serum levels for calcium in patients diagnosed of MD.

Methods: We recruited 77 outpatients (aged = 37.7 ± 9.6) with bone-muscular pathology diagnosed by functional and clinical variables in a rehabilitation clinic from Granada (Spain). They were divided in 3 groups according to their pain: cervical (n =29), low back (n = 24) and knee (n = 24). Blood was drawn to determine serum calcium levels by colorimetric method using a commercial kit (SPINREAC). Dietary intake was assessed by a personal interview, using a food-frequency and 3-d diet record questionnaires. Data were analyzed using Nutriber software (Mataix and García, 2005). Student´s T test for independent samples was used to determine significant differences between groups, using the SPSS software version 19.0.

Results: We found that 28.2% of the patients do not reach 2/3 of recommended Ca intake (DRIs 2011). Regarding the type of MD, there was greater number of subjects with insufficient Ca intake in low back pain group (45.5%) vs. 28% and 9 % in cervical and knee pain groups, respectively. The lower Ca intake is correlated with a lower dairy products intake ($P < 0.05$). However, serum calcium levels are within normal limits (8.5 -10.5 mg /day).

Conclusions: Lack of correlation between intake and serum levels reflect the homeostatic control of calcium (Mataix et al, 2006). Obtained results support the idea that an insufficient calcium intake must be a factor involved in the development of MD.

Key words: Musculoskeletal diseases, calcium, bone diseases.

PO1929

EFFECT OF A CARDIAC REHABILITATION PROGRAM ON THE EVOKED INFLAMMATORY SIGNALING AS A RISK FACTOR IN PATIENTS WITH CARDIOVASCULAR DISEASE

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Background and objectives: Cardiac rehabilitation programs (CRP) improve quality of life and psycho-social functions and allows for the more efficient management of risk factors. The aim of the study was to evaluate the evoked inflammatory signaling as a risk factor in patients with Cardiovascular Disease (CVD) attending a CRP in comparison with those not attending the mentioned CRP.

Methods: We recruited 160 subjects suffering CVD and members of Cardiac Patients Association from Granada (Spain). They were divided into two groups: CRP (n=88, attending a CRP) and no-CRP (n=72, who refuse to attend the CRP). CRP was carried out during 12 months and consisted of combined dietary and exercise prescriptions. TNF-α, IL-6, IFN-γ, sICAM-1, sVCAM-1, MCP-1 and VEGF levels were determined in plasma using Milliplex based on the Luminex xMAP human CVD (Millipore Corporation, Missouri, USA). A two-tailed non-paired Student's t-test was used due to the normal distribution of results, and correlations were determined by Pearson's coefficient, using SPSS software version 19.0.

Results: Patients not attending CRP featured a remarkable over-expression of the proinflammatory cytokine IL-6 (P = 0.012), whereas no changes were observed in the other cytokines studied, according to Baum et al. (1999). Obesity and lack of physical activity are also determinants of impaired endothelial function (Steinberg et al., 1996) and tends to cluster with other risk factors including a pro-inflammatory state (Kapiotis et al., 2006), which might explain our findings.

Conclusions: These data suggest that CRP in CVD patients reduces one of the most noteworthy inflammatory biomarkers, improving the evolution of the disease.

Key words: Cardiac rehabilitation programs, inflammatory signaling, cardiovascular disease.

PO1930

ANTI-HYPERGLYCEMIC AND ANTI-OBESITY EFFECT OF ICHNOCARPUS FRUTESCENS, LINN. ON STREPTOZOTOCIN INDUCED DIABETIC RATS

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Background and objectives: Ichnocarpus frutescens is commonly known as Indian Sarsaparilla, highly regarded in Ayurvedic medicine for the treatment of diabetes, and considered as a substitute for Hemidesmus indicus. This plant is also used by native tribes in atrophy, convulsions, cough, dysentery, measles, tuberculosis and glandular tumors. The present study summarizes the observations on the administration of Hexane, Ethyl acetate and Methanol extracts of I.frutescens for its anti-diabetic and anti-obesity activity on the streptozotocin induced diabetic rats.

Methods: Shade dried powdered leaves was extracted with Hexane, ethyl acetate and methanol by percolation method. These extracts were concentrated under reduced pressure to yield a dry extracts and were subjected to phytochemical investigations to identify the phytoconstituents. 36 adult male WNIN rats taken for the study and were divided into six groups. Group I normal control rats and Group II diabetic control rats received standard diet. Group III, IV and V diabetes induced rats received extracts mixed diets. Group-VI rats treated with Gliberclamide. Biochemical parameters for anti-diabetic activity, body composition by total body electrical conductivity (TOBEC) for anti-obesity activity and bone mineral contents by dual X-ray absorptiometry were studied.

Results: Blood glucose, serum hepatic marker enzymes and lipid levels were significantly reduced in diabetic rats treated with extracts and this was more pronounced with the ethyl acetate extract. A significant increase in the lean body mass, bone mineralization seen in the rats treated with extracts. Histology revealed a reduction in liver steosis and an increase in the architecture of islets of the pancreas.

Conclusions: The present study suggests that, the hexane, ethyl acetate and methanol extracts derived from the aerial parts of I.frutescens have beneficial effects in curing diabetes mellitus, and new antidiabetogenic drugs can be developed from aerial parts of I.frutescens.

Key words: Diabetes, anti-obesity, bone mineralization, steosis.

PO1931

CATALASE POLYMORPHISMS IN CHILDHOOD OBESITY

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Background and objectives: Catalase (CAT) is one of the major enzymes of the antioxidant systems. Previous studies have proven that genetic variations in the CAT gene are putative risk factors for metabolic disease. Single nucleotide polymorphisms (SNPs) in the promoter region have been associated with hypertension and impaired glucose tolerance. In the present study we analyzed the association of candidate CAT SNPs with childhood obesity and its related phenotypes.

Methods: This is a case-control study in which we recruited 194 obese children (105 male, 89 female) and 191 normal-weight children (110 male, 81 female) aged 3-13. A total of 14 SNPs in the CAT gene were selected from the HapMap and NCBI databases based on their location, function and minor allele frequency. Genotyping was performed with the Illumina GoldenGate assay. Statistical analysis was performed with PLINK and SPSS 15.0. Erythrocyte catalase activity was determined spectrophotometrically.

Results: SNPs located in the promoter region showed a significant association with obesity: rs769214 [OR=1.42; CI 95%:1.03,1.96; P=0.035] and rs1049982 [OR=1.41; CI 95%:1.02,1.95; P=0.039]. Serum catalase values were significantly decreased in obese children (90±2 KHb) compared to normal weight children (104±3 KHb) (P<0.001). Both SNPs were associated with higher BMI, BMI Z-Score, weight, plasma fatty acid-binding protein 4 and apolipoprotein B and lower plasma cortisol levels. However, none of the studied SNPs was associated with catalase activity.

Conclusions: SNPs rs769214 and rs1049982 seem to play a role in childhood obesity. The nature of this relation remains unknown, however, the association of these promoter SNPs with obesity biomarkers may indicate a role of CAT in the early onset obesity that needs to be elucidated in further experiments. Acknowledgements: This study was funded by: ISCIII-FIS [PI 020826, PI051968], Junta de Andalucía [PO6-CTS 2203, 0098/2005], and ISCII-FIS-RETIC [Red SAMID RD08/0072/0028].

Key words: catalase, single nucleotide polymorphism, childhood obesity.

PO1932

NUTRITIONAL STATUS AND INTERVENTIONS IN CHILDREN HOSPITALIZED FOR PLEURAL EMPYEMA

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Background and objectives: Prolonged fever, pain and surgical interventions put otherwise healthy children with pleural empyema at risk for prolonged hospitalization and weight loss. Our aims were to investigate the change in body weight during hospitalization and two weeks after discharge, and to determine clinical risk factors for weight loss during hospitalization.

Methods: Retrospective review of the medical records of 18 boys and 18 girls hospitalized with pleural empyema in UZ Brussel (2007-2011) for data regarding age, length of stay (LoS), stay in pediatric intensive care unit (PICU), nutritional interventions, body weight and height during hospitalization and at outpatient follow-up (n=28) 2 weeks after discharge.

Results: Median (range) age and LoS were 3.45 (1.0-14.8) years and 19.25 (10-37) days. Body weight and height was reported at admission for 36 and 28 children, and at follow up for 28 and 27 patients. Minimal body weight during hospitalization was retrieved for 26 children. 7 (19.4%) patients received a nutritional intervention: 6 parenteral nutrition and 1 oral supplements. Children receiving a nutritional intervention had a significantly longer LoS (p=0.01) and stay on intensive care (p=0.03). 21/26 (80.8%) patients lost weight during hospitalization, with 38.0% and 9.5% losing respectively >5% and >10% of their initial body weight. Two weeks after discharge, 15/27 (55.6%) patients did not yet reach their initial weight for height (WFH) z-score. Maximal percentage weight change during hospitalization did not correlate with age, LoS or days on PICU.

Conclusions: Although children with pleural empyema were infrequently weighed during hospitalization, >10% weight loss was documented in 7.7%. Nutritional intervention was started in one fifth of the children, especially in children with a stay on intensive care and a longer LoS. We recommend weight surveillance and more frequent nutritional interventions in severe infections such as empyema.

Key words: child; empyema; nutritional status; under-nutrition.

PO1933

EFFECT OF DIETARY PROTEIN AND GLYCEMIC INDEX ON METABOLIC SYNDROME STATUS: THE DIOGENES RANDOMIZED CONTROLLED TRIAL

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Background and objectives: The effect of dietary protein and/or glycemic index (GI) on metabolic syndrome (MetSyn) status has not been investigated in large-scale intervention trials. This study aimed to investigate the effect of weight loss and weight maintenance with diets varying in protein and GI on MetSyn status within the DiOGenes study, a randomized, controlled dietary intervention.

Methods: 938 overweight/obese adults from eight European countries entered an 8-week low-calorie diet (LCD) period. 773 adults who lost ≥ ; 8% of body weight were randomized to one of five ad libitum diets for 6 months: low-protein (LP)/low-GI (LGI); LP/high-GI (HGI); high-protein (HP)/LGI; HP/HGI; and control diet. MetSyn was defined using the National Cholesterol Education Program criteria (2001). MetSyn status was assessed at baseline, post-LCD and post-intervention, by using a standardized, continuous MetSyn score. A greater absolute decrease in MetSyn score indicates a favourable outcome.

Results: Completers¢ data was available for 661 (weight loss phase, i.e. baseline and post-LCD) and 434 (weight maintenance phase, i.e. post-LCD and post-intervention) participants. Weight loss during the LCD significantly reduced total MetSyn score (-1.48 vs. -4.45, P<0.001). During weight maintenance, changes in MetSyn score differed significantly between the dietary groups, with the highest increase observed in the LP/HGI group (P=0.039, partial ç 2=0.023), supporting earlier evidence that a diet with an increased ratio of protein to carbohydrate that includes low GI foods has beneficial effects on MetSyn in obese individuals. Protein, GI or their interaction did not independently affect MetSyn score.

Conclusions: In this sample of European overweight/obese adults, a moderately-high protein diet, which incorporates low, as opposed to high-GI foods, was beneficial in MetSyn management following weight loss. Acknowledgements: The Diogenes project is funded by the European Union (Contract no FOOD-CT-2005-513946).

Key words: Diogenes, obesity, protein, glycemic index, metabolic syndrome.

PO1934

SPECIFIC PLASMA PROTEINS IN PATIENTS SUFFERING FROM HEAD AND NECK CANCER WITH OR WITHOUT NUTRITIONAL SUPPORT. PRELIMINARY STUDY

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Background and objectives: Previous results demonstrated that a group of patients suffering from head and neck cancer showed an impairment of nutritional status and inflammation. The objective of this work was the comparison of the levels of specific plasma proteins, in patients who received oral intake of a nutritional supplement versus a group that couldn´t take it.

Methods: Fourteen adult patients, were attended in the A. Roffo Institute, with local advanced head and neck cancer, underwent therapy with chemoradiotherapy; seven of them completed the oral intake of nutritional support (S) and the other couldn´t tolerate it (NS).The Ethics Committee of the School of Pharmacy and Biochemistry (University of Buenos Aires)

approved the study and participants gave informed consent before recruitment. The nutritional supplement joined to the habitual diet, was administered during 60 days (Supportan®, Fresenius-Kabi) and provides 500 Kcal/day, P% 27, F% 40 (2 g EPA provided by fish oil, MCT and vegetal oils) and 33% of carbohydrates. Blood samples were collected from fasten patients. Specific plasma protein fractions: TTR, transferrin, Apo A-I, Apo B and PCR were measured by single radial immunodiffusion technique (Biocientífica SA, Argentina and Binding Site, UK).

Results: Results were expressed as mg/dL, X±SD (S vs NS): TTR: 21.2±+8.9 vs 17.7±74.0; Transferrin: 188.9±36.1 vs 157.9±49.0; ApoA: 124.6±30.6 vs. 106.2±27.1; ApoB: 136.1±44.7 vs 103.8±35.8; PCR : 1.4± 1.8 vs 2.8±2.3.

Conclusions: Group S showed higher values of TTR, transferrin, Apo AI and Apo B with lower levels of PCR than NS, although no statistical differences were observed between groups. Taking into account preliminary data, the results suggest that the administration of this oral supplement was useful to maintain the initial values of these plasma proteins. This effect was not observed in NS.

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Key words: head and neck cancer-plasma proteins-nutritional support

PO1935

HYPOGONADISM IS AN EARLY EVENT IN THE DEVELOPMENT OF METABOLIC SYNDROME IN FRUCTOSE-FED RAT

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Background and objectives: High fructose consumption induces metabolic syndrome (MS), which predisposes to type II diabetes and cardiovascular diseases. MS is a complex pathophysiological entity associated with multiple risk factors including insulin resistance (IR), dyslipidemia, visceral obesity, and hepatic steatosis. In the present study we investigated the time dependent changes in MS parameters in fructose induced model of metabolic syndrome in Sprague-Dawley (SD) rats.

Methods: Weanling male SD rats (n=48) were divided into two groups: Control group (n=24) fed with starch based synthetic diet (AIN-93) and experimental group (n=24) fed with fructose based diet (54.5%) to induce MS. After 4, 8 and 12 weeks of feeding, OGTT and body composition by TOBEC were measured. At the end of each time point animals were euthanized and plasma and tissue samples were collected. Plasma insulin, total testosterone, glucose, triglycerides (TG), total cholesterol were estimated. Hepatic steatosis was evaluated biochemically by TG estimation and further confirmed by H&E and Oil red staining. Testicular morphology was assessed by H&E staining. Student's t-test was used for statistical analysis.

Results: Food intake and visceral obesity was comparable between the groups at all time points. As early as 4th week plasma total testosterone levels were decreased (48%, $p<0.05$) in fructose fed rats but normalized at later time points Insulin resistance developed in fructose fed rats at 8th week and it heightened at 12th week ($p<0.05$). Plasma triglyceride levels were increased ($p<0.05$) in fructose fed rats at 8th and 12th weeks. Liver triglycerides were increased ($p<0.05$) in fructose rats at all time points.

Conclusions: Hypogonadism and hepatic steatosis were the early changes in fructose induced model of MS. Further, in this model Insulin resistance was developed in the absence of visceral obesity.

Key words: High fructose, metabolic syndrome, hypogonadism.

PO1936

UNYDIET: A GLOBAL COMPUTER PROGRAM DEVELOPED TO PERSONALIZE NUTRITIONAL ASSESSMENT WITH UPDATED FUNCTIONS

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Background and objectives: Different nutritional assessment instruments can evaluate the health status of an individual calculating nutritional needs and intake as well as specific nutritional features and predict the possible development of chronic diseases. Currently, there are several criteria and questionnaires that allow us to make a prognosis of health status and to assess the quality of life, as related to nutrition of an individual in a quick and easy way. The aim of this project was to design a new program in which all these approaches are included.

Methods: In order to achieve this goal, a search was carried out in different databases such as PUBMED or MEDLINE, as well as in virtual libraries related to clinical nutrition, pharmacology, quality of life or physical education and in scientific societies websites related to medicine, nutrition and dietetic; using different keywords depending on the module that was being worked: Anthropometry, Medical History, Diet History, Diagnosis, Quality of life, Fitness, Energy Expenditure and Diet.

Results: The result is a computer program that can be used on any operating system as it has been performed under Java Swing, using SQLite database and some external libraries such

as JfreeChart for plotting graphs. This application includes different screening tools through which you can: assess nutritional status by anthropometrics, biochemical measurements, clinical data, psychosocial traits including genetic risk of developing a disease by an individual as well as to evaluate his/her quality of life. Also, the program included several diagnostic criteria for diseases such as the metabolic syndrome and other eating disorders.

Conclusions: UNYDIET is a prototype of software useful for educators, scientists, clinicians and nutritionists because of the great number of tools included. It also offers the possibility of creating new and individualized utilities.

Key words: Software, nutrition, screening, questionnaire, diagnostic criteria.

PO1937

DETERMINING ENERGY AND PROTEIN REQUIREMENTS BY INDIRECT CALORIMETRY AND 24-HOUR URINARY UREA NITROGEN IN ADULT PATIENTS WITH SKELETAL FRACTURES

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Background and objectives: Pathological skeletal trauma states are associated with hypermetabolic and hypercatabolic states. The objective was to determine energy requirements by indirect calorimetry and protein requirements by urinary urea nitrogen.

Methods: This was a descriptive transversal study of 10 patients (6 leg fractures and 4 arm fractures). Weight, height, and BMI were measured. Resting metabolic rate was evaluated by the indirect calorimetry method (RMR IC) after overnight fasting (10-12 h) and for 30 min at physical and mental rest. The exclusion criteria were: fever, respiratory disease, anaerobic metabolism, and use of hypo- and hypermetabolic medication. Assessment included protein catabolism evaluation by 24-h urinary urea nitrogen (UUN), trauma factor (RMR CI/BMR Harris-Benedict equation), and energy metabolism [(RMR IC x 100)/BMR FAO/WHO/UNU 2001)]. The statistical analysis included central tendency and dispersion measurements and descriptive statistics.

Results: The sample consisted of 10 patients (8 men and 2 women) aged between 26 and 63 years with a mean of 4.5 d post fracture. The nutritional state of the subjects was 20% normal, 70% overweight, and 10% obese. Mean RMR CI was 1525 kcal/d (1110-1730 kcal/d) and mean UUN was 8.23g/24/h, which was classified as minor. The trauma factor was 0.97; 60% were classified as hypometabolic, 30% normometabolic, and 10% hypermetabolic.

Conclusions: A total calorie intake of 22.80 kcal/kg/d and 1.05g/kg/d protein intake could be sufficient for the patients under study.

Key words: Resting metabolic rate, protein requirements, skeletal trauma, adult.

PO1938

HYPOCALORIC DIET WITH CARBOHYDRATE EATEN MOSTLY AT LUNCH AND PROTEIN MOSTLY AT DINNER INCREASES FASTING SERUM GLUCOSE

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Background and objectives: Obesity is known to be a risk factor for many chronic diseases. Recent evidences suggested that a diet with carbohydrates eaten mostly at dinner have additional metabolic benefits compared to a conventional hypocaloric diet in obese individuals. Little is known about the effects of a diet with carbohydrate eaten mostly at lunch. This study aimed at evaluating the metabolic effects of a hypocaloric diet with carbohydrate eaten mostly at lunch ad protein mostly at dinner.

Methods: Twenty-one healthy men aged between 20-43 years with BMI ranged from 26.5 to 35.2 kg/m2 were included in this 8-week randomized clinical trial. The hypocaloric diet prescribed to control group included a balanced lunch and dinner. To the experimental group a hypocaloric diet with a high-carbohydrate/low-protein lunch and a high-protein/low-carbohydrate dinner was prescribed. Weight, body composition using deuterium isotope and fasting serum glucose, insulin and lipid profile were evaluated at baseline and at end of the study. The t test, for groups comparison, and paired t test, for within group comparison, were performed by using the SAS software.

Results: Despite no difference between groups (P>0.05), both groups significantly reduced body weight, yet, a significant reduction in the body fatness was observed only in the experimental group (P<0.05). Serum glucose increased in the experimental group (P=0.0049) while in control group serum insulin decreased (P=0.0314) and HDL-cholesterol increased (P=0.0293).

Conclusions: Thus, a hypocaloric diet with carbohydrate eaten mostly at lunch and protein mostly at dinner does

not seem to have better metabolic effects than a conventional weight loss diet, mainly considering glucose homeostasis and HDL-cholesterol. Acknowledgements: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior-CAPES, Conselho Nacional de Desenvolvimento Científico e Tecnológico-CNPq, and Fundação de Amparo à Pesquisa no Estado de Minas Gerais-FAPEMIG.

Key words: Carbohydrate, protein, body composition, obesity, glucose homeostasis.

PO1939

THE RELATIONSHIP BETWEEN BREASTFEEDING AND POSTPARTUM WEIGHT LOSS - A SYSTEMATIC REVIEW AND CRITICAL EVALUATION

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Background and objectives: Pregnancy and the postpartum period is a time of increased vulnerability for weight gain or retaining excess body fat in women. Breastfeeding (BF) has been shown to have many health benefits for both mother and baby, however its role in postpartum weight management is unclear. Our aim was to systematically review the literature published to date examining the relationship between BF and postpartum weight loss and maternal body composition.

Methods: Electronic literature searches were carried out using MEDLINE, EMBASE, PubMed, Web of Science, BIOSIS, CINAHL and British Nursing Index. Searches covered publications up to 12/06/2012. This systematic review included observational studies (prospective and retrospective) carried out in BF mothers (exclusively or as a sub-group), who were less than or equal to 2 years postpartum and with a BMI >18.5kg/m2, with an outcome measure of change in weight and/or body composition.

Results: Thirty-seven prospective studies and 8 retrospective studies met the selection criteria; studies were stratified according to study design and outcome measure. Studies were heterogeneous, particularly in relation to sample size, measurement time-points and in the classification of BF and postpartum weight loss. The majority of studies reported little or no association between BF and weight loss (n=27, 63%) or change in body composition (n=16, 89%), although this depended on the measurement time-points and BF intensity. Any associations observed tended to be relatively small and were often confounded by other factors, particularly gestational weight gain.

Conclusions: This review highlights the difficulties of examining the association between BF and weight management in observational research and challenges the widely held belief that BF promotes weight loss. More robust studies are needed to reliably assess the impact of BF on postpartum weight management.

Key words: breastfeeding, postpartum, weight.

PO1940

EFFECT OF LOW-CARBOHYDRATE RESTRICTED DIET AND MODERATE CALORIC RESTRICTION ON HYPERGLYCEMIA, DYSLIPIDEMIA AND REVERSE CHOLESTEROL TRANSPORT IN OBESE RAT

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Background and objectives: The low–calorie-diets were developed as a strategy for initiating or accelerating weight reduction including improved glucose metabolism and lipid profile. The aim of the study was to investigate whether 40% of caloric restriction compared to a low–carbohydrate restricted diet can improve the dyslipidemia, hyperglycemia and reverse cholesterol transport in obese rat.

Methods: Male Wistar rats (n = 18) consumed at weaning an obesegenic diet. At 405 ± 14g, obese rats were randomly divided into three groups (n = 6) consumed each for 4 weeks a low-carbohydrate restricted diet (LCR) (1.16MJ) or a calorie restricted diet (40% of energy of the standard diet (0.96MJ) (CR) or normocaloric diet (NC) (1,60MJ). At day 28, glycemia and serum total cholesterol (TC) and triacylglycerols (TG) concentrations were estimated. High density lipoproteins (HDL2 and HDL3) were separated and their contents and composition in lipids and apolipoproteins (apo's) were analyzed. Lecithin:cholesterol acyltransferase (LCAT) activity was determined.

Results: The two low calorie diets reduced serum TC values (-68% and -66%), TG contents (-62% and -52%) and glycemia (-62% and -46%), respectively compared to NC diet. However, LCR diet increased HDL-cholesterol (1.2- and 2- fold) and apo A-1 (1.16- and 1.26- fold) compared to CR and NC diets, respectively. In LCR and CR groups versus NC group, respectively, HDL3–phospholipids and HDL3–unesterified cholesterol were decreased (-52% and -38%) and (-86%) whereas, LCAT activity and HDL3–apo's were increased (+80% and +77%) and (+16% and +10%), respectively. The LCR diet elevated the content of HDL2–cholesteryl esters (+24% and +55%), respectively compared to both groups.

Conclusions: In obese rats, low carbohydrate restriction diet may have a more protective effect against cardiovascular risk by improving the anti–atherogenic metabolic pathway of cholesterol and triacylglycerols.

Key words: Rat, obesity, low calorie diets, LCAT.

PO1941

THE EFFECT OF POMEGRANATE EXTRACT AND JUICE INTAKE ON SATIETY PARAMETERS IN HUMAN VOLUNTEERS: A PILOT STUDY

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Background and objectives: The health benefits of antioxidant rich pomegranate have been recognized throughout history and shown to neutralise free radicals better than other juices (Basu, Penugonda, 2009). Appetite control has been implicated as an important factor in the dietary treatment of obesity (Drapeau et al. 2007), and research shows that dietary antioxidants may modify appetite by inducing satiety (Josic et al. 2010). This study aimed to investigate the effect of pomegranate extract and juice (PomeGreat, UK) intake on satiety parameters in human volunteers.

Methods: Ethical approval was granted by the Ethics Committee (Queen Margaret University). Volunteers (7 males and 22 females) participated in a randomised, double-blind, placebo-controlled parallel study [Mean BMI was 25.05±3.91kg/m^2 (18.57-32.46), age 34.5±13.7years (19-62)]. After randomisation, participants consumed either one pomegranate extract (n=15) or placebo capsule daily (n=14) for 3 weeks and then ate a lunch where they drank pomegranate or placebo juice (energy-matched low polyphenol drink) beforehand. Participants recorded their feelings of hunger, desire to eat, fullness and satisfaction on Visual Analogue Scales at 15 minute intervals for 120 minutes. Dietary history and habits were also recorded.

Results: The pomegranate extract group drinking pomegranate juice tended to report feeling less hungry (12%), had less desire to eat (21%), felt fuller (16%) and more satisfied (15%) than those who consumed the placebo. They also ate less (22%) on average (446.97g vs.574.25g; p=0.05) than the placebo group. Moreover, they rated their food as being significantly more palatable (p=0.05) than the placebo group.

Conclusions: This research indicates that pomegranate extract and juice can promote satiety by reducing hunger and desire to eat and enhancing fullness and satisfaction, while simultaneously increasing enjoyment of the food. It also suggests that pomegranate extract intake may have the potential to assist in reducing risk factors for overweight and obesity.

Key words: pomegranate, satiety, appetite, antioxidants, obesity.

PO1942

ANALYSIS OF DETECTION AND NUTRITIONAL APPROACH IN INTESTINAL HIGH-OUTPUT STOMAS

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Background and objectives: Surgical approach of digestive cancer is one of the main causes of discharge stoma construction. These stomas are related to complications that have been widely described, but little is known about the development of high-output stomas.

Methods: A retrospective observational study was conducted, from January to June of 2011, on patients who underwent an output stoma. Universal variables, causes and type of surgery, nutritional and pharmacological treatment were collected. Presence and severity of complications, morbidity and mortality related to stomas were examined.

Results: Of 39 new stoma formations, 28.2% were ileostomies and 71.8% colostomies. Colorectal cancer was in 64% of cases the main cause of surgery. Complications associated with the stoma were present in 48.7% of the patients, the most frequent being stenosis. Six patients were identified with high-output stoma. Those stomas were located in colon in all patients, preserving the ileocecal valve in every case. Causes of high-output stoma were not identified in any case and the resected length of intestine did not statistically differ from those patients without high-output. All patients were wrongly advised to increase their oral fluid intake and in any case plasmatic magnesium was measured, no losses were treated with oral rehydration salts solutions and only two patients were referred to nutrition department. At discharge, no patient weights were controlled and no patient received nutritional recommendations for the management of the debit. 33% re-entried because of stoma complications.

Conclusions: High-output stomas are a common but little identified complication. They are not usually taken into account by clinicians, resulting in a lack of information about pathophysiology, parameters that define them and their related complications. An adequate nutritional support in these patients could reduce hospital re-entried and metabolic complications related to stoma losses.

Key words: Colostomy, high-output, hypomagnesemia, ileostomy, ostomies.

PO1943

EARLY PREDICTION OF DIETARY WEIGHT LOSS THERAPY EFFECTIVENESS

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Background and objectives: It is suggested that new strategies are needed for successful obesity prevention and treatment. To personalize weight-loss therapy and to predict its effectiveness, we assessed individuals' health locus of control, emotion regulation, and self-efficacy which can make them determined to eat well and exercise regularly.

Methods: The study group consisted of 48 individuals with BMI=32.15±2.02, mean age 39.70 ± 5.33 years. Recruited subjects participate in a 3-month dietary intervention program. Weight loss was assessed at each visit. Dietary compliance regarding energy and nutrient intake were monitored by 3-day food records. Before the dietary intervention all patients filled in the Multidimensional Health Locus of Control (MHLC) scale to assess the beliefs by which person determines his or her health status; the Courtauld Emotional Control Scale (CECS) for the assessment of emotion regulation; and the General Self-Efficacy Scale (GSE) to assess a general sense of perceived self-efficacy.

Results: The mean score in the dimension of internal control on the MHLC Scale was M = 26.33; SD = 4.98 and was related to successful weight loss ($r = -0.61$, $p < 0.05$). The mean score in the CECS total was M = 49.77; SD = 10.34 and was associated with frequency of sweets intake ($r = 0.42$, $p < 0.05$). Patients with low GSES statistically less frequently consult dieticians or try to lose weight on their own than the other GSES groups ($s^2 = 9.65$, df = 4, $p = 0.047$). There were no statistically significant differences between men and women in the scores of the Scales.

Conclusions: Introducing psychological perspective is infrequent in obesity treatment but it is a challenge, and also an opportunity to concentrate on patients' resources and may contribute to evaluation of the comprehensive treatment program.

Key words: obesity, weight-loss, psychological scales.

PO1944

ADIPONECTIN AND PREDICTION OF THE EFECTIVENESS OF WEIGHT LOSS THERAPY

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Background and objectives: There is a strong evidence suggesting that adiponectin plays an important role in modulation of lipid profile and insulin resistance, while its metabolic actions as an adipose-specific protein decreases proportionally to the rise in BMI. The relationship between adiponectin levels and BMI, % of total fat mass (%FM), VAT adipose tissue, HOMA-IR, and serum lipid profile during 3-months period (four visits) of weight-loss therapy was studied.

Methods: The recruited group consisted of 60 subjects of both sexes, 30-50 years old, with excess body weight: 30 ≤; BMI < 35, non-smokers, not under any pharmacological therapy. Plasma lipids, glucose, and insulin concentrations were determined by routine laboratory methods. Adiponectin levels were measured by ELISA assay. Insulin resistance index (IR-HOMA) was calculated using the following formula: insulin(μU/ml)x fasting blood glucose (mg/dl)/ 405. Weight loss was controlled at each (of the four) visit by anthropometric and body composition measurements (BMI, %FM and VAT level assessed by bioimpedance, using TANITA MC 180 MA camera).

Results: There was a statistically significant correlations between adiponectin and serum lipids: HDL- cholesterol, total cholesterol/HDL-cholesterol ratio, LDL- cholesterol, serum triglycerides ($p<0,05$). All "obesity measures" (weight-loss, BMI, %FM, VAT) and HOMA-IR were negatively correlated with adiponectin level ($p<0,05$). It was also found that the strength of the relationship between adiponectin and VAT (assessed by linear regression) increases during a weight loss therapy (from r:-0,045 before therapy to r:-0,64 at the end of weight loss therapy, all $p<0,05$).

Conclusions: Adiponectin seems to be the one of the major factors, predicting the effectiveness of applied dietary program, obesity reduction and associated metabolic disorders.
Acknowledgements: This study was supported by The Polish National Science Centre (N151923).

Key words: Adiponectin, weight loose, lipid profile, VAT, HOMA-IR.

PO1945

MA-PI MACROBIOTIC DIET AND TYPE 2 DIABETES. MULTICENTRIC STUDY

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Background and objectives: Satisfactory results have been observed in long term interventions with macrobiotic vegetarian Ma-Pi diet (70% carbohydrate as whole cereals, 12% vegetable protein, 18% fat) in diabetic patients. The aim of this study was to evaluate the short term effect of this diet in type 2 diabetes.

Methods: A 21- day multicenter intervention was carried out in adults from Cuba (n=61), China (n=16), Ghana (n=23) and Italy (n=24), supported by Un Punto Macrobiotico, Italy. Biochemical indicators, body composition and blood pressure were measured at onset and intervention end. Changes were analyzed by univariate and multivariate statistical methods. **Results:** Significantly (p=0,000) decreased: glycemia, 24,1%; cholesterol, 18,6%; LDL cholesterol, 21,5%; LDL/HDL ratio, 20,0%; cholesterol/HDL ratio, 18,2%; triglyceride, 23,4%; urea, 32,5%; capillary blood glucose (33,6%, in fasting; 37,9%, two hours after breakfast; 32,5%, two hours after lunch); blood pressure (systolic,7,5%; diastolic,6,1%); urine pH increased (13,6%). No adverse events were observed. Four components were extracted by Principal Component Analysis (PC), which accounted for 69,3% of the total variance: PC1 was characterized by lipid indicators, PC2 by glycemia and glycemic profile, PC3 by blood pressure, PC4 by urea and urine pH. Similar behavior was evidenced for glycemia and glycemic profile in all countries, according to One-Way ANOVA of the extracted PC2 scores, (p=0,237).

Conclusions: The 21 day intervention with Ma-Pi macrobiotic diet in type 2 diabetic adults improved carbohydrate, lipid and protein metabolism and blood pressure. The improvement of the carbohydrate metabolism showed a similar pattern in all countries.

Key words: Ma-Pi macrobiotic diet, type 2 diabetes, adults.

PO1946

SUGAR INTAKE IN CUBAN CHILDREN AND ADOLESCENTS

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Background and objectives: High sugar consumption is associated with overweight, glucose intolerance, serum lipids modifications and predisposition to diabetes mellitus. Nutritional recommendations set the sugar upper level intake around 10% of the total energy intake. The objective of this study was to assess its dimension in the Cuban young population.

Methods: 873 children and adolescents (56 preschoolers, 768 school children and 49 adolescents, 4-16 y of age) included in studies of body composition, physical activity and daily energy expenditure by isotopic methods were submitted to semi-quantitative dietary recalls, 24 hours dietary recalls or 3 day weighed dietary records for the assessment of the sugar contribution to the total energy intake. Data were evaluated with the FAO CERES Software.

Results: High energy intake, fast foods and soft drinks; low consumption of fruits, vegetables, and micronutrients. Sugar intake doubled the nutritional recommendation. In some studied groups, one of each three children consumed more than three times the recommended daily portion.

Conclusions: The observed high sugar intake in all children and adolescents favours fat accretion and the high prevalence of NCDs in adulthood. Those results shall be urgently considered in the nutrition policy.

Key words: Adolescents, children, Sugar intake.

PO1947

THYROID HORMONE PRODUCTION IS ASSOCIATED WITH THE DIFFERENCE IN METABOLIC MARKERS BETWEEN OBESE AND OBESITY RESISTANT MICE

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Background and objectives: Diet-induced obesity (DIO) and obesity resistance (DIO-R) are two different models characterized by different metabolic states. The aim of this study was to explore the association between thyroid hormones and different metabolic markers in DIO and DIO-R mice.

Methods: Sixty female C57B/L mice (4week old) were randomly divided into two groups: Group I (n=15, Control) received normal diet containing 5.34%fat; Group II (n=45) received high-fat diet (HFD) containing 19.57%fat. After 20 weeks, Group II subjects were selected and divided into two groups according to their body weight: DIO group (n=15) and DIO-R group (n=15). All animals were weighed and slaughtered after a 12-hour fasting. Concentration of blood glucose (FPG), plasma insulin (FINS), lipid parameters (TCH, TG, HDL-C and LDL-C) and thyroid hormones (T3, T4, FT3 and FT4) were measured. T3/T4 ratio and insulin resistance index (IRI) were calculated. Deiodinase-1(Dio1) which is the major source of circulating thyroid hormone was also determined in the liver by RT-PCR.

Results: Feeding the HFD for 26 weeks significantly increased body weight, FPG, FINS, and IRI, but significantly decreased the level of thyroid hormones in the DIO group, resulting in the development of hyperlipidemia and hyperglycemia. In contrast, the DIO-R group exhibited significantly higher level of thyroid hormones as compared to the DIO group and presented partial restoration in hyperlipidemia and hyperglycemia. Moreover, Dio1 mRNA expression in the DIO-R group was significantly higher than in the DIO-R group.

Conclusions: The present study indicates that thyroid hormones level is related to different metabolic markers between DIO and DIO-R mice, which may be attributed to the abnormal mRNA expression of Dio1 in the liver. Acknowledgements: Supported by the 12th Five-Year Plan for Science and Technology Development (No. 2012BAD33B05).

Key words: High-fat diet, obesity, obesity resistance, hyperlipidemia, hyperglycemia, thyroid hormones.

PO1948

BODY FAT MASS DETERMINATION OF ARGENTINEAN CHILDREN BY DEUTERIUM DILUTION TECHNIQUE AND ITS RELATIONSHIP TO LIPID PROFILE

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Background and objectives: Body composition, particularly body fat, is associated to non-transmissible chronic diseases. The aims of this study were to determine body fat mass (FM) in argentinean children using the Deuterium Dilution Technique (DDT) and to analyze its association with the lipid profile.

Methods: 98 children (51 boys, 47 girls), aged 6-12 years old, were recruited for the study. Weight (kg), height (cm), waist circumference (WC; cm) and triceps, biceps, subscapular and suprailiac skinfolds were measured. Body mass index (BMI; weight/height2) and sum of skinfolds (SK; mm) were calculated. Total Body Water was determined by DDT. Children received a weighed oral dose of deuterium oxide (0.5 g/Kg; 99%) and two samples of saliva (basal and post-equilibration period of 3 hours) were obtained. Deuterium concentration was determined by FTIR and FM% was calculated. Blood samples were collected. Total plasma cholesterol (CT; mg%) and triglycerides (TG; mg%) were determined by enzymatic-colorimetric technique. LDL cholesterol (LDL-C; mg%) was calculated using Friedewald equation.

Results: The FM% was 28.6 ± 7.4 (Boys: 25.5 ± 6.7 vs Girls: 32.0 ± 2.4; $p<0.001$). FM% was significantly correlated ($0.05>p<0.0001$) to BMI (r=0.74), WC (r=0.69), SK (r=0.88), CT (r=0.22), TG (r=0.45), and LDL-C (r=0.20).

Conclusions: As expected, girls showed higher FM% than boys. It was observed an association between fat mass and anthropometric measures and between fat mass and lipid profile, mainly with the triglycerides plasma levels. This study supports the importance of the determination of FM in the nutritional assessment of programs for the prevention and control of overweight and obesity in children. Acknowledgements: Supported by UBACyT 20020100100255, OIEA/RLA6064.

Key words: Body fat, children, deuterium dilution, lipid profile.

PO1949

GLUTAMINE MODULATES CHANGES TO SMALL INTESTINAL INTRAEPITHELIAL γδ T LYMPHOCYTE EXPRESSION IN MICE WITH ACUTE DSS-INDUCED COLITIS

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Background and objectives: This study investigated the effect of glutamine (GLN) on small intestinal intraepithelial lymphocyte (IEL) γδ T-cell cytokines and immune regulatory factor gene expressions in a mouse model of dextran sulfate sodium (DSS)-induced colitis.

Methods: Mice were randomly assigned to a normal control group, or 2 DSS-treated groups. The control group (C) and one of the DSS group (DC) were fed with a common semipurified diet, while the other DSS-treated group (DG) were provided an identical diet except that part of the casein was replaced by GLN, which provided 25% of total amino acid nitrogen. The diets were fed for 10 days, then mice in the control group received distilled water and DSS groups were treated with distilled water containing 2.5% DSS for 5 d. At the end of the experiment, mice were sacrificed and small intestines were collected for histological examination. Intestinal IEL γδ T-cell subset was isolated for the analysis of proinflammatory mediator gene expressions.

Results: Compared to normal mice, DSS-colitis resulted in lower IEL γδ T-cells percentage and higher messenger (m) RNA expressions of interferon γ;, tumor necrosis factor α ;, interleukin (IL)-17, complement 5a receptor, and keratinocyte growth factor by IEL γδ T-cells. GLN administration enhanced the proportion of IEL γδ T-cells, and the immunomodulatory mediator genes expressed by IEL γδ T-cells exhibited decreases in colitis mice. The histological findings showed that the immunoreactive intensity of ZO-1 expression in intestinal mucosa was higher in DG than the DS group.

Conclusions: These results indicated that pretreatment with GLN promoted the proportion of small intestinal IEL γδ T-cells, and downregulated γδ T-cell-expressed inflammatory mediators that may consequently ameliorate the severity of DSS-induced intestinal epithelial injury.

Key words: glutamine, dextran sulfate sodium-induced colitis, intraepithelial lymphocyte, γδ T-cell, inflammatory mediator.

PO1950

EFFICACY OF A LIFESTYLE INTERVENTION PROGRAM USING HEALTHY PLATE FOR TREATING DIABETIC SUBJECTS WITH OBESITY: A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Portion size is an important determinant of energy intake. Then, we developed the Japanese-version portion size control plate. The aim of the study is to assess the efficacy and safety of a lifestyle intervention program using the portion control plate (Healthy plate®) to reduce the body weight and achieve the good glycemic control in diabetic subjects with overweight and obesity.

Methods: We randomized 19 diabetic subjects with overweight and obesity (body mass index (BMI) ≥ ;24, aged 20-70) to an intervention group including group-based lecture and counseling by a dietician incorporating a healthy plate (n=10) or waiting list control group (n=9). Exclusion criteria included insulin therapy, dementia, and chronic renal failure. Following initial lecture on diabetes and diet, subjects in the intervention group were contacted at 1, 2, and 3 months by the dietician for 2-hour group-based session. Subjects in the control received instructional handouts on diabetes knowledge, diet, and exercise. The primary endpoint was improvement of glycemic control as measured by glycosylated hemoglobin (A1C). The secondary endpoint was change in body weight, serum lipids, and diet-related quality of life. Analysis was done by intention to treat.

Results: Drop-out rate was 5.3 %. Subjects in the intervention group had a greater change (±SD) in weight from baseline at 3 month (-3.6 ±2.6 kg vs. -0.3±1.6 kg ; p=0.04) and a trend in A1C from baseline at 3 month. The majority of subjects assigned to the intervention group reported the overall intervention was helpful and would recommend it to others. Adverse events were not reported.

Conclusions: The findings suggest that the healthy plate also enabled diabetic subjects to decrease body weight with safety.

Acknowledgements: This work was supported by JSPS KAKENHI Grant Numbers 23500825, 24501029.

Key words: Portion control plate, weight loss, diabetes, obesity.

PO1951

EFFECT OF ANDROGRAPHOLIDE ON STREPTOZOTOCIN-INDUCED DIABETIC CATARACT IN SPRAGUE-DAWLEY RATS.

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Background and objectives: Cataract, characterized by cloudiness or opacification of the crystalline eye lens, dramatically affects the quality of life. Duration of diabetes and the associated chronic hyperglycaemia increase the risk of development of cataract. Andrographolide, an active principle in the leaves of A. paniculata has shown significant anti-hyperglycaemic action in streptozotocin-induced diabetic rats. The present study was carried out to investigate the anticataractous potential of Andrographolide through its capacity to prevent streptozotocin- induced hyperglycaemic osmotic and oxidative stress.

Methods: 48 SD rats were taken for the study and divided into four groups of twelve animals each. Group I (control) rats received vehicle and hyperglycaemia was induced in experimental rats (Group–II, III and IV). Diabetic rats (Group II) (positive control) and Group III, IV diabetic rats treated with Andrographolide at two different doses. Eyes examined, using slit lamp bio microscope for incidence of cataract and expressed as percentage of total lenses in each group. Biochemical parameters were measured in the lens of control and experimental rats.

Results: Treatment with Andrographolide decreased the blood glucose levels in a dose-dependent manner. Significant decrease in both total and soluble protein was observed in group II compared to group I. Supplementation of Andrographolide improved both total and soluble protein levels in group III and IV compared to group II. The percentage of mature cataract lenses decreased to 52% and 28% in group III and IV respectively. The levels of antioxidant enzymes were also increased in group II.

Conclusions: In conclusion, a combination of glycemic control, antioxidant potential could be the mechanism in delaying the cataract formation by Andrographolide. Therefore, delaying of cataract associated with diabetes by treatment with Andrographolide merits further attention and can be explored for their potential antihyperglycemic and anticataractous properties.

Key words: Diabetic cataract, hyperglycemia, streptozotocin, andrographolide.

PO1952

POSTPRANDIAL EFFECTS OF POTASSIUM SUPPLEMENTATION ON VASCULAR FUNCTION AND BLOOD PRESSURE

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Background and objectives: Increased potassium intake has been related to reduced blood pressure (BP) and improved vascular function. The effect of potassium supplementation on endothelial function and BP in the postprandial state is not known. The aim was to determine the effect of potassium supplementation on post prandial endothelial function, as assessed by flow mediated dilatation (FMD).

Methods: Thirty-two healthy, normotensive volunteers received a meal with 1300 mg (33mmol) potassium (HighK) and a control low potassium (LowK) 130 mg (3.3mmol) meal on 2 separate occasions in a randomized order. FMD and BP were measured while participants were fasting and at 30, 60, 90 and 120 minutes after the meal.

Results: There was a postprandial decrease in FMD in both groups. FMD decreased less after the HighK meal compared to the LowK meal ($p<0.05$). Both meals produced a postprandial decrease in BP at 30 minutes which returned to baseline levels by 120 minutes. No significant differences in BP were observed between meals. There were no correlations between FMD and BP prior to randomization. FMD and BP were negatively correlated at 90 (SBP: HighK r= -.55, $p<.01$; LowK r=-.54, $p<.01$) and 120 minutes (SBP: HighK r= -.56, $p<.01$; LowK r=-.42, $p<.01$) after both meals, and at 30 (SBP: r=-.39, $p<0.05$) and 60 minutes (DBP r=-.36, $p<0.05$) following the HighK meal. There was a negative correlation between the change in SBP and FMD (r=-.435, $p<05$) at 90 minutes after LowK treatment.

Conclusions: A high potassium meal, which represents similar amounts of potassium in 2-3 serves of fruit, can lessen the postprandial reduction in brachial artery FMD when compared to a low potassium meal. This suggests potassium intake may have protective effects on vascular dilatation in the postprandial state.

Key words: potassium, endothelial function, blood pressure.

PO1953

PREVALENCE OF INSULIN RESISTANCE IN AN OBESE EGYPTIAN YOUNG POPULATION

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Background and objectives: Insulin resistance (IR) and glucose intolerance are frequent in obese children and adolescents and lead to a significant risk for hypertension and cardiovascular diseases, as well as for type 2 diabetes. This study aimed to investigate the prevalence of IR in a sample of Egyptian obese young population and assess factors associated with IR. In addition, the study attempted to determine the cut-off values of homeostatic model assessment of insulin resistance HOMA-IR for the diagnosis of metabolic syndrome (MS).

Methods: A descriptive, cross-sectional study was conducted on 300 obese young individuals (150 males and 150 females) and 200 with normal weight as controls. All subjects participated in the project entitled "Obesity among Youth: Lifestyle and Genetic Factors" funded by the Science and Technology Development Fund, Egypt. They gave their informed consent which approved by the Ethical Research Committee of National Research Centre. Variables examined included body mass index (BMI), waist circumference (WC), waist to hip ratio (WHR), systolic and diastolic blood pressure (SBP and DBP), fasting blood glucose, cholesterol, triglycerides (Tg), high density lipoprotein (HDL), low density lipoproteins (LDL), insulin and insulin resistance (IR) measured HOMA-IR. Cut-off values of HOMA-IR for diagnosis of MS were calculated by receiver operating characteristic (ROC) analysis.

Results: The overall prevalence of IR was 20.5% among obese young subjects. Patients with IR had a significant higher levels of WHR, BP, Tg, glucose, total cholesterol, insulin, HOMA-IR and low HDL level as compared to obese patients without IR and controls. The area under the curve (AUC) (95%CI) was 0.770 (0.681-0.771) for MS.

Conclusions: Abdominal obesity, dyslipidemia and hypertension are risk factors for IR. The study determined the optimal HOMA-IR cut-off points for the diagnosis of MS in subjects with and without IR.

Key words: Youth, IR, obesity, cut-off points.

PO1954

THE EFFECT OF SPARC ON INSULIN-SENSITIVE GLUCOSE METABOLISM IN SKELETAL MUSCLE

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Background and objectives: Secreted protein acidic and rich in cysteine (SPARC) is a muscle-secretory protein which elevated in response to exercise. SPARC is shown to inhibit fat accumulation and involved in regulation of energy metabolism. In this study, we investigated the effect of SPARC on glucose metabolism in skeletal muscle.

Methods: Young male wild type (WT) and SPARC-KO (SPKO) mice were used. Oxygen consumption and carbon dioxide exhaustion were measured in the dark phase and carbohydrate oxidation was calculated. After measuring body weight and epididymal fat weight, blood and gastrocnemius muscle were collected. Blood glucose and plasma insulin were measured. Protein was extracted from the muscle and used for measuring Akt phosphorylation by western-blot analysis. Statistical analysis used Mann-Whitney's U test and, in all analyses, $p < 0.05$ indicated statistical significance. The data is shown as mean ± standard error.

Results: Blood glucose level was significantly higher in SPKO mice (171.1 ± 6.2 mg / dL) than in WT mice (146.5 ± 8.6 mg / dL) ($p = 0.036$). Epididymal fat weight and blood insulin were identical between mice. The amount of carbohydrate oxidation was significantly lower in SPKO mice (56.9 ± 1.9 μg/g B.W./min) than in WT mice (64. ± 2.4 μg/g B.W./min) ($p = 0.025$). Phosphorylation level of Akt, a rate-limiting enzyme of insulin-dependent signaling pathway, was significantly reduced 42.9% in SPKO mice compared to WT mice ($p < 0.001$).

Conclusions: SPARC improves glucose metabolism associated with enhancement of insulin sensitivity in skeletal muscle. Acknowledgements: This study was partly supported by Grants-in-Aid from the Japan Society of Promotion of Science (23700776WA).

Key words: SPARC, skeletal muscle, glucose metabolism.

PO1955

GENETIC LINKAGE BETWEEN FATTY ACID DESATURASE POLYMORPHISM AND OBESITY IN A SOUTHERN ITALY POPULATION

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Background and objectives: The fatty acid composition of serum lipids and adipose tissue triacylglycerols reflects the dietary fat intake over the previous weeks/years. The fatty acid composition is also influenced by desaturating enzymes. Serum fatty acids and desaturase indices have been related to obesity, insulin resistance, type-2-diabetes and the metabolic syndrome. However, little data exist among fatty acids-CoADesaturase (FADS-1/FADS-2) polymorphisms and obesity in humans, although studies in knock-out mice indicate a clear linkage between the obesity status and desaturation of fatty acids.

Results: In the present study we demonstrate a clear link between particular polymorphisms of FADS-1 and FADS-2 and obesity in a southern Italy population (n=92). The exon one of FADS-1 gene showed a mutation in the GCG/AGG codon (Ala/Thr). The exon two showed a mutation in the AAT/GAT codon (Ile-Asp). The exon 3 showed a mutation in the GCC/GGC codon ((Ala-Gly). The exon 5 showed a mutation in the GCC/GGC codon (Ala-Gly). The exon two of FADS-2 gene showed a mutation in the GGC/AGC codon (Gly/Ser). All mutations determined were missense mutations. The changes in aminoacid sequences observed may determine a variation in enzyme efficiency and as a consequence a low levels of desaturated fatty acids. Interestingly our patients showed high levels of saturated fatty acids that may play a role in the tendency to obesity. All obese subject showed one of the above mutation at least.

Conclusions: The introduction of desaturated fatty acids in diet help to improve the fatty acid composition of obese patients in terms of saturated/desaturated ratio. On the other hand the group of normal subjects, used as controls, did not show such polymorphisms and had a normal content of desaturated fatty acids. We conclude that these polymorphisms may be a useful tool to early diagnosis of obesity.

Key words: Desaturation, mutation, fatty acid composition, genetics, obesity.

PO1956

CARBOHYDRATE DEPRIVATION AND BODY WEIGHT IN THYROID AUTOIMMUNITY

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Background and objectives: The thyroid is one of metabolism regulating gland. Its function is to determines the amount of calories that the body has to burn to maintain normal weight. Thyroiditis are inflammatory processes that result mainly in autoimmune processes. We have conducted the present study in order to have a clear picture on both autoimmune status and the control of the body weight.

Methods: We have evaluated the amount of either anti-thyroid, or anti-microsomal, or anti-peroxidase antibodies in patient with high antibodies.

Results: A balanced diet devoid of carbohydrates (bread, pasta, fruit and rice) and free of goitrogen food and based on the BMI, the distribution of body mass and intra- and extracellular water led to three weeks give the following results 1. Patients treated as above show a significant reduction of anti-thyroid (-40%, p <0.013), anti-microsomal (-57%, p <0.003) and anti-peroxidase (-44%, p <0,029). 2. Untreated patients have a significant increase in anti-thyroid (+9%, p <0.017) and anti-microsomal (+30%, p <0.028). Even the anti-peroxidase rise without reaching statistical significance (+16%, p> 0064). 3. With regard to body parameters measured in patients undergoing to this diet significant changes are seen in the reduction of body weight (-5%, p <0.000) and in body mass index BMI (-4%, p <0.000). Lastly 83% of patient with high auto-antibodies are Bread test positive to lactase with a lactase deficit higher than 50%.

Conclusions: This let us to hypothesize a correlation with ChREBP (carbohydrate responsive element protein) and therefore a possible role of carbohydrate metabolism in the development and maintenance of autoimmune thyroiditis associated to body weight increase and slower basic metabolism.

Key words: Thyroiditis, antibodies, carbohydrate, body weight reduction, BMI.

PO1957

PREVALENCE AND RELATED KNOWLEDGE OF HYPERTENSION AMONG ADULTS OF SHIJIAZHUANG

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Background and objectives: Studies on hypertension usually focus on the treatments, whereas the healing effect is usually overlooked. Our objective was to study the prevalence rate, the awareness rate, the treatment and control rate of hypertension among adults in Shijiazhuang urban area, to appraise the present situation of hypertension prevention and control, and improve the preventive and treat effect.

Methods: We used a confidential National Health and Nutrition Examination Survey data set (2010-2012) that included 946 adult inhabitants of 450 families randomly selected from six residents' committees in Shijiazhuang in 2010. We analysed the data in SPSS and compared the prevalence rate, the awareness rate, the treatment and control rate of hypertension between men and women.

Results: The overall hypertension prevalence rate of Shijiazhuang urban adults was 35.62%, 43.29% for males and 30.13% for females. The standardized hypertension prevalence rate was 28.41%. The overall hypertension awareness rate was 52.52%, 51.46% for males and 53.61% for females; the differences in hypertension awareness in different ages were statistically significant ($p<0.05$). The overall hypertension treatment rate was 45.99%, 43.86% for males and 48.19% for females; the differences of hypertension treatment in different ages were statistically significant ($p<0.05$). The overall hypertension control rate was 12.46%, 9.94% for males and 15.06% for females; the differences of hypertension treatment in different ages were statistically significant ($p<0.05$). Ageing was accompanied by a treatment rate raise.

Conclusions: These results show that besides the high rates of hypertension awareness and treatment, the healing effect still needs further improvement. We should strengthen comprehensive prevention and treatment of hypertension and pay more attention to healing effect.

Key words: Hypertension, prevalence rate, treatment rate, Healing effect.

PO1958

CONVERSION OF GASTRIC BYPASS TO SLEEVE AS A TREATMENT OF SEVERE AND PERSISTENT HYPOGLYCEMIA

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Background and objectives: In recent years, positive results have been published about an emerging technique for bariatric surgery, gastric sleeve, with a reduction of excess weight about 50% after 4 years and with few complications. Also, after gastric bypass certain complications may arise that require the conversion to another technique: if the patient develops hyperphagia, he/she may require placement of a gastric band or ring; if the patient develops polyphagia, he/she may need a conversion to malabsorptive technique; and if the patient develops severe hypoglycemia after eating, he/she may need a gastric sleeve. After performing this, food pass again through the pylorus and duodenum with less changes in the gastrointestinal peptide secretion and glucose homeostasis than those occurring after performing the bypass, so this could contribute to the disappearance of hypoglycemia after performing the conversion.

Methods: We report a patient with persistent hypoglycemia after bariatric surgery due to hyperinsulinism generated by islet cells hyperplasia that was treated by converting the bypass into sleeve.

Results: A 45 year old woman with morbid obesity (BMI:48) underwent bariatric surgery (gastrojejunal bypass). One year after surgery and after successful weight loss (BMI:25.9) she began with posprandial hypoglycemias that did not improve with dietary treatment, acarbose or diazoxido. Oral glucose tolerance test showed hyperinsulinism and hypoglycemia. Mesenteric arteriography imaging was normal but hypersecretion was found in splenic and superior mesenteric area. We conducted a body and tail pancreatectomy and splenectomy. The pathology confirmed the presence of islets cells diffuse hyperplasia supporting diagnosis of nesidioblastosis. A few months later hypoglycemia recurred. We decided to place a gastrostomy and feeding in this manner checking whether hypoglycemia improved. She only ate by mouth proteins and hypoglycaemia disappeared. A few months later, when the patient tolerated a sufficient volume, she underwent a conversion from bypass to gastric sleeve. Now the patient continues without hypoglycemia and maintains weight.

Conclusions: Rather than total pancreatectomy (which can generate chronic malabsorption syndrome and diabetes), there is a new therapeutic option for severe cases of persistent hypoglycemia resistant to medical treatment, much less aggressive: the conversion of gastric bypass to sleeve.

Key words: morbid obesity,hypoglycemia.

PO1959

PROCESSED FOOD CONSUMPTION AND ESOPHAGEAL SQUAMOUS CELL CARCINOMA IN CHINESE

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Background and objectives: Esophageal squamous cell carcinoma (ESCC) is one of the most prevalent cancers in China. Some studies reported its positive association with processed food consumption, but others did not. This study aimed to further examine the association between ESCC and consumption of processed food.

Methods: A population-based case-control study was conducted in a high ESCC risk area of China, in which 722 incident ESCC cases with histological confirmation and 722 controls matched with age and sex were included. Demographic characteristics and lifestyles including smoking and alcohol consumption were collected; detailed information on daily food consumption during the past 5 years prior to onset of the disease for cases and the past 5 years for controls were obtained with validated food frequency questionnaire (FFQ). Average intake per week on salted meat, preserved and pickled vegetables were categorized into four levels based on quartiles. Conditional logistic regression models were applied to estimate odd ratios (OR) for ESCC associated with processed food intake. Consumers that never had processed food were the reference group, and smoking, alcohol, drinking and family cancer history were adjusted.

Results: Salted meat intake was significantly associated with an increased risk of ESCC (OR=1.93, 95% CI 1.27, 2.94), showing a clear exposure-response trend. A higher level of preserved vegetable consumption was related to a higher risk, though only the highest level reached a statistical significance (OR=2.24, 95% CI 1.52, 3.29). Pickled vegetable intake was also associated with a higher risk (OR=1.94, 95% CI 1.33, 2.85), but no clear exposure-response trend was detected.

Conclusions: The data support that consumption of traditionally processed food increases a risk of ESCC. Effective interventions on individuals¡¯ dietary habit are needed to reduce the cancer risk, particularly in high risk areas of China.

Key words: esophageal cancer, diet, salted meat, processed vegetables.

PO1960

PLASMA RETINOL BINDING PROTEIN STATUS IN RELATION TO OCULAR CHANGES IN CYSTIC FIBROSIS PATIENTS TREATED WITH VITAMIN A SUPPLEMENTS

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Background and objectives: Cystic fibrosis (CF) is an autosomal recessive disease characterised by increased viscosity of mucus secretions. The patients suffer from chronic pulmonary changes, pancreatic deficiency, and an obstruction of the gastrointestinal tract. The disease affects all secretory epithelia including the eye. The influence of nutritional status on long-term survival and quality of life of cystic fibrosis patients is well documentd. Steatorrhea and absorption may be associated with vitamin deficiences, including vitamin A. The aim of this study was to assess plasma retinol binding protein status and ocular surface changes in children and adolescents with cystic fibrosis.

Methods: The study was conducted and the patients were recruited at the regional Chest Diseases Unit. All the patients are regularly seen by a CF specialist dietitian. Twenty five patients had the investigations of plasma retinol binding protein, visual acuity, external examination, tear film break-up time, fluorescein staining and Schirmer's tear test. Twenty five age and sex matched controls without CF or ocular pathology were also recruited.

Results: Plasma RBP concentration is significally lower in patients with CF than in control group. Seven of our patients with CF had clinical evidence of dry eye.

Conclusions: Low plasma RBP levels occur frequently in clinically stable and retinol supplemented CF patients. We recommend monitoring of plasma RBP levels in CF patients and evaluation of ocular surface changes.

Key words: Vitamin A, retinol binding protein, eye,cystic fibrosis.

PO1961

FRIED FOODS CONSUMPTION AND THE INCIDENCE OF HYPERTENSION IN A SPANISH COHORT: THE SUN STUDY

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Background and objectives: The consumption of fried foods might be linked to the development of hypertension. However, evidence from long-term prospective studies is scarce. Therefore, the aim of our study was to evaluate the association between fried foods consumption and the incidence of hypertension in a Mediterranean cohort.

Methods: The SUN project is a prospective Spanish cohort study. For the present analyses we included 13,680 participants (5,059 men and 8,621 women), free of hypertension at baseline with a mean age of 36.5 y (SD: 10.8) who were followed-up for a median of 6.3 years, to assess the incidence of hypertension and the average change of systolic and diastolic blood pressure.

Results: During the follow-up, 1,232 incident cases of hypertension were identified in participants without baseline hypertension. After adjusting for potential confounders, the hazard ratio for developing hypertension among participants with higher consumption of fried foods (>4 times/week) was 1.22 (95% CI: 1.04-1.42) in comparison with those who consumed these food items <2 times/week (p for trend 0.02). The consumption of fried foods was associated with a 6-year increase of systolic blood pressure among participants with the highest consumption of fried foods compared to those in the lowest category of consumption (r coef. = 1.05 mm; Hg 95% CI: 0.12 to 1.99 mmHg).

Conclusions: In this Mediterranean cohort study, a more frequent consumption of fried foods at baseline was associated with a higher risk of developing hypertension during follow-up. Acknowlesgements: The SUN Study has received funding from the Spanish Government (Grants PI01/0619, PI030678, PI040233, PI042241, PI050976, PI070240, PI070312, PI081943, PI080819, PI1002658, PI1002293, RD06/0045, G03/140 and 87/2010), and the Navarra Regional Government (36/2001, 43/2002, 41/2005, 36/2008, 45/2011).

Key words: Hypertension, fried foods, cohort study.

PO1962

DIETARY INTAKE OF ACRYLAMIDE AND OESOPHAGEAL CANCER (OC) RISK IN THE EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION (EPIC) COHORT

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Background and objectives: Acrylamide (AA) is a water soluble chemical compound, reactive in air and polymerizable. Based on animal and in vitro studies, the International Agency for Research on Cancer (IARC) classified AA as 'probably carcinogenic' to humans in 1994. Three previous studies have evaluated the association between dietary AA intake and OC risk, but only one observed an association. The aim of the study was to assess whether dietary AA intake increases the risk of developing OC, including oesophageal squamous cell carcinoma (OSCC) and oesophageal adenocarcinoma (OAC) in the EPIC cohort.

Methods: EPIC was designed to investigate the relationships between diet, lifestyle, and environmental factors and the incidence of cancer and includes participants from 23 centers in 10 European countries. The hazard ratios (HRs) and their corresponding 95% confidence intervals (CIs) for the development of OC were estimated using Cox proportional hazards regression models. HRs are presented as risk per 10 μg of AA per 2000 kcal. All models are adjusted for sex, total energy intake, fruit, smoking intensity, processed meat, alcohol (OSCC) and BMI (OSCC and OAC).

Results: After a mean of 11 years of follow-up, 341 OC were identified; 142 of which were OAC, 176 OSCC and the remaining 23 were not specified or other types. At baseline, the mean AA intake was 26.22 μg/d. No association between AA intake and OC was found (HR: 1.01 (95% CI 0.92-1.12)), even when OC was evaluated by histological subtypes (OSCC: HR: 0.96, 95% CI 0.83-1.11; and OAC: HR 1.04, 95% CI 0.90-1.21).

Conclusions: In agreement with previous studies, we did not observe a statistically significant association between AA intake and OC risk.

Key words: Acrylamide, oesophageal cancer, cohort, nutrition.

PO1963

DIETARY INTAKE OF ACRYLAMIDE AND PANCREATIC CANCER RISK IN THE EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION (EPIC) COHORT

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Background and objectives: Based on animal and in vitro studies, the International Agency for Research on Cancer classified acrylamide (AA) as 'probably carcinogenic' to humans. To date, three epidemiologic studies, with <349 pancreatic cancer (PC) cases and with different design and range of intakes, have evaluated the association between dietary intake of AA and PC risk, and overall they have found no association. The aim was to assess the association between dietary intake of AA and the risk of PC in the EPIC cohort.

Methods: The EPIC cohort included men and women mostly aged 35 to 75 at enrolment from 10 European countries. Food consumption data were matched to a harmonized AA database that is largely based on the EU monitoring database of AA levels in foods maintained by the European Community Institute for Reference Materials and Measurements.

Results: After a mean follow up of 11 years, 865 PC cases were observed and included in the present analysis. At baseline, the mean dietary intake of AA was 26.22μg/d. No overall association was found between dietary intake of AA and PC risk in EPIC (HR: 0.95, 95% CI: 0.88-1.01 per 10μg/day). There was no effect measure modification by smoking status, sex, diabetes, alcohol intake and geographic region. However, there was an inverse association (HR: 0.73, 95% CI: 0.61-0.88 per 10μg/day) between AA intake and PC risk in obese persons as defined using body mass index (BMI ≥;30kg /m2), but not when body fatness was defined using waist and hip circumference or their ratio.

Conclusions: Dietary intake of acrylamide was not associated with an increased risk of PC in the EPIC cohort.

Key words: acrylamide, pancreatic cancer, cohort, nutrition, obesity.

PO1964

CHANGES IN MICROBIOTA AND EPIGENETIC METHYLATION OF INFLAMMATION RELEVANT GENES IN TYPE 2 DIABETES AND OBESITY

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Background and objectives: Metabolic diseases are believed to involve changes in the structure of microbiota causing low grade inflammation.

Methods: We studied obese and type 2 diabetes patients in a four month intervention period in comparison to a lean control group. Intervention involved Victoza for type 2 diabetics and nutritional counselling for both intervention groups. Microbiota were analysed for abundance and diversity by PCR-DGGE, qPCR and 454 Pyrosequencing. Epigenetic methylation of 3-7 CpG sites in promoter regions of TLR2, TLR4, FFAR3, TNF-α; and Line1, as a marker for global methylation, waere analysed.

Results: In type 2 diabetes and obesity the diversity of band patterns was decreased compared to healthy controls. Firmicutes/Bacteroidetes ratio, abundance of lactic acid subgroups and Enterobacteria increased during the intervention period in type 2 diabetes. In contrast, the ratio of Firmicutes/Bacteroidetes was decreasing in obese patients with weight loss. We generally found a significant decreased methylation in TLR2, TLR4 and FFAR3 in obesity but also decreased methylation in diabetics, (TLR2: obese: 2,96%, TLR4: obese: 4,30%, FFAR3: diabetes: 31,75%; obese: 32,51%). CpG methylation of TNF-α; and Line1 did not show significant changes between the groups. In general we found a significant correlation between an increased BMI/WHR and decreased methylation of TLR2, TLR4 and FFAR3 but increased methylation of Line1.

Conclusions: Our results suggest that a different composition in microbiota in obesity and type 2 diabetes effect the epigenetic regulation of inflammatory molecules, possibly also underlying a progression of the metabolic disease. Interactions between microbiota and epigenetic regulation may involve NF-kB signalling from bacterial cell wall components or DNA as well as SCFA binding to SCFA-receptors or TLRs. Significant correlations of anthropometric measurements and TLR2, TLR4, FFAR3 or in contrast to global methylation assessed by Line1 could develop into useful markers.

Key words: obesity, diabetes, microbiota, epigenetic.

PO1965

IS THE ONE-ANASTOMOSIS GASTRIC BYPASS (OAGB) USEFUL IN NORMALIZING WEIGHT, BMI AND LIPID PROFILE IN THE SHORT AND THE MEDIUM TERMS?

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Background and objectives: The aim of this study was to describe the variation of weight, BMI and lipid profile in obese patients after a postoperative period of 3 and 12 months.

Methods: Sample: 418 obese patients, two groups: 183 with BMI < 40, and 235 with BMI ≥ 40. Variables: sex, age, weight, BMI, total cholesterol (Col-t), cholesterol HDL (HDL-c), cholesterol LDL (LDL-c), and triglycerids (TG). Results are expressed as the Mean ± Standard Deviation. ANOVA and P-Pearson ($p < 0.05$) were applied.

Results: Non-morbid group: (i) Mean weight: 98.57 ± 12.46 preoperative (preQ), 71.57 ± 9.38 (3 months), and 62.14 ± 10.15 (12 months). (ii) Lipid profile: Col-t: 209.82 ± 42.70 preQ and 168.73 ± 28.09 (12 months); HDL-c: 54.28 ± 16.06 preQ and 59.94 ± 13.85 (12 m); LDL-c: 130.47 ± 37.91 preQ and 92.25 ± 24.29 (12 m); TG: 121.31 ± 67.45 preQ and 78.63 ± 30.99 (12 m). Morbid group. (i) Mean weight: 126.55 ± 20.13 preQ, 86.76 ± 12.97 (3 m) and 73.57 ± 13.50 (12 m). (ii) Lipid profile: Col-t: 189.56 ± 38.14 preQ and 161.30 ± 27.21 (12 m); HDL-c: 46.19 ± 12.31 preQ and 56.68 ± 12.10 (12 m); LDL-c: 118.99 ± 33.77 preQ and 86.66 ± 24.19 (12 m); TG: 128.93 ± 74.01 preQ and 80.30 ± 38.85 (12 m). P-value p<0.001.

Conclusions: The weighted reduction per year was higher in morbid patients. All non-morbid patients normalize the BMI the 3rd month, and morbid patients after 12 months. Col-t and LDL-c decrease in both groups (the higher decrease in non-morbid and morbid patients, respectively). TG decrease equally in both groups. HDL-C increased in both groups (the higher increase in morbid patients). The OAGB is an effective technique in reducing weight and improving lipid profiles.

Key words: Gastric Bypass, BMI, lipid profile.

PO1966

EFFECTS OF LIFESTYLE INTERVENTION AND MEAL REPLACEMENT ON GLYCEMIC AND BODY WEIGHT CONTROL IN CHINESE SUBJECTS WITH IMPAIRED GLUCOSE REGULATION

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Background and objectives: Impaired glucose regulation (IGR) refers to a metabolic status between normal glucose homeostasis and diabetes. It is necessary to initiate effective interventions for IGR patients to promote the restoration of normal glucose regulation (NGR) and prevent diabetes. The present study aimed to evaluate the impact of a lifestyle intervention program, combined with a daily low-glycemic index meal replacement, on body weight and glycemic control in IGR patients.

Methods: Subjects with IGR were recruited from two community and randomly assigned to an intervention group (n = 46) and control group (n = 42). Both groups received health counseling at baseline. The intervention group also received a daily meal replacement and intensive lifestyle intervention to promote healthy eating habits during the first 3 months of the study, and follow-up visits performed monthly until the end of the one-year study.

Results: Results showed that body weight loss after one year was significant in the intervention group compared to the control group (-1.8 ¡À 2.2 vs. -0.6 ¡À 2.5 kg, $P < 0.05$). The 2-h plasma glucose concentration decreased 1.24 mmol/L in the intervention group and increased 0.85 mmol/L in the control group ($P < 0.05$) compared to their baseline respectively. A 5-kg body weight loss at one year was associated with a decrease of 1.49 mmol/L in 2-h plasma glucose ($P < 0.01$). The incidence of NGR in the two groups was significantly different (39.0 vs. 7.5%, intervention vs. control; $P = 0.001$).

Conclusions: The present study has illustrated that treatment with regular contact, lifestyle advice and low-glycaemic index meal replacements was an effective means of improving weight loss and glycaemic control, and promoting the conversion from IGR to NGR in IGR patients over a 1-year period.

Key words: £º Impaired glucose regulation, meal replacement, glycaemic control, weight loss.

PO1967

IMPROVEMENT OF THE PLASMA AND ERYTHROCYTES LIPID PROFILE IN OVERWEIGHT/OBESE AND DYSLIPIDEMIC PATIENTS AFTER CONSUMPTION OF A NATURALLY PUFA-ENRICHED CHEESE

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Background and objectives: Obesity is considered a key factor in a vast array of diseases. There are evidences associating the PUFA-enriched diets with a lower incidence of cardiovascular diseases (CVD). In this sense, there is much interest in adding value to dairy products by naturally increasing the PUFA levels. Within the context, a PUFA-enriched low fat cheese was elaborated (Lactalis Iberia) from ruminant milks whose diet included a commercial linseed supplement (Lodyn S.L). A balanced hypocaloric diet including the consumption of this functional cheese for its potential benefits by overweight/obese and dyslipidemic patients, was analyzed. Our aim was to assess the effect of the functional cheese intake, through the changes in the lipid composition of plasma and erythrocytes from volunteers and identify potential health biomarkers.

Methods: A prospective, randomized, double-blind, placebo-controlled clinical trial was performed. Sixty two overweight/obese and dyslipidemic volunteers were randomly assigned to receive during 12-wk a 60 g/day intake of Light Cheese (LC) or Light Functional Cheese (LFC). Lipids from plasma and erythrocytes were derivatized by a direct transmethylation procedure. Lipid profile was thoroughly monitorized by GLC-MS.

Results: The dietary–induced changes in the FA composition of plasma and erythrocyte were similar. In volunteers consuming LFC, the levels of myristic (C14:0), palmitic (C16:0) and stearic (C18:0) acids significantly decreased. This is interesting since C14:0 and C16:0 are considered to be cholesterol-raising and are associated with the increased incidence of CVD. A major increase in the PUFA content, correlated with the higher amount of linoleic acid (C18: 2), was also detected. An enhancement in oleic acid (C18:1c9) level, occurred in erythrocytes but not in plasma.

Conclusions: The LFC intake improves the FA composition of plasma and erythrocytes from overweight/obese and dyslipidemic patients. Acknowledgements: This work has been supported by CENIT-PRONAOS Project (2008-2011).

Key words: Obesity, lipid profile, PUFA-enriched cheese.

PO1968

AN EVALUATION OF SATIETY, AND WEIGHT CHANGES FOR THE TREATMENT OF PRIMARY OBESITY WITH THE P.O.S.E PROCEDURE.

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Background and objectives: Obesity is a complex, metabolic disease. Diet and exercise, medications, and bariatric surgery have been used as tools to affect satiety and treat obesity. A less invasive surgical tool, the Incisionless Operating Platform¢â (USGI Medical, San Clemente, CA, USA) utilizes the g-Cath EZ ¢â suture anchor, to plicate gastric tissue endoscopically, inducing physiologic and mechanical changes in gastric function, prolonging the sensation of satiety and assisting compliance with a reduced calorie diet.

Methods: A prospective, single site study was initiated with institutional Ethics Board approval. Enrolled patients were ages 21-60 with BMIs of ≥ 30 and ≥ 40 and no prior bariatric procedure. Suture anchors were placed in the fundus and antral inlet to inhibit fundal accommodation and slow emptying. Diet was advanced post -op to full solids over 4-6 weeks to allow for tissue healing. A standardized liquid satiety test (Ensure) was done pre-procedure and at 2/6 months. Also, subjective feelings of fullness and hunger were recorded at 2-4, and 6 months post-procedure.

Results: 18 patients were enrolled (78%F/22%M). Mean age =39.1. Mean baseline weight was 101.7Kg; mean BMI (kg/m2kg)=36.3. Six month mean AW loss was 16.9 kg (N=18). Satiety test demonstrated reduced capacity and earlier satiety in all patients tested at 2/6 months. Mean volume change and time to satiety significantly changed compared to pre-procedure at 2/6 months ($p < .05$). Reduction in capacity at 2 months correlated with weight loss at same time-point. This mirrored subjective perceptions of satiety. The majority of patients (n=16) reported less hunger and earlier satiety post-procedure.

Conclusions: At early follow-up, satiety markers and patient perceptions of satiety may be related to successful weight loss. The patient's feeling of earlier fullness and longer satiety may also contribute to dietary compliance.

Key words: Satiety, obesity, weight Loss.

PO1969

ALKYLRESORCINOLS (BIOMARKERS OF WHOLE-GRAIN INTAKE) AND RISK OF COLORECTAL CANCER IN THE EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION

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Background and objectives: Few studies have investigated the association between whole-grain intake and colorectal cancer. Whole-grain products are one of the dietary items prone to measurement errors, making the use of objective measures, such as biomarkers, highly relevant. The objective of the study was to investigate the association between biomarkers of whole-grain intake, alkylresorcinols, and colorectal cancer in a nested case-control study within the European Prospective Investigation into Cancer and Nutrition (EPIC).

Methods: We included 1372 first incident colorectal cancer cases and 1372 individually matched controls and calculated the incidence rate ratios (IRR) for overall and sub-sites of colorectal cancer using conditional logistic regression adjusted for potential confounders.

Results: Plasma total alkylresorcinol concentrations were not associated with risk of overall colorectal cancer, proximal colon cancer or rectal cancer. However, high plasma total alkylresorcinol concentrations were statistically significantly associated with lower incidence of cancer located in the distal (left or descending) part of the colon. Adjusted IRR of distal colon cancer for highest versus lowest quartile of plasma alkylresorcinol was 0.48 (95% confidence interval = 0.28 to 0.83). Furthermore, we observed an inverse association with colon cancer for the Scandinavian part of the participants. Alkylresorcinols may be more appropriate as biomarkers in Middle Europe and Scandinavia i.e. in areas where whole grains are regularly consumed.

Conclusions: Whole-grain intake, assessed by alkylresorcinols, was associated with a lower incidence of distal colon cancer. Alkylresorcinols seem useful as objective biomarkers of whole-grain intake in populations where whole-grains are a staple part of the diet. Acknowledgements: This work was supported by World Cancer Research Fund International (WCRF) and WCRF Netherlands (WCRF NL) (2011/436), and NordForsk (Centre of Excellence programme HELGA (070015)).

Key words: Whole grains, colorectal cancer, biomarkers.

PO1970

ASSOCIATION BETWEEN PROTEIN INTAKE AND OBESITY AMONG CHILDREN

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Background and objectives: Dietary intakes of macronutrients, particularly protein, have been examined as part of attempts to understand the dietary aspects of obesity. This study examines the relationship between protein intake and obesity in children in Scotland.

Methods: The data were from the Survey of Sugar Intake among Children in Scotland. The survey was carried out in children aged 3-17 in 2006. Diet was assessed by semi-quantitative food frequency questionnaire and height and weight were measured. Of the 1390 subjects with complete dietary and anthropometric data, 889 were used in the analyses following the exclusion of mis-reporters. Children were classified as obese or non-obese, BMI z-score ý1.64 and <1.64 respectively. Analyses of covariance were performed to determine the mean differences in protein intake (g/day) between obese and non-obese children. Logistic regression tested the association between protein intake and obesity, while controlling for age, gender, physical activity, social class and energy intake/basal metabolic rate ratio.

Results: The mean+SD protein intake of obese children was significantly higher compared with the non-obese children in all three age groups: 3-5 years (62.3 ± 15.6 vs 54.7 ± 11.8 g/day); 6-10 years (67.1 ± 20.5 vs 61.5 ± 14.7 g/day); and 11-17 years (78.0 ± 22.6 vs 66.8 ± 18.5 g/day). There was a significant association between the protein intake and obesity after controlling for confounders: 3-5yrs Adjusted Odds Ratio (AOR) 1.12; 95% Confidence Interval (CI) 1.04-1.20; 6-10yrs AOR 1.10; 95% CI 1.06-1.13 and 11-17yrs AOR 1.07; 95% CI 1.04-1.09.

Conclusions: Obese children had higher protein intakes than their non-obese counterparts at all ages. High protein intake in childhood may contribute to childhood obesity. Acknowledgements: UK Data Archive, Food Standard Agency UK funded the Survey.

Key words: Protein intake, obesity, children.

PO1971

EXCESS WEIGHT AND BREAST DENSITY AT PUBERTY, AN UNKNOWN ASSOCIATION: EVIDENCE FROM THE GROWTH AND OBESITY CHILEAN COHORT

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Background and objectives: Mammographic breast density (BD) is the strongest predictor of Breast Cancer(BC) risk and it is negatively associated with Body Mass Index(BMI), which is a risk factor for postmenopausal BC. However little is known in relation to BD and adiposity during puberty; the former is highest at the end of puberty and declines with age; thus understanding the association between BD and adiposity at the end of puberty would be critical for determining BC predisposition during adulthood.

Methods: We recruited 61 girls from an ongoing cohort of 400 low-income Chilean girls born in 2002-2003, who reached Tanner Breast Stage 4 or 5 in 2012. At the same visit, we assessed i) anthropometric measures(weight and height) and ii) breast composition(%fibroglandular volume (FGV), absolute FGV(AFGV, i.e dense tissue) and breast volume) by DXA, a validated method to measure breast composition at young ages (low dose radiation). Crude and adjusted Odds Ratio (OR) and 95% Confidence intervals (95%CI) were estimated to assess the relation between excess weight (BMI z-score>1) and %FGV, AFGV or breast volume.

Results: The mean age and height z-score of the study group were 122 months(sd=4.8) and 0.8(sd=0.9) respectively

and 61% of the girls had excess weight. After adjusting by age and height, excess weight was positively associated with breast volume (r adj=88.9, 95%CI:50.6-127.3), and inversely associated with %FGV(r adj=-15.1, 95%CI:-19.9;-10.2). Excess weight had a positive relation with AFGV, but it did not reach statistical significance (p-value=0.1).

Conclusions: Our results supports that excess weight is inversely associated with %FGV since puberty. Further studies are needed to assess the possible association between adiposity and absolute dense tissue. Studying adiposity and breast composition during puberty is of paramount; it is known that puberty is a time of great susceptibility to breast carcinogens, thus preventive strategies must be addressed at early stages.

Key words: Breast, puberty, body weight

PO1972

WAIST CIRCUMFERENCE AS PREDICTOR FACTOR FOR LOW-GRADE INFLAMMATION IN MIDDLE-AGED BRAZILIAN MEN

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Background and objectives: Anthropometrical variables could predict a low-grade inflammation, since the relationship between inflammatory markers and adiposity indicators has been thoroughly reported. The aim of this cross-sectional study was to identify the best anthropometric predictor for high-sensitivity C-reactive protein (hs-CRP) concentrations as well as a potential cut-off for this adiposity indicator.

Methods: Two-hundred and twenty-eight men (age: 52±5y; BMI: 25.9±3.7kg/m2), employees at the Federal University of Viçosa – Viçosa (Brazil), were enrolled. Body mass index (BMI), body adiposity index (BAI), waist (WC), abdominal (ABD), hip (HC) and arm (MUAC) circumferences were measured. Plasma hs-CRP concentrations as well as lipid (total cholesterol, triglycerides and HDL-c) and glucose (glucose and HOMA-IR) profiles were assessed. The ROC curve was used to identify the best predictor among adiposity indicators in relation to the high hs-CRP (≥; 1.0 mg/dL). The anthropometric and metabolic variables were compared between low and high hs-CRP groups by the Mann-Whitney tests.

Results: Subjects with high hs-CRP had greater prevalence for hyperglycemia, hypertriglyceridemia, and insulin resistance as well as lower HDL-c concentrations, as expected. By the ROC curve analysis, WC [(AUC=0,662) and ABD (AUC=0.659)] were the best predictors for the occurrence of high hs-CRP, with the cut-offs of 87.7 cm (sensitivity: 63.9%; specificity: 63.2%) and 90.95 cm (sensitivity: 62.4%; specificity: 60.6%), respectively.

Conclusions: The central adiposity indicators, WC and ABD, showed the strongest relations to hs-CRP higher than 1.0 mg/dL in this cross-sectional study. In addition, the cut-offs of 87.7 and 90.95 cm for WC and ABD, respectively, may be suggested as predictors of low-grade inflammation in middle-aged Brazilian men, though further studies with larger populations are necessary.

Acknowledgements: We thank the Foundation for Research Support of the State of Minas Gerais – FAPEMIG (Brazil) for financial support.

Key words: Anthropometry, biomarkers, inflammation, cardiovascular diseases.

PO1973

THE CONSUMPTION OF LEGUMES AND WHITE MEATS IS RELATED WITH ADIPOSITY AND LIPID BIOMARKERS: CROSS-SECTIONAL STUDY IN MIDDLE-AGED BRAZILIAN MEN

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Background and objectives: The consumption of legumes and white meat (L&WM) has been considered as a good choice within healthy dietary pattern. Thus, this cross-sectional study aimed to investigate the potential association of the consumption of L&WM with total body fat (TBF) and circulating lipid profile in middle-aged Brazilian men.

Methods: Two-hundred and ninety-four men (age: 51±5y; BMI: 25.8±3.5kg/m2), employees at Federal University of Viçosa – Viçosa (Brazil), were enrolled. TBF was assessed by DXA (Lunar 13.31, GE®). Circulating lipid profile (total cholesterol, LDL-cholesterol, and triglycerides), occurrence of metabolic syndrome as well as lifestyle variables (smoking, alcohol consumption, and physical activity) were assessed by standardized protocols. Food intake was estimated by a validated quantita-

tive food-frequency questionnaire. Multiple linear regression models were performed.

Results: Comparing the highest with the lowest tertile of energy-adjusted- L&WM consumption (<119.0 vs. >163.7 g/d), subjects included in the highest tertile presented lower TBF values (21.97±7.7 vs. 24.3±7.4%, P=0.040), independently of age, smoking status, alcohol consumption, physical activity level, energy intake, and metabolic syndrome occurrence. In addition, those subjects with the highest tertile of energy-adjusted-L&WM consumption had lower plasma concentrations of total cholesterol (206.3±42.5 vs. 218.9±37.7 mg/dL P=0.030) and LDL-cholesterol (142.8±35.3 vs. 132.6±35.3 mg/dL, P=0.040), independently of age, smoking status, alcohol consumption, physical activity level, energy intake, and obesity prevalence (TBF > 20%).

Conclusions: L&WM consumption was inversely associated with TBF and lipid biomarkers, indicating its beneficial effect on adiposity and lipid profile control in middle-aged men. Acknowledgements: We thank the Foundation for Research Support of the State of Minas Gerais - FAPEMIG (Brazil) for financial support.

Key words: white meat, legumes, body fat, cholesterol.

PO1974

BODY FAT, INFLAMMATION AND GUT MICROBIOTA IN CUBAN ADOLESCENTS

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Background and objectives: Body fat excess is associated with insulin resistance, hyperlipemia, inflammation and gut microbiota changes. The aim of this study was to identify these associations in adolescents.

Methods: From 420 subjects in study (12-15 years), 26 with overweight, randomly selected, and paired by age and sex with 26 normal adolescents were submitted to records of body fat by deuterium dilution and anthropometry, epidemiologic and life style recall, clinical history, arterial blood pressure (following the recommendations of the 2004 IV Report on Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents), 24 h dietary recall, physical activity by Actiheart monitors (2 week days, 1 week end day), glycaemia, serum lipids, serum citoquines (CPR, TNF-α and IL-6 by ELISA), and composition of the gut microbiota.

Results: Our results in overweight adolescents were as follows: hyperglycemia (17% of cases and no controls), low HDL Cholesterol (40% vs.13%), low physical activity, high levels of inflammatory citoquines, and 50% higher values of E. coli, Bifidobacteria and Enterobacteria.

Conclusions: Overweight classification only by size and not by body composition not favoured the comprehension of the associations between body fat, glucose intolerance, and serum affections. In all subjects, a mean 18 kg overweight was registered, but 12 kg were fat. Those differences shall be considered.

Key words: Body fat, adolescents, inflammation, gut microbiota.

PO1975

B-VITAMINS AND BONE HEALTH AMONG COELIAC DISEASE PATIENTS

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Background and objectives: Osteoporosis, a condition characterised by decreased bone mass, incurs healthcare costs in excess of €30 billion per year in Europe alone. Emerging evidence indicates that compromised B-vitamin status and/or elevated homocysteine (Hcy) may have a negative effect on bone health [1]. Patients with coeliac disease, a common inflammatory condition induced by gluten consumption, are at increased risk of B-vitamin deficiency and osteoporosis. The aim of this investigation is to explore the relationship between B-vitamin status and bone mineral density (BMD) among coeliac patients.

Methods: Baseline data from coeliac patients (n= 115), recruited from specialist coeliac clinics in Northern Ireland and enrolled at this centre in an ongoing 2 year randomised controlled trial with folic acid and vitamin B12, were examined. Blood samples were collected and analysed for plasma Hcy, red cell folate, serum folate and vitamin B12 at Trinity College Dublin. BMD at the total hip, femoral neck and spine were measured using dual energy X-ray absorptiometry scans (Lunar Prodigy, GE Healthcare, UK).

Results: Serum B12 concentrations were significantly correlated with BMD at the femoral neck (r = 0.644; P <0.001) and total hip (r = 0.487; P = 0.012) after adjustment for age and BMI in male coeliac patients (n= 31).

Conclusions: These preliminary findings add to the current body of evidence suggesting a potential protective role for B-vitamins in bone health. Results of the 2 year randomised, placebo controlled intervention trial are expected in 2014. Acknowledgements: We would like to acknowledge funding from the Department for Employment and Learning, Northern Ireland. Reference: 1) Yang J, Hu X, Zhang Q et al: Homocysteine level and risk of fracture: A Meta-analysis and systematic review. Bone 2012;51:376-382.

Key words: B-vitamins, bone Health, coeliac disease.

PO1976

PREVALENCE OF METABOLIC SYNDROME IN INDIAN ADULTS FROM MUMBAI CITY AND ITS CORRELATION TO THEIR DIETARY PATTERN

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Background and objectives: Metabolic syndrome is a pre requisite to diabetes and heart disease. There is a lacunae of Indian studies on prevalence of metabolic syndrome. The present study aimed to find out the prevalence of metabolic syndrome in Mumbai city and its correlation to the dietary pattern.

Methods: The present study was an observational cross sectional study of 500 adults from middle and-upper income group of Mumbai city. Data collected included anthropometric and biochemical parameters using standardized techniques. The dietary pattern was detailed using qualitative and quantitative pretested and standardized dietary questionnaire.

Results: The prevalence of metabolic syndrome was 39% as per the modified ATP III criteria with high prevalence of overweight (80%), high waist circumference, high body fat, high LDL and Low HDL levels. There was a positive correlation between BMI, waist circumference, total body fat (p=0.000), fasting blood sugars (p=0.005), and a negative correlation with HDL levels (p=0.01). The total energy and fat intake were positively correlated to incidence of metabolic syndrome (p= 0.01) and negatively correlated with fruit and vegetables intake (p=0.002). High refined carbohydrate intake was associated with high HbA1c (p=0.04), elevated systolic blood pressure (p=0.01) and high uric acid levels (p=0.008).

Conclusions: There is a felt need to identify Indian adult population with metabolic syndrome so that with early intervention the onset of non communicable diseases can be prevented. A concerted input towards quality of diet with desired macronutrient modulation coupled with increase in physical activity is the suggested way out.

Key words: Metabolic Syndrome, prevalence, dietary pattern, Indian adults.

PO1977

EFFECT OF DIET ON LIPIDS BLOOD LEVELS

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Background and objectives: Globally there has been an explosive increase in cardiovascular risk factors, such as dyslipidemia. Studies have reported that diet modifies blood lipid levels, however the magnitude of this effect at the population is unclear. The objective of this study was to quantify the effect of energy, carbohydrate and fat intake on blood levels of triglycerides (TG) and total cholesterol (TC) in adults.

Methods: 518 subjects aged 32 to 38 years were randomly selected from a registry of individuals born between 1974 and 1978 at the Hospital of Limache, Region of Valparaiso, Chile. We measured blood levels of TG and TC. A food frequency questionnaire was carried out to quantify energy and macronutrient intake during the last month (Software FP2). Multiple linear regression models adjusted for BMI, physical activity, alcohol consumption and education was performed.

Results: Sex interaction was found (p <0.015) therefore the analysis was stratified. Only in women there was association between diet and blood lipid levels. TG levels increased 1.2 mg/dL (95% CI: 0.3 to 2.1) per 100 kcal and 5.9 mg/dL (95% CI 0.8 to 10.9) per 100 grams of carbohydrates consumed. While TC increased 0.5 mg/dL (95% CI 0.1 to 1.0) per 100 kilocalories and 16.6 mg/dl (95% CI 4.0 to 29.3) per 100 grams of fat consumed.

Conclusions: In adult women, higher energy and carbohydrate intake increases blood levels of TG and higher energy and fat intake increases the TC. This study provides information to guide food interventions to improve blood lipid level at the population. Funded by Fondecyt Proyect #1100414.

Key words: Diet, energy, blood lipids, triglycerides, cholesterol.

PO1978

THE ASSOCIATION BETWEEN URINARY SODIUM AND POTASSIUM EXCRETION AND CAROTID INTIMA MEDIA THICKNESS IN PEOPLE WITH DIABETES

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Background and objectives: There is significant evidence that sodium intake is positively associated with cardiovascular disease. Carotid intima media thickness (CIMT) is a strong and independent predictor of vascular events. Few studies have investigated the association between CIMT and sodium and potassium intake in people with type 1 and type 2 diabetes. The objective was to investigate the correlation between predicted 24 hour urinary sodium and potassium excretion and CIMT in people with type 1 and type 2 diabetes.

Methods: Participants (age 53+18years) were 41 adults with type 1 (n= 13) or type 2 (n= 28) diabetes recruited from the community. Common CIMT was measured using B mode ultrasound. Carotid pulsatility index and resistive index were measured using Doppler evaluation. A random spot urine sample was collected and predicted 24 hour urinary sodium and potassium excretion was calculated using the following formula: spot urine sodium or potassium concentration/spot urine creatinine concentration x predicted 24 hour creatinine (- 2.04 x age + 14.89 x weight + 16.14 x height (cm) -2244.45).

Results: Mean predicted 24 hour urinary sodium and potassium excretion were 191+133mmol and 139+74mmol, respectively. Twenty four hour sodium excretion was positively correlated with mean and maximum left CIMT (r= 0.372 and 0.357; both $p<0.05$), independent of age, in the whole cohort. Potassium and the sodium to potassium ratio were not correlated with CIMT. There was no correlation between urinary sodium or potassium excretion and carotid resistive index or pulsatility index in this cohort.

Conclusions: Urinary sodium excretion is positively associated with CIMT in people with type 1 and type 2 diabetes.

Key words: Diabetes, carotid intima media thickness, sodium, potassium.

PO1979

PERCENTILES OF FRUIT AND VEGETABLE INTAKE ACCORDING TO AGE AND NUTRITIONAL STATUS IN ADULTS AND ELDERLY IN SÃO PAULO, BRAZIL

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Background and objectives: Evidence suggests that fruit and vegetable intake (FVI) plays a protective role against chronic diseases, as obesity, diabetes, cardiovascular diseases and cancer. The World Health Organization (WHO) recommends the intake of a minimum of 400 g of fruit and vegetables per person/day, in order to prevent these health problems. The aim of this study is to identify differences in fruit and vegetable intake, according to age and nutritional status.

Methods: Data from a cross-sectional population-based survey among a representative sample (n=529) of adults and elderly people living in Sao Paulo, Brazil (ISA-Capital Survey, 2008). Dietary intake was assessed using two 24-hour dietary recalls and a Food Frequency Questionnaire. Habitual intake was estimated by the Multiple Source Method. Confidence Intervals (95%) for the percentiles (25, 50, 75) were used to assess the differences in FVI (g), according to the aging group (20-59 years and 60 years or more) and nutritional status (normal weight and overweight/obese).

Results: The overall mean consumption of fruit and vegetables was 179.9 g, which is 55% less than the recommended and only 4.35% of the population achieved the intake of 400 g. About 53% of the population is overweight, and this proportion is similar among adults and elderly (p=0.676), however there were no significant differences in percentiles of FVI according to nutritional status: normal weight - p25=85.8 g (CI:71.5-96.7 g); p50=144.0 g (CI:126.8-166.8 g); p75=226.4 g (CI:209.6-249.4 g) and overweight - p25=105.3 g (CI:87.8-121.8 g); p50=171.6 g (CI:156.2-189.2 g); p75=253.6 g (CI:238.3-275.7 g). Percentiles of FVI were significantly higher in all percentiles among elderly - p25=129.8 g (CI:113.5-145.5 g); p50=213.7 g (CI:191.6-230.4 g); p75=309.5 g (CI:273.8-328.7 g) than among adults - p25=71.3 g (CI:59.0-82.4 g); p50=129.9 g (CI:119.3-141.3 g); p75=196.5 g (CI:178.8-207.9 g), in both nutritional status. It was nevertheless below the recommendation.

Conclusions: FVI among adults and elderly of São Paulo was below the WHO recommendation. The percentiles were higher among the elderly and did not differ between nutritional status.

Key words: Food consumption, portion size, fruit, vegetables, obesity.

PO1980

RISK FACTOR OF IRON INTAKE, CALCIUM INHIBITOR AND BIRTH SPACE TO INCINDENT OSTEOPOROSIS FOR PREGNANT WOMEN

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Background and objectives: Osteoporosis happened when a woman is pregnant or lactating. Pregnant women must have more iron intake, more calcium intake for development babies inside. A factor that inhibitors calcium absorption is the presence of organic substances that can be compound with calcium to form insoluble salts, such as the consumption of oxalic acid, sodium and fiber. Birth space of near can also being the risk of osteoporosis, the mother which no time to recover health after child birth.

Methods: Observasional research with design of case-control study. Research conducted at Klinik Nurani Godean. There are 90 sample pregnant women such as 30 pregnant women as osteoporosis and 60 pregnant women as non osteoporosis. As data research iron intake, calcium inhibitor, birth space, and Bone Mineral Density.

Results: Most pregnant women with osteoporosis happen in the third trimester (60%), iron consumption risk (93,3%), oxalic acid consumption risk (53,3%), sodium consumption risk (56,7%), fiber consumption risk (56,7%) and birth space risk (3,3%). After that, the majority of pregnant women on non-osteoporosis happen in the second trimester (35%) and the third trimester (33,3%), iron consumption risk (91,7%), oxalic acid consumption risk (30%), sodium consumption risk (45%), fiber consumption risk (48,3%) and birth space risk (1,7%).

Key words: Iron intake, calcium inhibitor, birth space, osteoporosis.

PO1981

EFFECT OF CALCIUM SUPPLEMENTATION ON BONE MASS AND CALCIUM METABOLISM IN ADOLESCENTS, LACTATING AND POSTMENOPAUSAL WOMEN: A 2-YEAR RANDOMIZED TRIAL

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Background and objectives: The aim of this study was to examine effect of calcium supplementation on bone changes and calcium metabolism.

Methods: 210 adolescents (11-14y), 150 lactating women and 320 postmenopausal women (57 ± 4 y) were recruited for this double-blind, randomized trial. Participants were randomly assigned into 3 or 4 groups with daily doses of 40 g milk powder and 0, 300 and 600 mg calcium in the Low, Middle, and High dose groups for two years; and an additional Blank group for postmenopausal women. Bone mineral density (BMD) and content (BMC) at the whole body, spine and hip were determined using DXA at 0, 1 and 2 year. 10 participants in each age-intervention group further completed a 7-day calcium balance study using a double stable-isotope technique.

Results: 184 adolescents, 101 lactating and 287 postmenopausal women completed the study. During the 2-year intervention, mean calcium intake (mg/d) in the Low, Middle and High dose groups were: 685, 962, 1184 (girls); 761, 1008 and 1264 (boys); 777, 1069 and 231 (lactating women); and 730, 940, and 1205 and 720 (blank group) in postmenopausal women; BMD and BMC increased substantially in adolescents and decreased in lactating and postmenopausal women, but no significant difference in the 2-year changes in BMD and BMC among the three intervention groups in each study population. Calcium metabolism study showed enough calcium retention (342 mg/d) was found in adolescents (mean intake 1000 mg/d); positive balance (53 mg/d) was obtained in lactating women (mean intake: 893 mg/d), and net balance reached in postmenopausal women (mean intake: 1024 mg/d).

Conclusions: Our findings suggest mean calcium intakes of 700-800 mg/d could produce the plateau effect on bone changes, but higher values of calcium balance are obtained in the metabolism study in the three populations.

Key words: Calcium intake, bone mass, calcium metabolism, randomized trial, Chinese.

PO1982

GLYCEMIC RESPONSES FOLLOWING A MIXED-MEAL TOLERANCE TEST AMONG CHINESE, MALAY AND ASIAN-INDIANS IN SINGAPORE

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Background and objectives: Ethnicity has been shown to influence inter-individual variability in postprandial glycemic responses. However, no studies to date have examined glycemic variability among the ethnic groups in a multi-ethnic Asian population. We hypothesized that ethnic differences in glycemic responses following a mixed meal tolerance test (MMTT) is a function of body composition and fat distribution.

Methods: Blood samples, anthropometric measurements and body composition (DEXA) were obtained from 83 male subjects [32 Chinese (C), 25 Malay (M), 26 Asian-Indians (I)] who had no history of glucose intolerance. They underwent a liquid MMTT, consisting of 400 ml of Ensure PlusTM (300 kcal, 40.4 g carbohydrate, 12.5 g protein, 9.8 g fat). Postprandial glycemic responses (incremental area under the curve, iAUC) over 240min of MMTT were calculated using the trapezoidal rule. **Results:** The mean ± SE age and body mass index (BMI) were 25.2 ± 4.2 years and 21.3 ± 1.4 kg/m2 respectively. Despite similar BMI, the inter-ethnic fat adiposity was different, with the Indians having a greater waist circumference (cm) (I: 78.3 ± 4.8 vs. C: 75.2 ± 3.5 vs. M: 73.9 ± 4.1, p=0.001) and a trend towards higher percent body fat (I: 19.8 ± 5.1 vs. C: 18.2 ± 4.5 vs. M: 16.4 ± 4.8, p=0.051). The postprandial glycemic response (iAUC), adjusted for age, waist circumference and percent body fat was highest in Malays, followed by Indians and Chinese (M: 275.1 ± 155.7 vs. I: 197.1 ± 137.3 vs. C: 99.5 ± 196.3, p=0.002) over 240min.

Conclusions: Although Indians have greater abdominal adiposity reflecting higher insulin resistance, their glycemic response was lower than Malays. Other physiological and metabolic factors should be evaluated to provide further insights into the inter-ethnic variability in glycemic responses.

Key words: Postprandial glycemia, ethnicity, adiposity.

PO1983

GLUTAMINE ADMINISTRATION MODULATES T LYMPHOCYTE POLARIZATION IN DEXTRAN SULFATE SODIUM-INDUCED COLITIS

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Background and objectives: Inflammatory bowel disease (IBD) is a multifactorial disorder of unknown etiology. Dysregulated immune response between T regulatory (Treg) and T-helper (Th) cells may be responsible for the pathogenic mechanism. Glutamine (Gln) is a nutrient with immune-modulatory properties. This study investigated the effects of Gln on Th/Treg cell homeostasis and colonic inflammatory mediator expression in mice with dextran sulfate sodium (DSS)-induced colitis.

Methods: Mice were randomly assigned to a normal control group, and 2 DSS-treated groups. The control group (C) and one of the DSS group (DC) were fed with a common semipurified diet, while the other DSS-treated group (DG) were provided an identical diet except that part of the casein was replaced by Gln, which provided 25% of total amino acid nitrogen. The diets were fed for 10 days. At day 6, mice in the control group received distilled water and DSS groups were treated with distilled water containing 1.5% DSS for 5 d. At the end of the experiment, mice were sacrificed for further examination.

Results: DG group had lower plasma haptoglobin, colon weight/length ratio, immunoglobin G, monocyte chemoattractant protein-1, tumor necrosis factor-α levels than the DC group. Also, the percentages of interleukin-17F, interferon-γ in blood and gene expression of transcription factors T-bet, RAR-related orphan receptor-α expressions in mesenteric lymphatic node were lower while blood Foxp3 was higher in the DG group than the DC group and had no differences from the C group.

Conclusions: The results showed that Gln administration suppressed Th1/Th17 and Th-associated cytokine expressions. Also, the expression of Treg was upregulated. These findings suggest that Gln modulates the balance of Th/Treg that may consequently reduce inflammatory reaction in DSS-induced colitis.

Key words: DSS-induced colitis, IBD, T-lymphocytes.

PO1984

EFFECTS OF EICOSAPENTAENOIC ACID AND DOCOSAHEXAENOIC ACID ON PROSTATE CANCER CELL MIGRATION INDUCED BY TUMOR-ASSOCIATED MACROPHAGE

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Background and objectives: Dietary n-3 polyunsaturated fatty acids (PUFAs) are associated with reduced risk of prostate cancer (PCa). Tumor-associated macrophages (TAMs) are the main intratumoral infiltrating leukocytes, and increased TAMs numbers correlates with poor prognosis in PCa. The aim of this study was to investigate the effect of n-3 PUFAs on PCa cell migration induced by TAMs.

Methods: PCa epithelial cell line, PC-3, were pretreated with 50 ?M eicosapentaenoic acid (EPA), 50 ?M docosahexaenoic acid (DHA) or 10 ?M peroxisome proliferators-activated receptor (PPAR)-? antagonist GW9662 before exposure to the conditioned medium (CM). CM was derived from M2-polarized THP-1 macrophages treated with phorbol-12-myristate 13-acetate (PMA), interleukin (IL)-4 and IL-13. We analyzed the DNA binding activity of PPAR-? by transcriptional assay kit. The nuclear factor (NF)-kB p65 and IkB? were assayed by Western blot. The mRNA expressions of matrix metalloproteinase (MMP)-9, urokinase-type plasminogen activator receptor (uPAR), colony stimulating factor (CSF)-1and transforming growth factor (TGF)-? were measured by real-time RT-PCR in PC-3. Also, migration ability of PC-3 was evaluated by using a co-culture system of M2 macrophages and PC-3.

Results: PPAR-? DNA binding activity significantly increased in PC-3 incubated with CM in the presence of EPA or DHA. EPA/DHA administration upregulated cytosolic I?B? expression and decreased protein levels of nuclear NF-?B P65 in PC-3. Furthermore, EPA/DHA downregulated the mRNA expressions of MMP-9, uPAR, CSF-1 and TGF-?. Also, PC-3 migration ability was inhibited. Pre-treatment with GW9662 abolished the favorable effect of EPA/DHA on PC-3.

Conclusions: These results indicate that EPA or DHA administration reduce PC-3 cell migration and decrease chemotactic ability of macrophages. The impact of EPA/DHA may partly be explained by upregulating PPAR-? and decreasing NF-?B p65 transcriptional activities in PC-3.

Key words: Prostate cancer, TAM, n-3 PUFAs, PPAR-? , migration.

PO1985

GABA TEA ON CARDIAC FIBROSIS AND FAS DEATH RECEPTOR DEPENDENT APOPTOTIC PATHWAY IN STREPTOZOTOCIN-INDUCED DIABETIC RATS

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Background and objectives: GABA tea is a tea product that contains a high level of gamma-aminobutyric acid (GABA). Thus, this study aimed to investigate the effect of GABA tea on diabetic myocardial fibrosis, and further to clarify the potential mechanisms.

Methods: In this study, to investigate the roles of GABA tea in the heart of diabetic rats, male Wistar rats as diabetic animal models were injected with 55 mg/kg streptozotocin (STZ) to induce diabetes for 2 weeks, and subsequently administrated with the dosages of 4.55 and 45.5 mg/kg/day GABA tea extract for 6 weeks.

Results: Our data showed that the fasting blood glucose levels were reversed back to normal levels in GABA tea-treated diabetic rats as compared with untreated diabetic rats. Additionally, we observed GABA tea as potent inhibitors of cardiac fibrosis induced by STZ. We further found that GABA tea exposure reduced the elevated expression of tumor necrosis factor-alpha (TNF-alpha), Fas and Fas ligand (FasL) in the excised hearts of diabetic rats. Moreover, our results demonstrated that the STZ-induced protein level of activated caspase-8 and caspase-3 were significantly inhibited after GABA tea treatment. Taken together, we propose that the inhibitory effect of GABA tea on STZ-induced cardiac fibrosis could be mediated by reducing blood glucose and further attenuating TNF- alpha expression and/or the Fas/FasL system-mediated apoptosis in rats.

Conclusions: These findings will provide implications for the potential of GABA tea in anti-diabetic property, which may involve polyphenol and GABA and the consequent antioxidant action.

Key words: GABA tea, diabetes, heart, Fas, TNF-alpha.

PO1986

BETTER BITTER GOURD: A HOLISTIC EVIDENCE- AND FOOD-BASED APPROACH TO MANAGE TYPE-2 DIABETES AND PROMOTE HEALTH IN DEVELOPING COUNTRIES

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Background and objectives: Today, more than 285 million people in the world live with diabetes, 80% of which reside in low- and middle-income countries. Bitter gourd (Momordica charantia L.) is a low-cost, food-based intervention that can play a vital role in the treatment and prevention of insulin resistance and type 2 diabetes mellitus. To provide evidence-based dietary recommendations for bitter gourd, a consortium of scientists and experts from Germany, India, Taiwan, Tanzania and Thailand participated in the design and implementation of a three-year research project from 2011 to 2014.

Methods: The first phase aims to (1) optimize production and utilization of antidiabetic compounds in bitter gourd through varietal selection, postharvest practices and preparation methods; (2) determine optimal dosage through in vitro and mice; and (3) develop dietary strategies for diabetes management and prevention in Asia and Africa. The second phase emphasizes strategies to enhance bitter gourd value chains and promote consumption.

Results: Currently, the project has undertaken bitter gourd surveys among diabetic patients, medical experts, general consumers, sellers, and producers in Taiwan, India and Tanzania; horticultural evaluations and phytochemical analyses of 53 bitter gourd germplasm accessions and 20 commercial hybrids; animal studies on bitter gourd's antidiabetic properties; placebo-controlled double-blind cross-over studies on human subjects in India and Tanzania; research on the effects of cooking and storage on bitter gourd's anti-diabetic properties; and development of bitter gourd recipes for Tanzania and India. Project-related communications and promotions are published in print and web-based platforms (www.Bitter-Gourd.org).

Conclusions: This multidisciplinary project to apply a food-based intervention to tackle a health problem in developing countries is the first of its kind linking nations and institutions that study bitter gourd.

Key words: Bitter gourd; food-based intervention; type-2-diabetes

PO1987

SATISFACTION WITH CLINICAL USE OF CONTINUOUS GLUCOSE MONITORING SYSTEM (CGMS) IN JAPANESE PEOPLE WITH DIABETES AND WITH NORMAL GLUCOSE TOLERANCE

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Background and objectives: The evaluation of patient-reported satisfaction is important in trials of continuous glucose monitoring system (CGMS). A continuous glucose monitor satisfaction scale (CGM-SAT) was evaluated after a four-day trial of the CGMS in Japanese patients with diabetes and subjects with normal glucose tolerance (NGT).

Methods: At the end of the 4-day trial of the CGMS, 24 patients with diabetes (Age 62.6 ± 12.8 yrs, BMI 22.3 ± 3.2 kg/m^2, Duration of diabetes 14.4 ± 10.4 yrs, HbA1c 7.2 ± 1.0%: mean ± SD) and 22 subjects with NGT (Age 30.0 ± 11.1 yrs, BMI 20.7 ± 2.9 kg/m^2, HbA1c 5.1 ± 0.1%) completed the CGM-SAT, which assesses satisfaction on 37 items using a five-point Likert scale. Descriptive analysis and glycaemic variables were performed using Spearman's correlation. P values < 0.05 were considered statistically significant.

Results: There was no difference between subjects with and without diabetes in mean score of CGM-SAT. The standard deviation (SD) of daily blood glucose, the mean amplitude of glycemic excursions (MAGE), and mean incremental area under the blood glucose curve (IAUC) did not demonstrate any correlation with each statement nor total score of CGM-SAT. Subjects with NGT demonstrated significantly unsatisfied in ¡ÈSometimes gives too much information to work with¡É ($p < 0.05$) and ¡ÈInterferes a lot with sports, playing outside, etc.¡É ($p < 0.05$) compared to the patients with diabetes. Patients with insulin treatment showed more positive in ¡ÈTeaches me how eating affects blood sugar¡É ($p < 0.05$) and ¡ÈMakes it easier to complete other diabetes self-care duties¡É ($p < 0.05$) than patients without insulin treatment.

Conclusions: No correlation was observed between the each statement or score of CGM-SAT and glycaemic variables in Japanese people with and without diabetes.

Key words: Diabetes, CGMS, CGM-SAT, glycaemic variables.

PO1988

TEN-YEAR CARDIOVASCULAR RISK PREDICTION AMONG 194 THAI MIDDLE-AGED ADULTS

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Background and objectives: Cardiovascular diseases (CVD) cause an estimated 17 million deaths each year, accounting for one-third of all deaths worldwide. More than one-third of these deaths occur in middle-aged adults. This study estimated 10-year CVD risk trends in Thai middle-aged adults living at Bangkoknoi district where the subjects have migrated from various parts of Thailand.

Methods: Total number of 194 subjects (51 M, 143 F) aged 35-59 were enrolled into this study via multistage sampling method from the people living in Bangkoknoi district and volunteered for the study. Information on the martial status, education, occupation, living condition, physical activities, smoking, consumption and drinking habits, stress as well as their history of diseases were obtained through a questionnaire. Anthropometric and biochemical assessment were also determined. We estimated 10-yr risk of CVD by using Framingham heart study risk factor categories point scores, the risk functions by gender, age group in account of level of blood pressure, total serum cholesterol, HDL-C , LDL-C, diabetes and smoking status.

Results: Mean+SD of age, BMI, WHR, %BF, systolic and diastolic BP were 45.6+6.7 yr, 23.2+3.3 kg/m2, 0.88+0.06, 29.9+6.0 %, 126.1+17.1 mmHg, 83.9+13.1 mmHg in males, and 46.5+7.8 yr, 25.2+4.3 kg/m2, 0.82+0.11, 40.4+4.5%, 121.4+19.2 mmHg, 80.4+11.8 mmHg in females. Male subjects: 49% had a 10-year risk for CVD of < 10%, 31.4% had a risk of 10-20%, and 20% had a risk of > 20% when compared to female subjects, 71.3% had a 10-year risk for CVD of < 10%, 21% had a risk of 10-20%, and 7.7% had a risk of > 20%.

Conclusions: 10-year CVD risk were highly prevalent in males who had the common combination of risk factors. Therefore, the current epidemic rise of CVD in middle aged adult needs attention.

Key words: CVD, Framingham heart study, 10-yr CVD risk.

PO1990

DIABETES: A RISING PROBLEM IN TANZANIA. WHAT CAN WE DO?

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Background and objectives: Tanzania is faced with high rates of pre-diabetes (9.4%) and diabetes (2.3%). To identify possibilities for improvement, two cross-sectional studies on underlying factors, such as lifestyle, were conducted in the Kilimanjaro Region, Tanzania. The first study assessed knowledge on and management of diabetes among diabetic patients. The second study assessed rate of overweight, pre-diabetes, and related risk factors among adults without any diagnosed disease.

Methods: The 2011 study included 155 adult diabetic patients of the Kilimanjaro Christian Medical Centre, interviewed with standardized questionnaires. The 2012 study assessed following health indicators among 105 participants around Moshi: body mass index, fasting blood glucose, and blood pressure, among others. Two 24-hour dietary and physical activity recalls and a food frequency questionnaire were conducted.

Results: Almost all patients were on medication. Only one patient was on diet treatment alone. Farmers were significantly older at diagnosis than non-farmers, which demonstrates the role of physical activity in diabetes prevention. Although almost 50% could name four to six different symptoms, complications, or causes, this knowledge was presumably gained after diagnosis. More than 2/3 of patients were diagnosed at least 6 months after symptoms started. The 2012 study revealed high intakes of refined carbohydrates and fats and a median physical activity level of 1.5 (IR: 0.4). Forty percent of participants were overweight or obese. According to WHO criteria, 17% were classified as pre-diabetic.

Conclusions: The results demonstrate the need to increase awareness, management, and prevention of diabetes. Information leaflets could be placed in markets, churches/mosques, and bars. Access to glucose tests should be increased. Nutrition counseling, support groups, and sporting facilities should be instituted at community and clinical level. Additionally, preventive strategies are required. A dietary intervention study with bitter gourd among pre-diabetics is planned in Tanzania for 2013.

Key words: Diabetes, knowledge, management, prevention.

PO1991

FOOD AND ALCOHOL INTAKE IN JAPANESE TYPE 2 DIABETES

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Background and objectives: The number of type 2 diabetic patients is increasing in Japan. It is necessary for patients to continue diet therapy, exercise therapy and pharmacotherapy. Usually we suggest that patients stop drinking alcohol. However, there are many people who continue drinking. We investigated food and alcohol intake in Japanese type 2 diabetic patients.

Methods: A total number of 45 Japanese type 2 diabetic patients were surveyed as the subjects of this study. We measured the body height, weight, fasting blood glucose, HbA1c, TG, LDL-cho, HDL-cho. We also examined food and alcohol intake and physical activity. For the food and alcohol intake we used the BDHQ (brief-type self-administered diet history questionnaire) and drinking behavior questionnaire. And to measure physical activity we used the IPAQ (International Physical Activity Questionnaire). The statistical difference was determined by Student's t-test. A P value of less than 0.05 was considered statistically significant.

Results: There was no significant difference in blood measurements among people who drank often, people who drank a high volume and people who neither drank often nor in large quantities. Drinking frequency and volume of males was significantly higher than females ($p< 0.001$). In subjects who drank while eating dinner, 30% of males and females said they ate less when they drank and 70% of people said their food intake did not change. In people who drank often and people who drank a lot there were many males and people with high energy intake. People who drank often and people who drank a lot showed significantly lower protein and carbohydrate intake than people who neither drank often nor a large amount.

Conclusions: The results of this study suggest that people who drink often and people who drink a lot usually reduce their amount of food intake.

Key words: Alcohol, type 2 diabetes, Japanese.

PO1992

THE DEVELOPMENT OF A PORTABLE MEAL CARD TO COMPLEMENT NUTRITION EDUCATION FOR PERSONS WITH DIABETES

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Background and objectives: The number of people with diabetes has been increasing around the world, including Japan, where the rate of nutrition education of diabetics is high, but compliance with the principles taught in nutrition education is not verified. Thus, the creation of a portable meal card for persons with diabetes receiving nutrition education will be a useful measure to improve compliance. This paper presents such a card.

Methods: The portable meal card was developed and six university seniors majoring in nutrition were asked to use the card. After that, a questionnaire was administered to them. The questionnaire assessed the card's ease of use in terms of size, layout, the items mentioned on it, and so on.

Results: The data assessed included the questionnaire results the contents of a meal card, the students' photographs of their meals and the quantity of energy, protein, liquids, carbohydrates, and salt in them. An additional subjective component of values was indicated individually by participants. Recipes and cooking advice are printed on the back of the card. A postcard size was deemed the most suitable in terms of its convenience for printing.

Conclusions: Although this experiment was conducted among students, there are differences between them and diabetic patients, many of whom have little knowledge of nutrition and are elderly. A future follow-up study among diabetic patients will be conducted to examine the ecological validity of the card.

Key words: Diabetes, Portable meal card, nutrition education.

PO1994

KNOWLEDGE AND PRACTICES ON HOME MANAGEMENT OF DIARRHEA (HMD) AMONG CAREGIVERS OF CHILDREN 6-24 MONTHS IN URBAN AREA JAKARTA

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Background and objectives: Diarrhea is a leading cause of morbidity and mortality across all age groups and regions of

the world. Among children 0-59 months of age, it is responsible for 1.236 million deaths. The HMD is challenging for community in the urban setting area. This study was conducted to assess knowledge, and practice of caregivers on HMD in children aged 6-24 months.

Methods: The study design was cross sectional. It was conducted on May 7 to 21, 2012 in Paseban village, Central Jakarta. Both quantitative and qualitiative methods were carried out.

Results: As many as 42% of children aged 6-24 months suffered of diarrhea within the past two weeks; 57% of them were children aged 12-24 months. Diarrhea duration was less than three days (69%). A half of the caregivers had good knowledge (50%) on home management of diarrhea. Most of caregivers had poor practice (55%) on home management of diarrhea. There was no significant association between diarrhea within the past two weeks and the child's nutritional status, child's characteristics, caregiver's characteristics, and caregiver's knowledge and practice on home management of diarrhea. There was a significant association between caregiver's characteristics (age and education background) and caregiver's knowledge on home management of diarrhea.

Conclusions: Further research is needed to investigate the quality and quantity of child's intake during diarrhea. The socialization amongst the caregivers on diarrhea home management guidelines practices needs to be improved. Further effort need to be done to synchronize the guidelines and health staff opinion based on updated knowledge on diarrhea disease, including on child's intake during illness. Primary health center services need to be improved to increase community's referral to the primary health center.

Key words: Home management of diarrhea, children aged 6-24 months old, urban area.

PO1995

EFFECTS OF DIETARY MANAGEMENT AFTER BARIATRIC SURGERY ON BODY COMPOSITION CHANGES IN TAIWAN

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Background and objectives: Bariatric surgery is now regarded as the most effective method to control morbid obesity. Dietary management after the surgery is very important in long-term weight loss and maintenance for the patients. This study investigated the follow-up visit rates after surgery on weight loss and body composition changes in patients with sleeve gastrectomy (SG), Roux-en-Y gastric bypass (GB) and adjusted gastric banding (AGB).

Methods: This was a retrospective clinical study of obese patients after bariatric surgery during 2011 to 2012 in Taipei Medical University Hospital, Taiwan. There were 26 patients with GB, 51 with AGB and 315 performed SG in this study. The calorie and protein recommendations to the patients were based on NIH and ASMBS guidelines. The postoperative follow-up visits were scheduled at 1 week, 1, 3, 6, 9, and 12 months. Body compositions [weight, muscle mass, fat mass, and waist-hip ratio (WHR)] were measured before and after surgery using BIA method.

Results: All patients took muti-vitamin/mineral on the first month (AGB 70-80% vs. SG and GB 80-90%) after surgery. All patients had significant weight loss, lower body fat mass and WHR after follow up for 1 year. However, SG or GB had greater extend of body fat loss and lower WHR than AGB. Compare to the patients with lower follow-up visit rates, patients with higher visit rates resulted in higher body weight and fat mass loss, and WHR decrement. Also, the frequency of muti-vitamin/mineral consumption was higher.

Conclusions: Our results suggest that patients with SG or GB had better outcomes than AGB after follow up for 1 year. Independent of the surgical procedure performed, patients with higher follow-up visit rates had greater extend of body weight and fat mass loss than low visit rates.

Key words: Body composition, diet management, bariatric surgery, morbid obesity.

PO1996

NUTRIRIONAL STATUS OF HOSPITALIZED CANCER PATIENTS IN TAIWAN

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Background and objectives: The clinical care discussed malnutrition screening form nurse before in our hospital. This show that the third cancer patients who had moderate and height malnutrition were oral cancer, hepatic, and rectal colon cancer. In this study was to find whose the first severe malnutrition of cancer hospitalized, and the distribution of the nutritional status in Taipei medical university hospital, in Taiwan.

Methods: This was a retrospective clinical study. For all patients, the dietitians visited and recorded their nutritional status, laboratory tests [albumin (Alb), hemoglobin, C-reactive protein (CRP), and total lymphocyte count (TLC)], and nutritional problems [Alb <3, Body mass index < 18.5, NPO > 5 days, weight loss >10 % during 6 month, and poor intake].

Results: There were almost 1500 cancer patients who received the dietitian assessment and counseling on the first time during 2012. The results showed that there were significant differences in body mass index, dietary calorie intake, and protein intake among the high, moderate, mild and none malnutrition status. The biomarkers Alb, Hg, and TLC were mild different among nutrition status. Moreover, the percentage of different cancer disease discussed. This data indicated that the cancer patients who had higher malnutrition.

Conclusions: This study revealed the cancer patients to widespread malnutrition, nutritional intervention could increase their intake instead the nutritional status when hospitalized. We will as soon as possible to give nutritional support to prevention of cancer patients into severe malnutrition.

Key words: Nutritional therapy, nutritional status, cancer.

PO1997

EATING RATE IS ASSOCIATED WITH EATING BEHAVIORS ACCORDING TO GENDER AND OBESITY

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Background and objectives: The aim of this study was to compare the differences in eating behaviors and masticatory performances between genders or obesity status, and to determine the associations between eating behaviors and masticatory performances in both genders according to obesity status.

Methods: Twenty four (50% M and 50% F) adults were matched on age, gender, obesity status and dental health. Eating behaviors were assessed by the Three Factor Eating Questionnaire (TFEQ) and chewing performances were measured using electromyography (EMG) while eating a boiled-rice (150 g). Compared with lean participants, obese participants had significantly higher level of disinhibition ($p<0.05$ for M; $p<0.01$ for F). Chewing performances were not significantly different by obesity status. Males had greater bite size ($p<0.05$ for lean; $p<0.01$ for obese) and chewing power ($p<0.001$) and faster eating rate ($p<0.01$ for lean; $p<0.05$ for obese) than females. Females habitually chewed more ($p<0.01$ for lean; $p<0.05$ for obese) and had longer meal duration ($p<0.05$) than males. In lean males, the eating rate was negatively($r=-.812$, $p<0.05$) associated with disinhibition and total number of chew (TNC) was positively ($r=.902$, $p<0.05$) associated with the hunger sensitivity on the TFEQ. In obese males, the eating rate was negatively($r=-.860$, $p<0.05$) associated with cognitive restraint and positively ($r=.871$, $p<0.05$) associated with the hunger sensitivity. No significant associations between eating behaviors and chewing performances were observed in females.

Conclusions: Disinhibited eating was differentiated in obese adults. Eating behaviors were related to the rate of ingestion or TNC in males but not in females. Therefore, gender specific intervention and counseling aimed to improve the eating rate could be promising for the eating behavioral treatment in the obese. Acknowledgements: This research was supported by grants from the Globalization of Korean Foods R&D program, funded by the Ministry of Food, Agriculture, Forestry and Fisheries, Republic of Korea.

Key words: Obesity, gender, eating behavior, TFEQ, eating rate.

PO1998

PERCEPTIONS AND SATISFACTION ON HOSPITAL FOODSERVICE AND DIETARY INTAKE AMONG HOSPITALIZED DIABETIC DIET RECEIVERS

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Background and objectives: During hospitalization, patients with diabetes or its related symptoms are prescribed with diabetic diet, where the total calorie has been modified according to individual's requirement and stages of illness. Nevertheless, there are reports on low dietary intake among diabetic patients. In fact, patients' perception on hospital foodservice is reported to influence their dietary intake. Therefore, this study aimed to study the relationship between dietary intake and patients' perceptions and satisfaction on hospital foodservice among diabetic diet receivers.

Methods: Seventy-seven hospitalized patients who received diabetic diet in a local government hospital were recruited. A validated questionnaire consisting of four dimensions of foodservice, namely food quality, timeliness and reliability, staff issue and physical environment was used to investigate patients' perceptions and satisfaction on hospital foodservice. Weighed food intake (hospital food) and one day food record (non-hospital food) were used to measure patients' dietary intake.

Results: The total score of four dimensions of foodservice (Mean ± SD = 59.9 ± 6.05, Max score = 120) and patients' satisfaction (Mean ± SD = 6.10 ± 1.61, Max score = 10) showed

a moderate satisfaction on hospital foodservice. The means of energy and protein intake from hospital foods were higher than non-hospital foods. About 55% (n=42) of the patients met the individual requirement for energy and protein intake from the hospital foods. Of four foodservice dimensions, only food quality (r=0.588), timeliness and reliability (r=0.450) and staff issue (r=0.376) had significant (p<0.001) and positive correlations with patients' satisfaction on hospital foodservice. These three dimensions also showed significantly positive association between the energy intakes from hospital food.

Conclusions: The presence of associations between dietary intake and the foodservice dimensions indicated that satisfaction with the foodservices may influence diabetic patients' dietary intake during hospitalization.

Key words: Perceptions, satisfaction, hospital foodservice, Malaysia.

PO1999

OVERWEIGHT AND OBESITY TRENDS AMONG ELDERLY MEN LIVING IN UMLAZI -DURBAN SOUTH AFRICA

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Background and objectives: Overweight and obesity trends are more prevalent in women than men; however they must be investigated in elderly men. Although anorexia of ageing is also a reality in older men, overweight and obesity trends have been detected in this population group. The objective of the study was to determine the nutritional status of free living elderly men (>60yrs) living on state pension, in Umlazi, KwaZulu-Natal (Durban) South Africa. The mean age for elderly men was 73.

Methods: The nutritional status included anthropometrics to determine BMI, waist circumference and WTHR scores, dietary intake and blood pressure correlations of the elderly.

Results: 34.2% men were overweight (BMI> 25-29.9) and 18.8% were obese (BMI> 30), 43.0% were within normal weight (BMI > 18.5- 24.9) and only 4.0% were underweight (BMI <18.5), the mean BMI score was 26. Waist circumference scores indicated 74.0% (¡Ã 102 cm) were within the cut of points and 26.0% (>102 cm) exceeded cut off points. Waist to hip ratio-WTHR scores indicated that 48.0% were at risk for metabolic syndrome exceeding > 0.5 and 52.0% were not at risk. Hypertension was also prevalent in 83.0% of the men and there was a correlation between systolic pressure and BMI significant at 0.01. The carbohydrate intake was 65.0% of the WHO nutrient intake goals and fibre consumption was 33.3% of the RDA.

Conclusions: Central obesity, overweight and obesity trends were detected within the elderly men in this community. Interventions to reduce weight are detrimental in reducing health risks particularly for older people; since they can also improve the quality of life and fewer medical complications.

Key words: Elderly men, obesity, nutritional status.

PO2000

BETAINE IMPROVES GENOMIC HYPOMETHYLATION AND ALLEVIATES THE HEPATIC STEATOSIS INDUCED BY HIGH FAT DIET IN MICE

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Background and objectives: Betaine is a natural compound in common foods and serves as a methyl donor. The hepatoprotective effects of betaine supplement on fatty liver has been reported in experimental and clinical studies, with mixed results. The present study aims to determine the effect of betaine supplement in NAFLD mice through methyl group metabolism.

Methods: Thirty-two male C57BL / 6 mice were divided into four groups and fed with control diet (CD); high fat diet (HFD); HFD +1% betaine (HFD + 1% B) and HFD +2%betaine(HFD + 2% B), respectively, for 12 weeks.

Results: Betaine supplement significantly reduced visceral fat ratio, serum ALT, AST, TG (all $P < 0.05$) and dose-dependently alleviated hepatic TG deposite ($P < 0.01$) of NAFLD mice. HFD greatly increased serum homocysteine levels ($P < 0.05$), decreaed serum choline ($P < 0.01$) and hepatic S-adenosine methionine level ($P > 0.05$), treatment of betaine significantly reversed the abnormal metabolism of hepatic methyl group. Genomic DNA hypomethylation was found in HFD, and betaine supplement significantly improved it ($P < 0.01$) to the CD level. HFD markedly increased FAS-UCP2-ACOX mRNA expression and decreased the PPARα mRNA expression-all P<0.05-, betaine supplement reversed the disregulated gene expression.

Conclusions: Disordered methyl group metabolism likely contributes to the genomic hypomethylation during high fat diet induced NAFLD, betaine supplement can correct methyl group metabolism, elevate global DNA methylation level in the liver, regulate the expression of genes involving in triglyceride metabolism, and ultimately alleviate liver injury induced by high fat diet. Acknowledgements: This study was supported by grants from National Natural Science Foundation of China

(81072302 and 81273050) and Natural Science Foundation of Guangdong Province of China (10151008901000207).

Key words: Nonalcoholic fatty liver disease, betaine, methyl group metabolism, DNA methylation, gene expression.

PO2001

BODY ADIPOSITY INDEX IS A GOOD PREDICTOR FOR INCIDENT HYPERTENSION IN ADULTS

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Background and objectives: In recent years, there have been an increased number of studies showing the strong association between obesity and the risk of hypertension, which is well recognized as a major cause of morbidity and mortality. The body adiposity index has been recently proposed as a new method to estimate the percentage of body fat (%BF). The aim of our study was to compare BAI, body mass index (BMI), and waist circumference with respect to their ability to predict hypertension risk in a sample of middle-aged men and women.

Methods: The present follow-up analysis comprised 10309 individuals (2259 females) free of hypertension from the Aerobics Center Longitudinal Study (ACLS), who completed a baseline examination during 1988-2003. Incident hypertension was ascertained from responses to mail-back surveys between 1990 and 2004.

Results: During an average follow-up of 9.1 years, 872 subjects (107 females) became hypertensive. Cox proportional hazards regression analysis was used to calculate hazard ratios (HRs) for incidence of hypertension according to 3 different sets of confounders. In the fully-adjusted model, males in the middle and upper categories of all body adiposity measures showed a higher risk of incident hypertension (HRs ranged from 1.49 to 2.09). Females showed a higher risk of incident hypertension in the upper categories of BAI and BMI (HRs 1.84 and 3.36, respectively) but not waist circumference (HR 1.72).

Conclusions: In our best knowledge, no previous studies have analyzed the ability of BAI to predict the risk of incident hypertension. The middle tertile of BAI only identified higher risk of hypertension in males, thus showing lower discrimination accuracy in females. In order to predict incident hypertension, BAI could be considered an alternative to traditional body adiposity measures, being as good predictor as BMI or waist circumference.

Key words: Obesity, body fat, BAI, blood pressure, adults.

PO2002

ASSOCIATION BETWEEN BODY ADIPOSITY INDEX AND CARDIOVASCULAR DISEASE RISK FACTORS IN ADULTS: THE AEROBICS CENTER LONGITUDINAL STUDY

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Background and objectives: The body adiposity index (BAI) has been recently proposed as a new method intended to substitute BMI as an easy estimate of percentage body fat (%BF). Validation studies showed contradictory results, and the association between BAI and cardiovascular disease (CVD) risk factors is not well established. The aim of the study was to analyze the association between BAI and CVD risk factor compared with BMI and %BF in adult men and women.

Methods: The present analysis comprised 10309 individuals (2259 females) enrolled in the Aerobics Center Longitudinal Study (ACLS) between 1988 and 2003, with valid data for BAI, BMI, %BF and CVD risk factors (e.g. total cholesterol, fasting blood glucose, systolic and diastolic blood pressure, and cardiorespiratory fitness).

Results: All body adiposity measures were positively correlated with each other (P≤;0.001) . BAI showed lower correlation values with %BF than BMI in both males and females. Significant association were showed between all body adiposity measures and CVD risk factors (all P≤;0 .001). The highest correlation values for fasting blood glucose, systolic and diastolic blood pressure were found with BMI, and for total cholesterol and cardiorespiratory fitness with %BF. Except for systolic and diastolic blood pressure, BAI showed slightly stronger association with CVD risk factors in males than in females.

Conclusions: BAI showed lower correlation values with %BF than BMI indicating that calculation of BAI could result in inaccurate estimation of %BF. Our results reported significant associations between all adiposity measures and CVD risk factors. However, in general BAI showed slightly weaker associations than BMI or %BF, indicating that in our sample BAI did not provide a meaningful alternative to BMI or %BF as a CVD risk indicator.

Key words: Obesity, body fat, BAI, cardiovascular disease, adults.

PO2003

THE IMPACT OF OBESITY ON SPIROMETRIC LUNG FUNCTION OF THAI SCHOOL AGED CHILDREN

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Background and objectives: The prevalence of obesity among children and adolescent has increased greatly in all parts of the world. Obese children are at increased risk of a wide range of health conditions including respiratory diseases. The aim of this study was to investigate the impact of obesity on spirometric lung function in school aged children in Bangkok, Thailand.

Methods: Cross sectional data were collected from 1,038 children, aged 6-18 years, from 7 schools in Bangkok, Thailand. By using WHO 2007 plus, body mass index (BMI)-for-age Z-score (growth reference for 5-19 year), children were classified as obesity if their BMI were >+2 SD and normal if their BMI were >-2 SD to 0.99 SD. All children underwent physical examination, anthropometric assessment and spirometric lung function measured with Jaeger spirometer (Jaerger, model: 97342 Hoechberg, Germany). Spirometric parameters were compared between the two groups using unpaired t-test.

Results: There were 124 in the obesity group and 406 children in the normal group. Obesity had statistically significant lower spirometric values than normal including forced vital capacity (FVC) 2.95 + 0.75 VS 2.74 + 1.04, p=0.034, forced expiratory volume in the first second (FEV1) 2.68 + 0.70 VS 2.40 + 0.92, p=0.002, Forced expiratory flow at 25% point to the 75% point of Forced Vital Capacity 3.39 + 1.09 VS 2.95 + 1.25, p<0.001, FEV1/FVC 90.81 + 6.28 VS 87.84 + 6.51, p<0.001. There were no statistical difference in age and height between obesity and normal groups (p>0.05).

Conclusions: We confirm the impact of obesity on lung function in our Thai children. These findings emphasize the importance of preventive intervention on obesity in children as early as possible in order to avoid possible future respiratory complications.

Key words: BMI, obesity, spirometric lung function, children, adolescent.

PO2004

DIETARY RESTRAINT AND COMPLIANCE TO EXERCISE REGIMEN ARE KEY PREDICTORS OF WEIGHT LOSS

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Background and objectives: Measures of eating behaviors have been shown to predict weight loss outcomes but results are inconsistent. We aim to investigate if dietary restraint, disinhibition and hunger scores from the Stunkard Three-Factor Eating Questionnaire (TFEQ) or other measures are key factors to weight loss in individuals who have undergone an intervention program.

Methods: Healthy overweight Chinese adult men aged 21-45 years with >25% body fat and BMI of ≥23 to 35kg/m2 were recruited into the Singapore Adult Metabolism Study for a 16-week weight loss intervention program using behavioral therapy, meal replacements and supervised exercise regimen. TFEQ, three 24 hr recalls and a nutritional knowledge questionnaire were administered and anthropometric measurements taken, pre- and post- intervention.

Results: Analysis from the first 38 subjects, who lost a mean of 7.84kg (9.52% of their original weight), showed significant decrease in energy intake (p<0.001), disinhibition (p<0.001) and hunger (p=0.004) scores, while protein intake, nutritional knowledge and restraint scores increased (all p<0.001) significantly after intervention. The average number of meal replacements consumed per day and exercise sessions attended per week was 1.3±0.08 and 2.3±0.11 respectively. Post-intervention restraint scores and number of exercise sessions attended were significantly associated with weight loss (r=0.409, p=0.009; r=2.88, p<0.001) and percentage body fat loss (r=0.439, p=0.028; r=1.79, p=0.045) in models which adjusted for age, change in energy and macronutrient intake, amount of meal

replacements consumed and improvement in nutritional knowledge (adjusted R-square=0.533 for weight loss; 0.232 for percentage body fat loss).

Conclusions: Our results are consistent with extant evidence, suggesting that dietary restraint and close adherence to exercise regimen are important factors of weight loss. This emphasizes the importance of targeting dietary restraint and exercise as the key goals in behavioral therapy for successful weight loss.

Key words: weight loss, TFEQ, restraint, disinhibition, exercise

PO2005

ENVIRONMENTAL FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY IN UNIVERSITY STUDENTS OF THE BASQUE COUNTRY

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Background and objectives: The development of excess weight is usually attributed to environmental risk factors, some of them modifiable. The aim of this study was to assess the environmental factors associated with overweight and obesity (OV/OB) in a population of university students.

Methods: A cross-sectional nutritional survey was carried out in the University of the Basque Country. A sample (n=857, 70.9% females) of the adult population (18 to 25 years old) was studied. Indices and body composition were estimated by anthropometry, and body fat was used as criteria of diagnosis of OV/OB. Dietary questionnaires and a global questionnaire including questions related to sociodemographic, economic and lifestyle variables were used. Data were analyzed using SPSS version 20.0.

Results: The prevalence of OV/OB was 25.1%, being higher in males than in females (P<0.001). Protective factor against excess weight were considered: eating four or more times a day in both sexes; and being male whose mothers work in services sectors, technical job, are businesswomen or manager, that is, professional categories with an intermediate salary, in comparison with male whose mothers do other activities like housework. The predictor of OV/OB in females was being a higher score in the crowding index, an indication of the social class. Other factors like physical activity, smoking habit, alcohol consumption, or adherence to the dietary guidelines were considered neither protective nor predictive of excess weight.

Conclusions: This study uncovered some modifiable risk factor for excess weight in this population and identifies some risk groups according to socioeconomic status. These outcomes could be translated into the development of lifestyle intervention to prevent and treat excess weight. Acknowledgements: This survey was supported by following projects: EHU12/24, UPV 00154.310-E-13972/01, UPV 00101.125-15283/03; and a pre-doctoral scholarship from the UPV/EHU.

Key words: Overweight/obesity, risk factors, environmental factors, food habits, adult.

PO2006

DIET QUALITY AND LIFESTYLE IN COLORECTAL CANCER PATIENTS POST-SURGERY: A PILOT STUDY

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Background and objectives: The relationship between diet and colorectal cancer (CRC) has been extensively studied, sometimes with controversial results. However dietary data from CRC patients post-surgery has been examined in only few studies. We evaluated dietary intake and lifestyle characteristics of patients with CRC from the Basque Country.

Methods: This study included 51 patients who had undergone surgical resection of CRC (66.7% males). Mean age was 60.8 (SD 5.5) years. Various socio-demographic, economic, clinical, lifestyle and dietary characteristics were measured. A food frequency questionnaire was used to collect information on the dietary intake. Adherence to the dietary guidelines was evaluated using the Healthy Eating Index for Spanish Diet (HEISD) (theoretical range 0-100). Data were analyzed using SPSS version 20.0.

Results: The score for HEISD was 76.3 (SD 8.0), that is to say, their diet "needs changes"; the majority of participants (76.5%) was included in this category. The components of HEISD who obtained the worst scores were: legumes, processed meats and sweets. We found no significant statistical differences for HEISD by sexes, nor between the categories according the socio-demographic, economic and lifestyle characteristics; except by smoking status. Current smokers obtained lower scores for HEISD (69.5) than past smokers (78.2) and who never smoked (77.8) ($P<0.05$).

Conclusions: The results show that a significant proportion of the participants did not meet the dietary guidelines for legumes, processed meats and sweets. Moreover, smoker patients reported significantly lower adherence to the HEISD than no smokers. These outcomes could be translated into the development of effective recommendations for maintaining or improving health and quality of life of these patients. Acknowledgements: The present study was supported by two projects (Department of Health and Consumer Affairs, Basque Government, 2011111153; Saiotek, S-PE12UN058).

Key words: Diet quality, food habits, colorectal cancer, post-surgery, adults.

PO2007

METABOLIC AND MORPHOLOGIC COMPLICATIONS ASSOCIATED WITH HIV INFECTION AND ANTIRETROVIRAL MEDICATION: A SURVEY IN MALAYSIA

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Background and objectives: Metabolic disturbances including blood lipid and glucose abnormalities with the changes in distribution of body fat mass such as abdominal obesity are known as the hallmark adverse consequences of antiretroviral therapy (ART) among HIV subjects. This study aimed to determine the prevalence and associated risk factors with the metabolic and morphologic disorders among people living with HIV/AIDS (PLHIV).

Methods: A cross-sectional study was conducted among 340 Malaysian adult PLHIV on ART with a two-stage proportional stratified sampling based on the ethnicity and gender. Sociodemographics, medical history, dietary intake, biochemical tests and anthropometrics were collected.

Results: Most of the responders were male (79.8%), Chinese (63.8%), aged between 30-49 (76.1%) and employed (62.7%). Mean age and CD4 count was 42 years, and 403 cells/mm3 while 86% presented undetectable HIV-1 viral load. The mean duration of ART was 43 months and combination of one NRTI + two NNRTI was the most frequent (>80%) antiretroviral regimen. Dyslipidemia was prevalent among two-third of the responders. While 78% and 11% of subjects had normal blood glucose and impaired fasting glucose, remained 11% of responders had diabetes. Incidence of abdominal obesity and metabolic syndrome among responders was 4.5% and 27.9%. Increase in waist circumference was a significant risk factor for low HDL-C and elevated TG while BMI > 25.00 (Kg/m2), higher energy intake, higher percentage energy from carbohydrate and higher percentage energy from fat were the potential risk elements for metabolic syndrome. ART was not contributed in metabolic abnormalities.

Conclusions: The prevalence of dyslipidemia and metabolic syndrome were common. The medical and dietary interventions should be proposed in multidisciplinary therapeutic approach for a proper management of these health problems and improvement of patients' quality of life.

Key words: Metabolic and morphologic complications, HIV antiretroviral medication, Malaysia.

PO2008

INVESTIGATION OF LYCOPENE INTAKE IN THE DIFFERENT LITHUANIAN ETHNOLINGUISTIC GROUPS

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Background and objectives: Lycopene is a potent antioxidant, and it has been suggested that intake of lycopene-rich food is associated with a decreased risk of cardiovascular diseases (CVD). The goal of this study was to evaluate the median intake of lycopene in the Lithuanian population and the association of lycopene intake with biochemical blood risk factors of CVD in different Lithuanian ethnolinguistic groups.

Methods: 1140 randomly selected subjects (2–85 y) from 6 Lithuanian ethnolinguistic regions provided three 24-hour recalls to evaluate the consumption of lycopene. Subjects were interviewed using validated questionnaire consisting of lifestyle and clinical data. Serum concentrations of total cholesterol, HDL-Ch, LDL-Ch, triglyceride, Apo A-1, Apo B, Lp(a), glucose and hsCRP were measured using standardized proce-

dures. Due to the non-normal distribution of variables, nonparametric tests were applied using IBM/SPSS v20.0.

Results: The median dietary lycopene intake in study population was 2.2 (SD 7.48) mg/day or 0.07 (SD 0.11) mg/kg body weight per day. Major food sources of lycopene were tomatoes and tomato products (79%). Lycopene intake from natural dietary sources varied significantly between the Lithuanian ethnolinguistic groups (the lowest 1.54 (SD 5.64) mg/day, highest 3.07 (SD 7.66) mg/day, p=0.01) and gender (women 2.8 (SD 7.78) mg/day and men 1.83 (SD 7.22) mg/day, p=0.01). Median lycopene intake was significantly higher (p=0.00) in summer compared to winter period: 3.01 (SD 8.30) and 1.37 (SD 6.03) mg/day respectively. The lowest consumption of lycopene was in a study group of subjects older than 65 years (1.16 (SD 3.25) mg/day). Higher lycopene intake significantly correlated with higher HDL-Ch concentration (r=0.079; p<0.001).

Conclusions: In the study population and different Lithuanian ethnolinguistic groups the median lycopene intake was one of the lowest compared to intakes reported in other European countries and below the acceptable daily intake. Higher dietary lycopene intake was associated with higher HDL-Ch concentration. Acknowledgements: The study was supported by LITGEN Project (VP1-3.1-SMM-07-K-01-013).

Key words: Lycopene, Lituanian ethnolinguistic groups.

PO2009

NUTRITIONAL STATUS OF PATIENTS WITH CARDIOVASCULAR DISEASES IN HOSPITALS

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Background and objectives: Incorrect nutritional status of patients may prolong hospital stay and increase the cost of treatment. The objective of the study was to assess the nutritional status, including the prevalence of underweight, overweight and obesity among patients hospitalized due to cardiovascular diseases.

Methods: The study was performed in 16 Polish hospitals. It comprised 454 patients with cardiovascular diseases. The nutritional status was evaluated with the use of anthropometric measurements: height, weight, BMI and arm circumference and biochemical methods red blood cells count, haemoglobin concentration, white cells count, lymphocyte count in peripheral blood and serum albumin concentration.

Results: Among studied patients overweight occurred in 42.5% of males and 35.2% of females, whilst obesity in 24.9% and 41.2% respectively. Underweight was noted in 2.3% of males and 1.7% of females. Biochemical abnormalities, indicating the possibility of malnutrition have been reported frequently. A decrease of lymphocyte count was recorded in 18.1% of males and 19.7% of females, and a deficient serum albumin concentration was noted in 20.1% and 17.5% respectively. Some indicators of nutritional status deteriorated during hospital stay. Haemoglobin concentration and count of red blood cells, white cells and lymphocyte decreased in males. Changes in these indicators in females were not statistically significant. Weight and BMI decreased in both genders, however these changes do not significantly affect the increase of underweight occurrence, or a reduction of overweight and obesity prevalence.

Conclusions: Overweight or obesity are frequent in patients hospitalized due to cardiovascular diseases. Rarely this group appears to be underweight, however the results of blood chemistry, such as lymphocytes count and serum albumin indicates the possibility of malnutrition. Hospital stay could pose a risk of deterioration in the nutritional status of patients.

Key words: Cardiovascular diseases, hospital stay, nutritional status.

PO2010

PROSTATE CANCER MORBIDITY AND CHANGES IN THE DIET IN POLAND IN THE YEARS 1970-2010

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Background and objectives: Prostate cancer morbidity in Polish males is very high. Its standardised incidence rate in 2010 amounted to 32.3/100 thousand resulting from growing trend during the period of 1970-2010. Diet is probably one of the factors that played a significant role in prostate cancer pathogenesis. The objective of the study was to investigate the relation between selected dietary factors and prostate cancer morbidity in Poland in 1970-2010.

Methods: Standardised prostate cancer incidence rates were derived from the National Cancer Registry administered by the Institute of Oncology. The information source on the dietary pattern was the database established by the National Food and Nutrition Institute. This database covers data derived from the national food balance sheets showing food quantities available for consumption per capita/year and original calculations on the amounts of the energy and nutrients from food. The Spearman rank correlation coefficient (rs) was used as a measure of the relationship between examined variables.

Results: Positive correlation was found for prostate cancer incidence rates in 1970-2010 and vitamin D intake (rs=0.74) and edible fats (rs=0.89) and meat (rs=0.60) consumption. Edible fats consumption significantly increased during that period from 20.8 to 32.2 kg/person/year, whilst meat consumption from 53.0 to 74.3 kg/person/year, also the share of processed

meat increased. Negative correlation was noted with respect to food containing selenium such as cereals (rs=-0.74) and fish (rs=-0.51).

Conclusions: Dietary habits have probably contributed to the increase of prostate cancer morbidity rates between 1970 and 2010. That unfavourable trend could be affected predominantly by the growing edible fat and meat consumption, especially processed meat and the decrease of selenium content in the diet related to lower consumption of cereals and fish. Also the increase of vitamin D intake could influence the morbidity.

Key words: Prostate cancer, food consumption, nutrient intake.

PO2011

EFFECT OF KALE JUICE SUPPLEMENTATION ON THE LYMPHOCYTE DNA DAMAGE OF KOREAN SUBCLINICAL HYPERTENSIVE PATIENTS

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Background and objectives: Kale (Brassica oleracea) is claimed to have beneficial properties for human health, such as anti-mutagenic, immune-regulatory and antioxidant activities. In this study, we examined whether daily supplementation of kale juice for 6 weeks could modulate the levels of plasma total radical-scavenging antioxidant potential (TRAP), plasma conjugated diene (CD) and lymphocyte DNA damage in Korean subclinical hypertensive patients.

Methods: Eighty four subclinical hypertensive patients exhibiting a systolic blood pressure (BP) over 130 mmHg or a diastolic BP over 85 mmHg received 300 ml/day of kale juice for 6 weeks, and blood samples were drawn before and after 6 weeks. Plasma levels of TRAP and CD were analyzed using spectrophotometer. Lymphocyte DNA damage was determined using the COMET assay and damage was quantified by measuring % DNA in the tail (TD), tail length (TL), and tail moment (TM).

Results: Plasma levels of TRAP and CD were not significantly changed after the supplementation of kale juice. However, levels of lymphocyte DNA damage representing TD, TL and TM at baseline (0 week) decreased significantly from 12.1% to 8.4%, 201.9 um to 146.3 um, and 27.4 to 14.4, respectively, after 6 weeks of kale juice supplementation ($p<0.001$).

Conclusions: These results suggest that consuming moderate amounts of daily kale juice may favorably restore lymphocyte DNA damage in subclinical hypertensive patients. Acknowledgements: This research was supported by the Basic Science Research Program of the National Research Foundation of Korea (NRF) under the sponsorship of the Ministry of Education, Science and Technology (2012-0001682).

Key words: Kale juice, hypertensive patients, COMET assay, DNA damage.

PO2012

DARK CHOCOLATE RICH IN POLYPHENOLS AND ITS INFLUENCE ON BLOOD PRESSURE AND BMI IN NORMOTENSIVE ADULTS: A PRELIMINARY STUDY

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Background and objectives: Dark chocolate (DC) is believed to be rich in polyphenols with favourable effects on health. Several studies investigated the relationship between DC and blood pressure and whether it influences body weight. The aim of this study was to investigate the effect of polyphenol-rich DC on blood pressure and BMI in the normotensive apparently healthy population.

Methods: Ethical approval was granted by the Divisional Ethics Committee at Queen Margaret University. Thirty nine healthy men and women with BMI<25 kg/m2 (18-41 years old) were recruited to participate in a parallel randomized single-blinded study. Participants randomly received 20 g daily of either a placebo DC with negligible amount of polyphenols (19), or a DC containing 500 mg of polyphenols (20) for a period of 4 weeks. Anthropometry, blood pressure and other parameters were assessed before and at the end of intervention. Urine and blood samples were also collected.

Results: Results showed no significant effect of on systolic ($p=0.636$) or diastolic ($p=0.771$) blood pressure following the consumption of DC rich in polyphenols in a similar manner to placebo DC. In addition, no significant change in BMI was observed in the group administered DC rich in polyphenols ($p=0.443$) or placebo DC ($p=0.08$). This neutral effect on blood pressure was in agreement with the results of a large meta-analysis which showed that DC is only effective in decreasing blood pressure in pre-hypertensive and hypertensive subjects. The effect on body weight did not match that obtained with animal studies which showed that DC may reduce weight.

Conclusions: This pilot study suggests that DC intake did not reduce blood pressure or body weight in normotensive participants. A long-term larger study is required to test whether DC can influence body weight and blood pressure in healthy people.

Key words: Polyphenol, dark chocolate, blood pressure, BMI.

PO2013

NUTRITIONAL STATUS OF PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME (OSAS) TREATED BY POSITIVE AIRWAY PRESSURE (PAP)

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Background and objectives: OSAS, diagnosed by polysomnography Apnea Hypopnea Index (AHI) ≤5/h of sleep, is common (5-10% of adults). It is often treated with PAP. The aims of this study were i) to assess the nutritional status of patients with OSAS treated by PAP and supported by a care giver at home ii) to look for a link between nutritional status and OSAS after a long PAP treatment.

Methods: AHI was recorded when PAP was established. After a 66.4 ± 4 5.9 months, one collected AHI, Epworth's sleepiness scale (up to 15, normal <8), compliance (h), weight, body mass index (BMI).

Results: PAP at home was set in 435 patients with initial AHI at 52.8 ± 25.9. At the final assessment, they were aged 63.8 ± 10.4 years, with a sex ratio M/F at 3.7 and a BMI at 33.5 ± 6.1. Nutritional status was normal in 5.7% of cases, 23.0% of patients were overweighted, 71.3% were obese (massive obesity: 12.9%). AHI decreased to 4.0 ± 4.0 (p <0.0001), Epworth's scale was at 4.3 ± 3.0 and observance at 7.1 ± 1.8 hours. For sleep, alertness, memory and headache, respectively 45.5%, 52.6%, 58.6% and 86.6% of patients were improved or had no more disorder. There was no link between the duration of PAP treatment and the final BMI nor between nutritional status and final AHI.

Conclusions: PAP used for more than 5 years in patients with OSAS normalizes AHI, improves symptoms and sleepiness scale. At the end of the follow-up, younger patients and those with normal BMI have a lower need of PAP. Overweight or obesity remains highly prevalent. It could be interesting to consider whether a nutritional care associated with the coverage of excess weight could reduce the need of PAP.

Key words: Nutritional status, obstructive sleep apnea syndrome, positive airway pressure.

PO2014

BODY MASS INDEX, GLYCEMIC CONTROL AND MACRO-ALBUMINURIA IN TYPE 2 DIABETIC PATIENTS IN IBADAN, NIGERIA

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Background and objectives: The presence of overweight and obesity with poor glycemic control in type 2 diabetic patients are predicting factors for decline in renal function. This study assessed the body mass index (BMI), glycemic control and macro albuminuria in patients with type 2 diabetes mellitus (DM) in Ibadan, Nigeria.

Methods: The cross sectional study involved 240 male and female type 2 diabetic patients. A semi-structured, interviewer administered questionnaire was used to obtain the socio-demographic information and medical history of the patients. Their body mass index (weight (kg) /height (m)2 were determined and categorized into underweight (<18.0 kg/m2), normal weight 18 – 24.9 kg/m2), overweight 25 – 29.9 kg/m2) and obese (>30 kg/m2). The last four fasting blood sugar level was obtained from the patient's record and the mean was determined. The presence of macro albuminuria was tested on the patients using Medi-test strips. The data was analyzed as range, means with their standard deviations and percentages. Chi-square test was employed to determine the association between the BMI, glycemic control and presence of albuminuria among the patients.

Results: The age of the patients ranged from 35 – 76 years. Majority (67.2%) of the patients were diagnosed with DM <10years. Most (59.2% and 31.7%) of the patients were treated with diet + hypoglycemic drugs and diet + insulin respectively. Only 37.8% had normal weight while 72.2% were either overweight or obese. Hyperglycemia was present in 69.8% of the patients out of which 20.2% and 34.6% were either overweight and obese respectively. Macro-albuminuria was more prominent in 4.2% and 6.7% Overweight and obese than in 1.8% patients with normal weight.

Conclusions: Poor glycemic control and micro-albuminuria were more prevalent among obese type 2 diabetic patients.

Key words: Body mass index, glycemic control, macro-albuminuria, type 2 diabetic patients, Nigeria.

PO2015

SALT INTAKE AND SALT REDUCTION IN SECONDARY SCHOOL-AGE STUDENTS OF PRINCESS CHULABHORN'S COLLEGE CHIANGRAI (REGIONAL SCIENCE SCHOOL)

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Background and objectives: High sodium consumption has been identified as an important risk factor for cardiovascular disease, together with obesity and hypercholesterolemia. From Waisaihealth Program by Leelahagul P since 2009-2012, in students of Princess Chulabhron's college Chiangrai (PCCCR), aged 12-18 years it was found that prevalence of obesity and hypercholesterolemia is high, 6.7 - 29.0% and 20.8 - 21.0%, respectively. The aim of this study was to investigate the relationships among sodium intake, obesity, and hypercholesterolemia in those students.

Methods: Prospective study. PCCCR students, aged 12-18 years, who had obesity or hypercholesterolemia participated in this study for 12 months. We used Tanita BC-420 for body composition analysis at weeks 0, 16, 24, and 32; dietary assessment by 24- hour dietary records 3 days/week throughout the study; serum LDL-cholesterol measurement at weeks 0, 16, and 32; and 24-hour urinary sodium excretion measurement at weeks 8 and 32.

Results: The means of sodium intake in obese, hypercholesterolemic, obese and hypercholesterolemic students were 3,123, 2,999, and 2,687 mg/day, respectively. The means of urinary sodium excretion in obese, hypercholesterolemic, obese and hypercholesterolemic students were 121, 90, and 150 mmol/day, respectively. Students with over body fat had significantly higher average of urinary sodium excretion than normal body fat and low body fat students (P=0.013). Hypercholesterolemic students had significantly lower average of urinary sodium excretion than normocholesterolemic students (P=0.015).

Conclusions: The results of this study found that students who were obese had high sodium intake, whereas hypercholesterolemic students had lower sodium intake than normocholesterolemic students. Therefore, a campaign to reduce sodium intake in student is necessary, in addition to reducing weight and serum cholesterol because the obesity, hypercholesterolemia, and high sodium intake are risk factors that contribute to cardiovascular disease.

Key words: Sodium, urinary, hypercholesterolemia, obesity, adolescent.

PO2016

BIOACTIVE COMPOUNDS OF ROSMARINUS OFFICINALIS AGAINST COLON CANCER CELLS LINES

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Background and objectives: Rosmarinus officinalis L., commonly called rosemary, is one of the most widely used and commercialized plant extracts not only as a culinary herb for flavoring but also as an antioxidant in processed foods and cosmetics. This plant has been traditionally used as an herbal medicine for a large variety of disorders. Its beneficial effects have been attributed to the high content in bioactive compounds, such as phenolic diterpenes, flavonoids and other phenolic compounds. The aim of this work has been to carry out a characterization of the bioactive compounds present in a rosemary extract obtained using Supercritical Fluid Extraction. This extract has shown the capacity to inhibit cell proliferation in colon cancer human cell models, HT-29 and SW480. In order to elucidate which compound or compounds are responsible for such effect, the bioactive extract has been fractionated by using semi-preparative chromatography, and their antiproliferative activity against these cell lines have been studied.

Methods: The extract and the fractions have been analyzed using ultra-performance liquid chromatography (UPLC), coupled with a quadrupole-time of flight mass spectrometry (QTOF-MS) detector. The bioactivity of the extract and fractions has been determined using MTT cell proliferation assay.

Results: The fractions containing the highest concentration in diterpenes correlated with the highest inhibition of proliferation in both colon cancer cell models. Nevertheless, none of purified fractions improved the antiproliferative activity of the whole extract. HT-29 colon cancer cells were more resistant compared to SW480 cells to the most bioactive fractions and whole extract.

Conclusions: We hypothesised that carnosic acid is the compound that contribute the most to the observed antiproliferative activity. Nonetheless, other compounds, probably flavonoids also contribute significantly to the antiproliferative of the whole extract.

Key words: Rosmarinus officinalis, diterpenes, phenolic compounds, colon cancer.

PO2017

INTAKE OF LONG-CHAIN OMEGA-3 FATTY ACIDS AND RISK OF CORONARY HEART DISEASE IN THE SPANISH EPIC COHORT STUDY

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Background and objectives: Evidence about the benefits of omega-3 fatty acids intake on coronary heart disease (CHD) is varied and discordant. The objective of this study is to assess the relation between dietary intake of total omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) on the risk of CHD in the Spanish cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC).

Methods: Study of cohorts, where the analysis included 41,091 men and women aged 20-69 years, recruited from 1992 to1996 in Asturias, Gipuzkoa, Granada, Murcia and Navarra. The cohort had a mean follow-up of 10.4 years. Omega-3 fatty acids intake was estimated from a validated dietary questionnaire. Anthropometry and other characteristics were collected also. Case are participants with definite incident CHD. Cox proportional hazards regression were used to assess the association between the intake of omega-3 fatty acids, EPA or DHA and CHD. Models were run separately for men and women and included covariates showing different levels of adjustment.

Results: A total of 609 participants (79% men) had a definite CHD event. Mean intake of EPA+DHA was 0.8 g/d (SD: 0.4) in men and 0.5 g/d (SD: 0.2) in women. After stratification by age and adjustment for several risk factors, no significant associations were found between total omega-3 fatty acids, EPA or DHA intake and the risk of CHD in men or women

Conclusions: We have found no evidence of association between the intake of total omega-3 fatty acids, EPA or DHA and the risk of CHD in either men or women from the Spanish EPIC study. The overall null results obtained in the present study together with the varied and not entirely consistent results found in previous studies highlight the need of further research to analyse the cardio protective effect of omega-3 fatty acids intake.

Key words: Long-chain omega-3 fatty acids, coronary heart disease.

PO2018

DISTRIBUTION OF FAECALIBACTERIUM PRAUSNITZII PHYLOTYPES IN OBESE, DIABETIC PATIENTS AND CONTROLS COMPARED WITH HRMA AND ARISA.

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Background and objectives: Faecalibacterium prausnitzii is one of the most abundant commensal bacteria in the healthy human large intestine. Information on their genetic diversity and role in the inflammatory genesis is limited. Two phylogroups have been described We analyzed the different phylotypes of F. prausnitzii and their occurrence as well as butyrate production in obese, diabetics, and lean controls under nutrition intervention. We compared strain specifity and function. We examined F. prausnitzii as a diversity marker. Method comparison for fast routine analysis is under consideration.

Methods: We compared fecal samples of groups of obese, diabetics and lean controls at three time points with two primer pairs detecting F. prausnitzii and analyzed with qPCR and melt curve analysis, high resolution melt curve analysis (HRMA) and automated ribosomal intergenic spacer analysis (ARISA). F. prausnitzii depending butyrate gene levels are detected by qPCR . Phylogenetic differences of all detected F. prausnitzii strains were statisticaly analyzed and a phylogenetic tree was constructed.

Results: Obese- and diabetic groups differed significantly at all three time points compared to lean controls with fewer F. prausnitzii copies. All groups show significant stabilityle over the measured period. F. prausnitzii butyryl CoA:acetate CoA-transferase genes (butyrate levels) did not correlate to the total F. prausnitzii amount, due to variations in F. prausnitzii phylotypes.

Conclusions: Different phylotypes of F. prausnitzii and their various functions may lead to differences in the inflammatory genesis in the host. SCFA producers may have an influence in developing obesity.

Key words: Faecalibacterium prausnitzii, high resolution melt curve analysis (HRMA), butyrate, automated ribosomal intergenic spacer analysis (ARISA).

PO2019

EFFECT OF HIV INFECTION ON WEIGHT GAIN DURING TREATMENT OF MALNUTRITION IN MARASMIC CHILDREN BETWEEN 6 AND 59 MONTHS OF AGE

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Background and objectives: The effects of HIV on nutritional status are well known. Children affected by HIV infection have increased their nutrient requirements, which could make nutritional recovery more difficult. The objective of this study was to have more evidence about the influence of the HIV on the weight gain in children during treatment of severe acute malnutrition.

Methods: This study analysed the databases from nutritional centres working with ACH support in Swaziland. The study focused on 206 children affected by marasmo admitted in nutritional centres. Main variables studied were weight gain (cut off 8 g/Kg/day) and results of HIV test. Data were analyzed and results were compared with chi-square test.

Results: 206 children suffering of marasmo between 6-59 month old were cured or transferred to OTP. HIV test was done in 76,2% (157/206) giving the result HIV(+) in 45,8% (72/157) and HIV(-) in 54,2% (85/157). In HIV (-) children, weight gain > 8 g/Kg/day was present in 65,8% (56/85), whereas in HIV (+) was present only in 47,2%(34/72). When weight gain >8 g/Kg/day was compared considering HIV status, chi-square test showed significant differences.

Conclusions: The results show that weight gain was higher in HIV (-) children, which confirms that HIV (+) malnourished children need more time to recover and reach appropriate weight for height index. Probably the treatment of severe acute malnutrition should be readjusted in HIV (+) children to adapt it to their increased nutritional requirement.

Key words: Weight gain, HIV status.

PO2020

ORAL HYGIENE STATUS AND PREVALENCE OF GUM DISEASE IN OBESE CHILDREN

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Background and objectives: Consistent association between adult obesity and gum diseases has been shown. This association is not clear in obese children. Determining such possible links may help initiate remedial measures to reduce the prevalence among obese children. Poor oral hygiene and dietary habits are major causes of gum disease. This study compared oral hygiene status and gum disease in obese and non-obese children.

Methods: School children (n=510) ages 9-15 yrs were recruited from 8 selected private schools in Accra, Ghana. Oral examination was carried out among 219 obese and 291 non-obese children. Oral plaque, calculus, and gingival indices and Silnes and LÖe Plaque score were used to determine oral hygiene status. Community Periodontal Index of Treatment Need (CPITN) was used to assess gum disease status. Questionnaire was used to measure oral hygiene practice e.g., tooth cleaning materials and frequency, mouth wash and toothpick use.

Results: Mean age was 11.5 years. About half, 49.8% (n=254) of children had barely visible plaques while 46.1% (n=235) had abundant plaques at the gingival margin. Supragingival calculus was 70.6% (n=360) and subgingival calculus was just 4.0% (n=8). Majority 88.0% (n=449) had healthy gums but 10% (n=51) had swollen gum and 2% (n=10) had enlarged and bleeding gum on probing. Only 10% of the obese and 13.4% of the non-obese had various degrees of gum conditions. Silnes and Loe Plaque index estimating oral hygiene status was 1.38±0.34 in obese and 1.43±0.36 in non-obese. Prevalence of gum disease was 4.7% for all children but 3.7% and 5.5% for obese and non-obese respectively. None of the oral hygiene indices was significantly different for the two groups.

Conclusions: No significant differences in the oral hygiene indices and gum disease between obese and non-obese but lower Plaque index in the obese suggest better oral hygiene.

Key words: child obesity, gum disease, plaque, calculus.

PO2021

DAIRY PRODUCTS INTAKE AND CARDIOMETABOLIC RISK FACTORS: IS THERE A RELATIONSHIP?

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Background and objectives: Previous studies have shown inverse relationship of dairy products with blood pressure. However, it remains unclear whether dairy products are also inversely related to other cardiometabolic risk factors like dyslipidemia and obesity. The aim of this study was to investigate the relationship of dairy products intake with cardiometabolic risk factors through a structural equation model.

Methods: A total of 482 adults participating in a population-based survey "Health Survey of São Paulo (HS-SP)", Brazil, between 2009-2011 were evaluated. Dairy products intake (whole milk and yogurt; skimmed and low-fat milk and yogurt; cheeses) were assessed by two non-consecutive 24h-recalls. Adjustment for the within-person variation of intake of dairy products was performed through the Multiple Source Method. A Structural Equation Model was used to test a theoretic model for the relationship of each dairy product with obesity indicators (BMI and waist circumference), as well as with the following latent variables: blood pressure (systolic, diastolic and mean arterial pressure) and dyslipidemia (total cholesterol/HDL-cholesterol ratio, triglyceride/HDL-cholesterol ratio). The model was adjusted for potential confounding factors (age, sex, ethnicity, energy intake, antihypertensive and hypocholesterolemic drugs). Goodness-of-fit indexes (Comparative Fit Index (CFI); Tucker-Lewis Index (TLI); Standardized Root Mean Square Residual (SRMSR) were used to assess model fit.

Results: Whole milk and yogurts were inversely related to waist circumference (r= -0.042; p= 0.011), blood pressure (r= -0.143; p=0.001) and dyslipidemia (r= -0.152; p= 0.002). Skimmed and low-fat milk and yogurt as well as cheeses were not related to any variable under investigation. The goodness-of-fit indexes indicated an acceptable model fit (CFI = 0.973; TLI = 0.954; SRMR = 0.035).

Conclusions: Whole milk and yogurt intakes may contribute to reduce the cardiometabolic risk by their protective effects against central obesity, high blood pressure and dyslipidemia.

Key words: Dairy products, cardiometabolic risk, structural equation model.

PO2022

RELATIONSHIP BETWEEN INDICATORS OF LIPID, GLUCOSE, AND OXIDATIVE METABOLISM AND BODY WEIGHT IN AUSTRIAN ADULTS

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Background and objectives: The contribution of overweight to oxidative stress-related chronic diseases is well known. The Austrian Nutrition Report 2012 is part of a regularly conducted representative survey about nutritional status of the Austrian population and encompasses detailed anthropometric measures and biochemical measurements including metabolic health indicators revealing the influence of bodyweight on these parameters.

Methods: Body weight and height were measured in 417 adult men and women (18-64 years). Total, LDL, HDL cholesterol, and triglycerides, levels of uric acid, bilirubin, and whole blood fasting glucose, as well as the total radical-trapping antioxidant parameter (TRAP) were determined photometrically in plasma, HbA1c in whole blood by HPLC. Results were analyzed statistically with PASW (Predictive Analyses Software for Windows, 18.0, 2009, SPSS Inc., Chicago, IL).

Results: On average, levels of health indicators did not markedly deviate from reference ranges. Overweight subjects (BMI>25 kg/m2) showed higher levels of total (n.s.) and LDL cholesterol ($p<0.05$), triglycerides ($p<0.01$), fasting glucose ($p<0.001$), HbA1c ($p<0.01$), uric acid ($p<0.001$), and TRAP ($p<0.005$) than participants with normal weight. Likewise, the coefficient of total to HDL cholesterol was higher in overweight. Among those with fasting glucose above the reference level of 6 mmol/L, 70 % were overweight. Obese (BMI>30 kg/m2) had higher glucose and uric acid levels than overweight persons ($p<0.05$). BMI correlated HDL cholesterol ($r=-0.403$, $p<0.001$), triglycerides ($r=0.208$, $p<0.001$), glucose- ($r=0.264$, $p<0.001$), uric acid level ($r=0.383$, $p<0.001$), HbA1c ($r=0.118$, $p<0.05$), and TRAP ($r=0.171$, $p<0.01$), as well as with bilirubin level ($r=-0.138$, $p<0.05$).

Conclusions: Our data confirm the negative impact of overweight on lipid and glucose metabolism and uric acid excretion, the latter being a risk factor for gout despite its antioxidative properties. Acknowledgements: This project was funded by the Austrian Ministry of Health.

Key words: Overweight, blood lipids, oxidative stress, glucose metabolism, Austrian Nutrition Report 2012.

PO2023

IMMUNOMODULATORY EFFECTS OF DHA AND ARA IN THE TREATMENT OF COW'S MILK ALLERGY IN ALLERGIC INFANTS

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Background and objectives: Prevalence of cow's milk protein allergy (CMPA) has increased for the last decades in infants during the first years of life. Atopic march starts early in life and go on up to adulthood. There is a little knowledge about the role of docosahexaenoic acid (DHA) in the treatment of allergy. We aimed to investigate whether the consumption of DHA and arachidonic acid (AA) added to an extensively hydrolyzed infant formula was able to increase the levels of DHA and AA in red blood cells and decrease allergic response in infants with CMPA.

Methods: An open, multicenter, national clinical trial was performed in 22 infants with CPMA were fed with hypoallergenic formula for three months and blood samples were taken before and after nutritional treatment. Quantitative analysis of DHA and AA in phospholipid of red blood cells was performed by chromatographic gas coupled with flame ionization detector. Plasma levels of IL-8, IFN-ã , IL-4, IL-10, IL-13, TGF-â and IL-17A were measured by immunoassay, with a MILLIplexTM kit using the Luminex 200 system based in the xMap technology. Differences between before and after treatment were assesed by U Mann Whitney test.

Results: DHA and AA in red blood cells after the consumption of hypoallergenic formula tended to increase. In plasma IL-8 significantly decreased (1764.12±1542.84 vs 8.88±3.52 pg/ml, $p<0.05$) and IL-10 tended to increase. IL-4 and IL-13 were not detected in plasma and IL-17A , IFN-ã tended to decrease.

Conclusions: IL-8, an intestinal inflammatory cytokine, significantly decreased after treatment indicating that inflammatory response is being modulated at the gut by means of feeding with the new therapeutic formula fortified with DHA and AA. Cytokine profile in plasma in allergic infants can be modified by the consumption of DHA and AA.

Key words: Cytokines, DHA, infant, allergy.

PO2024

GREATER BODY MASS INDEX IS ASSOCIATED WITH LOWER PERCENTAGE OF IRON ABSORPTION, BUT NOT WITH IRON STATUS IN CHILEAN WOMEN

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Background and objectives: The prevalence of overweight and obesity has increased at an alarming rate worldwide and is now a common health concern in Chile. Some studies have noted a possible association between iron (Fe) deficiency and obesity, but scarce evidence is available in Chile.To assess whether body mass index (BMI) is associated with both Fe status and bioavailability.

Methods: A retrospective study was conducted using data from 318 Chilean childbearing age women who had previously participated in absorption studies conducted at our laboratory. BMI, Fe nutritional status and bioavailability were measured. Fe absorption was determined with double radioiron erythrocyte incorporation. Women received either 0.5 mg of Fe (group 1; n= 137) or 3 mg of Fe plus ascorbic acid (1:2 molar ratio) (group 2; n=181), both as ferrous sulfate, labeled with either 55Fe or 59Fe radioisotopes.

Results: 29%, 47% and 24% of women were classified as, normal, overweight or obese, respectively according to WHO criteria. Fe absorption was statistically significant lower in obese women. The geometric mean and range ±1 SD of percentage of Fe absorption in normal women of group 1 was 32.9% (15.9-68.2) v/s 19.7% (8.4-46.3) in obese. In group 2, this percentage was 36% (15.5-83.3) v/s 30.1% (14.5-62.5), respectively (2-way ANOVA: nutrition status and Fe dose $p<0.05$; interaction N.S.).Of all women, 7% had Fe deficiency anemia, 10% Fe deficiency without anemia and 18% depleted Fe stores. No significant differences were found in Fe nutritional status comparing by nutritional classification. Although Fe absorption was lower in obese, they had significantly higher values of serum ferritin ($p<0.01$) and hemoglobin ($p<0.05$).

Conclusions: Higher BMI is associated with a lower percentage of Fe absorption in Chilean childbearing age women, but not with Fe deficiency.

Key words: Iron, micronutrients, body mass index, overweight, obesity.

PO2025

NUTRITION RISK FACTORS ASSOCIATED WITH HIV IN RURAL AND URBAN COMMUNITIES IN SOUTH AFRICA

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Background and objectives: Nutritional risk factors can be described as those directly related to food and nutrition (e.g. reduced food intake) and those indirectly related to food and nutrition (e.g. poverty and food insecurity). The objective of this study was to determine significant independent nutritional risk factors associated with HIV in rural and urban communities in the Assuring Health for All (AHA) study.

Methods: 547 rural and 419 urban adults between 25-64 years participated. 16.8% of rural and 40.8% of urban participants were HIV-infected. Logistic regression with forward selection ($p<0.05$) was used to select significant independent factors (anthropometry, socio-demography, household food security, dietary diversity, physical activity and reported health) associated with HIV. Variables with a p-value of <0.15 were considered for inclusion in the model.

Results: In this sample, the odds of having HIV decreased as age increased. In rural areas, odds of having HIV were decreased for microwave oven ownership (odds ratio 0.20) and being married (odds ratio 0.17). Odds were increased in participants who spent less than R50 (€4.2) per week on food (odds ratio 3.15); had a body fat percentage of <5% versus 25%+ (odds ratio 4.41) or had been diagnosed with tuberculosis (odds ratio 3.81). In the urban sample, the odds of having HIV were decreased if a person was male (odds ratio 0.29), and increased if a person experienced periods of food shortage (odds ratio 2.34) and had a body fat percentage of <15% versus 25%+ (odds ratio 8.62).

Conclusions: Indicators related to wasting, previous tuberculosis and a lower socio-economic status (indicated by being female [urban] and unmarried [rural]; spending very little on food [rural]; and food shortage [urban]), increase the odds of having HIV. A vicious cycle develops, with poverty increasing the likelihood of contracting HIV/AIDS, and HIV/AIDS contributing to poverty.

Key words: nutritional risk, HIV.

PO2026

EFFECTS OF CONJUGATED LINOLEIC ACID ISOMERS ON PPAR-GAMMA AND ADIPOCYTE-SPECIFIC GENES IN ADIPOCYTES TREATED WITH ANTIRETROVIRAL DRUGS

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Background and objectives: HIV-associated lipodystrophy, a side-effect of antiretroviral drugs (ARV), has been suggested to occur as a result of down-regulation of peroxisomal proliferator-activated receptor-gamma (PPAR-γ), leading to reduced expression of anti-inflammatory adiponectin and increased leptin, resistin and pro-inflammatory interleukin (IL)-6. Conjugated linoleic acid (CLA) isomers, c9,t11-CLA in particular, are activating ligands for PPAR-γ. We hypothesised that CLA isomers mitigated ARV-induced down-regulation of PPAR-γ and adipocyte-specific genes, as well as inflammation. This study investigated the effect of CLA isomers on PPAR-γ, adipocyte-specific genes and inflammation in adipocytes pretreated with ARV.

Methods: 3T3-L1 pre-adipocytes were differentiated in the presence of tenofovir (TDF; 1 μM), ritonavir (RTV; 20 μM) or indinavir (IDV; 10 μM) and 100 μM of either c9,t11-CLA or t10,c12-CLA. Gene expression was investigated using real-time RT-PCR and protein secretion using ELISA. Statistical analysis was performed using ANOVA (SPSS,v20).

Results: The addition of c9,t11-CLA significantly increased PPAR-γ gene expression in the presence of RTV, and adiponectin gene expression in IDV-treated cells compared with vehicle (DMSO) control ($p=0.001$, $p=0.003$, respectively). c9,t11-CLA significantly increased adiponectin secretion in RTV-treated cells ($p=0.021$). t10,c12-CLA significantly decreased PPAR-γ expression in IDV- and TDF-treated cells($p<0.001$, $p=0.015$, respectively), adiponectin gene expression in RTV- and TDF-treated cells ($p=0.031$, $p<0.001$, respectively) and adiponectin protein secretion for all ARV ($p<0.001$). t10,c12-CLA significantly increased IL-6 gene expression in IDV- and TDF-treated cells ($p=0.001$, $p<0.001$,respectively).

Conclusions: Here, for the first time, we have shown that CLA isomers have differential effects on adipocytes treated with ARV. c9 has shown potential beneficial effects by increasing PPAR-γ and anti-inflammatory adiponectin, while t10 CLA seems to have a detrimental effect by decreasing PPAR-γ and adiponectin, and increasing pro-inflammatory IL-6 expression.

Key words: HIV-associated lipodystrophy syndrome, conjugated linoleic acid isomers; PPAR-γ, adiponectin.

PO2027

THE SPANISH FOOD PYRAMID SCORE AND ITS ASSOCIATION WITH OVERWEIGHT/OBESITY IN THE GRANADA-EPIC STUDY (EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION)

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Background and objectives: Adherence to dietary guidelines has been related to prevention of chronic diseases and obesity. Due to the steady increase of the obesity prevalence in Spain there is a need to evaluate whether the national guidelines may be efficient to tackle this problem. The aim was to develop the Spanish Food Pyramid Score (SFP) and to investigate its association with overweight and obesity in the EPIC-Granada study.

Methods: Cross-sectional study within EPIC-Granada, including 7,575 participants. The SFP was developed to assess adherence to the dietary guidelines. Overweight and obesity were defined as BMI <=25-<30 kg/m2 and >=30 kg/m2, respectively, and abdominal obesity as waist circumference >=102 cm (men) and 88 cm (women). Logistic regression was conducted to estimate odds ratios of overweight & obesity vs. normal weight, and obesity vs. over & normal weight, by quintiles of the SFP and by 10 points increment in the adherence to this score, controlling for potential confounders.

Results: No statistically significant association between adherence to the SFP and risk of overweight was observed. A 10 point increase in the adherence to the SFP was associated with a 13% (95% CI:0.76-0.99) lower risk of obesity only in men (p interaction by sex=0.03). Abdominal obesity risk decreased globally by 12% (95% CI:0.82-0.94) per 10 points increase in the adherence to the SFP. The effect of the SFP on obesity risk was stronger in physically active subjects.

Conclusions: A higher adherence to the SFP may lead to a lower risk of obesity in men and a lower risk of abdominal obesity in both sexes. Thus, the Spanish dietary guidelines might be an effective tool for the prevention of obesity among the general population. However, prospective studies investigating this relationship are warranted.

Key words: Nutrition policy, dietary guidelines, diet quality, obesity.

PO2028

POMEGRANATE AND ITS DERIVATIVES CAN IMPROVE BONE HEALTH THROUGH DECREASED INFLAMMATION AND OXIDATIVE STRESS IN AN ANIMAL MODEL OF POSTMENOPAUSAL OSTEOPOROSIS

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Background and objectives: Recently, nutritional and pharmaceutical benefits of pomegranate (PG) have raised a growing scientific interest. Since PG is endowed with anti-inflammatory and antioxidant activities, we hypothesized that it may have beneficial effects on osteoporosis.

Methods: We used ovariectomized mice as a well described model of postmenopausal osteoporosis to study the influence of pomegranate consumption on bone health. Mice were divided into five groups as following: sham-operated (SH CT) and ovariectomized (OVX CT) control mice fed a standard diet versus OVX treated mice given a modified diet from the AIN-93G diet, containing 5.7% of pomegranate lyophilized mashed totum (OVX PGt), or 9.6% of pomegranate fresh juice (OVX PGj) or 2.9% of pomegranate lyophilized mashed peel (OVX PGp).

Results: As expected, ovariectomy was associated with a decreased femoral bone mineral density (BMD) and impaired bone microarchitecture parameters. Consumption of PGj, PGp or PGt induced bone sparing effects in those OVX mice, both on femoral BMD and bone microarchitecture parameters. In

addition, PG (whatever the part) up-regulated osteoblast activity and decreased the expression of osteoclast markers, when compared to what was observed in OVX CT littermates. Consistent with the data related to bone parameters, PG consumption elicited a lower expression of pro-inflammatory makers and of enzymes involved in ROS generation, whereas the expression of anti-inflammatory markers and anti-oxidant actors was enhanced.

Conclusions: These results indicate that all pomegranate parts are effective in preventing the development of bone loss induced by ovariectomy in mice. Such an effect could be partially explained by an improved inflammatory and oxidative status.

Key words: Pomegranate, nutritional prevention, osteoporosis, animal model, inflammation, oxidative stress.

PO2029

POMEGRANATE SEED OIL PREVENTS OSTEOPENIA ESTABLISHMENT IN A PRECLINICAL MODEL OF OSTEOPOROSIS AND IN BONE CELLS CULTURE

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Background and objectives: In the current context of longer life expectancy, the prevalence of osteoporosis is increasingly important. This is why development of new strategies of prevention is highly suitable. Some dietary fats and particularly conjugated linoleic acid have a positive impact on bone formation leading to improved bone mineral density (BMD). Pomegranate seed oil (PSO) and its major component: punicic acid, a conjugated linolenic acid specific to this fruit, have potent anti-inflammatory and anti-oxidative properties both in-vitro and in-vivo, two process strongly involved in osteoporosis establishment.

Methods and results: In this study, we demonstrated that PSO consumption (5% of the diet) improved significantly bone BMD and prevented trabecular microarchitecture impairment in ovariectomized (OVX) mice C57bl6j, compared to OVX controls animals. Those findings are associated with transcriptional changes in bone tissue, suggesting involvement of both osteoclastogenesis inhibition and osteoblastogenesis improvement. In addition, thanks to an ex-vivo experiment, we provided evidence that serum from mice fed pomegranate seed oil (5% by gavage) had the ability to significantly down-regulate the expression of specific osteoclast differentiation markers and RANK-RANKL downstream signaling targets in osteoclast like cells (Raw264.7). Moreover, in osteoblast like cells (MC3T3-E1) it elicited significant increase in ALP activity, matrix mineralization and transcriptional levels of major osteoblast lineage markers involving the Wnt/α-catenin signaling pathways may. Our data also reveal that PSO inhibited pro-inflammatory factors expression, while stimulating anti-inflammatory ones.

Conclusions: These results demonstrate that PSO is highly relevant regarding osteoporosis. Indeed, it offers promising alternatives in the design of new strategies in nutritional management of age-related bone complications.

Key words: Pomegranate seed oil, nutritional prevention, osteoporosis, cell lines, animal model.

PO2030

POMEGRANATE PEEL EXTRACT IMPROVES BONE IMPAIRMENT IN A PRECLINICAL MICE MODEL OF POSTMENOPAUSAL OSTEOPOROSIS STIMULATING OSTEOBLASTIC DIFFERENTIATION IN VITRO

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Background and objectives: Aging is associated with impairment of bone remodeling process, characterized by an increase in the resorption/formation ratio and leading to a progressive loss of bone. This process is amplified by inflammatory and oxidative stress on bone microenvironment associated with age-related bone loss. Pomegranate (PG), especially pomegranate peel, has been used worldwide for many years as medical products. Recently, nutritional and pharmaceutical benefits of pomegranate raised a great scientific interest.

Methods: In this study, we investigated whether pomegranate peel extract (PGPE) consumption could effectively inhibit osteoporosis establishment through bone cells differentiation modulation.

Results: In ovariectomized control mice (OVX CT) compared to sham control mice (SH), the bone mineral density (BMD) decreased and bone microarchitecture were significantly impaired. However, PGPE metabolites substantially inhibited the decreased BMD and bone microarchitecture impairment induced by ovariectomy. Moreover, PGPE consumption reduced the osteoclast differentiation and bone resorption by inhibiting major osteoclasts markers, on RAW264.7 cells and in-vivo. In addition PGPE appeared to increase activity and differentiation of osteoblastic cells MC3T3-E1 and in-vivo. Furthermore, PGPE significantly improved inflammation and oxidative parameters on osteoporotic bone microenvironment.

Conclusions: Taken together, PGPE may be a good candidate to nutritional supplement in order to prevent osteoporosis progression and particularly for the management of postmenopausal osteoporosis.

Key words: Pomegranate peel extract, nutritional prevention, osteoporosis, cell lines, animal model.

PO2031

A NEW ROLE FOR THE FREE FATTY ACID RECEPTOR GPR40 IN PRESERVING BONE HEALTH

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Background and objectives: The mechanisms linking fat intake to bone loss remain unclear. G protein-coupled receptor/free fatty acid receptor 1 (GPR40/FFAR(1)) has been showed to regulate free fatty acid-induced insulin secretion. By demonstrating the expression of this receptor in bone cells, we hypothesized that GPR40 may play a role in mediating the effects of fatty acids on bone remodeling.

Methods: GPR40/FFAR(1) -knockout (GPR40-/-) and wild-type (WT) mouse bone phenotypes were compared using both in vitro primary cultures of bone marrow and in vivo CT analyses under administration of a GPR40 agonist (GW9508).

Results: We showed that GPR40-/- mice exhibit osteoporotic features suggesting a positive role of GPR40 on bone density. In bone marrow cultures, we showed that GW9508 abolished bone resorbing cell differentiation. Alteration of the Receptor Activator of NF-κB Ligand (RANKL)-induced osteoclast differentiation occurred via the inhibition of the Nuclear Factor κB (NF-κB) signalling pathway as demonstrated by decrease in gene reporter activity, inhibitor of κB kinase (IKKβ/β) activation, inhibitor of κB (IkB) phosphorylation and Nuclear Factor of Activated T cells 1 (NFATc1) expression. The GPR40-dependent effect of GW9508 was confirmed using shRNA interference in osteoclast precursors and GPR40-/- primary cell cultures. In addition, in vivo administration of GW9508 counteracted ovariectomy-induced bone loss in wild-type but not GPR40-/- mice enlightening the obligatory role of the GPR40 receptor. We are now looking forward to proving that natural GPR40 agonists, long chain fatty acids, parallel GW9508 effects in a fatty acid class-depending way.

Conclusions: In a context of growing prevalence of metabolic and age-related bone disorders, our results demonstrate for the first time in translational approaches that GPR40 is a relevant target for the design of new nutritional and therapeutic strategies targeting fatty acids to counter bone complications.
Key words: free fatty acids, GPR40, osteoclast, osteoporosis.

PO2032

NUTRITIONAL STATUS AND HYPERFERRITINEMIA IN PATIENTS WITH GAUCHER DISEASE ON ENZYME REPLACEMENT THERAPY

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Background and objectives: Gaucher Disease (GD) is characterized by multisystem manifestations, such as hepatosplenomegaly and hematological abnormalities. Studies have reported hyperferritinemia in patients with GD before enzyme replacement therapy (ERT), however some patients continue to present it while undergoing treatment. The aim of this study was to assess the nutritional status and ferritin levels in a sample of patients with Gaucher Disease at the Reference Center in Rio Grande do Sul, Brazil.

Methods: A retrospective study, data were obtained from medical records. Nutritional status were assessed for BMI; ferritin levels were considered elevated when above 291 ng/mL for women and 322 ng/mL for men.

Results: Thirty-five patients were followed at CRDG (male=17, mean age 35 +or-16 years old). The majority of patients assessed in this study present with normal weight; however, approximately 40% of them (14 patients adults) were overweight. Twenty-two patients (63%) had hyperferritinemia (male=15; 68%), from which 18 were on ERT and 12 had some alteration in liver enzymes. Data on the percentage of transferrin saturation were available for 21 patients with hyperferritinemia and revealed that none of them was above the reference value. The subgroup who initiated treatment with age >18 years (n=16) had a significant increase in BMI after ERT ($p < 0.0001$) and BMI presented correlation with serum ferritin level ($r=0.725$, $p=0.001$).

Conclusions: ERT seems to contribute to the weight gain of GD patients. BMI presented correlation with ferritin levels. Hyperferritinemia is common in GD patients without ERT, though the causes of their persistence even under treatment are unclear. Since it does not seem to be associated with hemochromatosis, further studies are warranted in order to see possible association with inflammatory processes related with the disease and with metabolic syndrome and/or overweight.

Acknowledgements: FIPE/HCPA and Propesq/UFRGS.

Key words: Gaucher disease, nutritional status, hyperferritinemia.

PO2033

NUTRITIONAL STATUS AND LIPID PROFILE OF PATIENTS WITH TYPE I GAUCHER DISEASE FROM THE SOUTH F BRAZIL

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Background and objectives: Gaucher disease (GD) is a rare genetic disease characterized by multisystemic manifestations such as hepatosplenomegaly, hematologic abnormalities, and bone pain. There are reports of low levels of HDL-cholesterol (HDL) in patients with GD, regardless of treatment. The aim of this study was to assess the levels of HDL in a sample of patients with GD at the Reference Center of Rio Grande do Sul, Brazil.

Methods: A retrospective study; data were obtained through review of medical records. Nutritional status was assessed by BMI and HDL levels were considered high risk when <40 mg/dL. Clinical and laboratorial parameters of importance were evaluated in order to relate them to the levels of HDL.

Results: Data on HDL levels were available for 33 patients (male = 17, mean age 35 ± 15 years): 6 were overweight and 5 obese. The BMI of the patients showed no significant correlation with HDL levels, LDL-cholesterol (LDL), total cholesterol (COL-T) and triglycerides (TRIGL). HDL levels were considered high risk for 21 patients (64% male = 11), being 5 overweight and 3 obese. COL level was moderately high for one patient, and LDL for another; levels of TRIGL were borderline for 5 and high for 3. Significant correlations were found ($r= 0.596$, $p = 0.004$) between the levels of HDL and COL-T, but not with LDL and TRIGL.

Conclusions: Low levels of HDL-COL observed in two thirds of patients are consistent with data reported in the literature and do not seem to be associated with higher cardiovascu-

lar risk as lower levels of HDL-COL also correlated with lower levels of COL-T. Additional studies are needed to understand the mechanisms involved in the lipid profile of these patients.

Key words: Gaucher Disease, nutritional status, HDL-Cholesterol, lipid profile.

PO2034

IRON STATUS DURING PREGNANCY AND THE RISK OF GESTATIONAL DIABETES MELLITUS

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Background and objectives: Gestational diabetes mellitus (GDM) leads to poor health outcomes for the mother and her child. Previous studies have examined the risk of GDM with either elevated body iron stores or dietary iron intake. This study relates indicators of iron status to the risk of GDM.

Methods: At 26-28 weeks of gestation, women in the birth cohort "Growing Up in Singapore Towards healthy Outcomes (GUSTO)" were tested for GDM using oral glucose tolerance testing. Blood samples were obtained for serum ferritin and iron measurements (n=472). Dietary iron intake and data on iron supplementation were also ascertained using 24-hr food recalls and interviewer-administered questionnaires. Logistic regression analyses were performed to determine risk factors for GDM.

Results: Based on WHO criteria, 17.4% of participants were diagnosed as having GDM. GDM was more prevalent among women in the highest quintiles of serum ferritin (Q1: 13.5%, Q2: 12.2%, Q3: 19.1%, Q4: 13.5%, Q5: 28.3%; p for trend=0.014) and total iron intake (Q1: 13.6%, Q2: 13.5%, Q3: 11.8%, Q4: 16.3%, Q5: 31.5%; p for trend=0.002). No associations were observed between serum iron concentrations or iron intakes from supplements and GDM. In models adjusted for BMI, ethnicity, maternal age, total energy intake and other covariates, the highest quintiles (compared to lowest four quintiles) of serum ferritin and total iron intake remained significant risk factors for GDM, with adjusted odds ratio (AOR) of 2.23 (95% CI: 1.15-4.30, p=0.017) and 3.30 (95% CI: 1.73-6.31, p<0.001), respectively. However, when the two variables were simultaneously included in the multivariate model, only elevated total iron intake remained significantly associated with GDM (AOR= 2.92 [95% CI: 1.50-5.67], p=0.002).

Conclusions: Our findings suggest that elevated dietary iron intake during pregnancy is linked to an increased risk of GDM in our Asian population.

Key words: Gestational diabetes mellitus, serum ferritin, dietary iron intake.

PO2035

PREVALENCE OF OVERWEIGHT, CENTRAL OBESITY AND EXCESS OF BODY FAT AMONG HIV-INFECTED ADULTS IN THE DOMINICAN REPUBLIC: A CROSS SECTIONAL STUDY

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Background and objectives: Excess weight and body fat are important risk factors for cardiovascular disease. How much

these factors affect people with HIV and on antiretroviral therapy (ART) is of increasing concern. The aim of this study was to determine the prevalence of overweight, central obesity and excess body fat among HIV-infected adults in the Dominican Republic (DR).

Methods: A cross-sectional study of 160 HIV-infected adults of mean±SD age of 40±11years old (31% male; 72% on ART) was conducted from March-December 2012 in four geographically-dispersed health centres (Santo Domingo, Puerto Plata, San Juan and Higuey). We measured anthropometric and socioeconomic data and ran descriptive analysis (ttest/Chi2) and multivariate logistic regression analysis.

Results: Mean±SD of energy intake among men and women was 1779±530 and 1711±593kcals (p=0.491), respectively. Overall, 38% (32% of men and 41% of women, p=0.282) were overweight using BMI (>24.9kg/m2); 28% (27% of men and 29% of women, p=0.727) had excess body fat (>25% in men and >33% in women) using bio-impedance analysis; and 37.5% (8% of men and 51% of women, p=0.001) had central obesity using waist circumference (>102cm in men and >88cm in women). After adjusting for age, sex, energy intake and health centre, we found no association between nutritional status and being on ART; women were much more likely to have central obesity than men (OR=20.4; IC95%=5.9;70.4); and increasing age was associated with excess of body fat (OR=1.05; IC95%=1.01;1.09).

Conclusions: Overweight is a substantial public health problem among HIV-infected adults in DR. Over a third of HIV patients were overweight according to BMI, central obesity and body fat; ART was not associated with nutritional status in this sample. Updated nutrition guidelines and policies are needed to address overweight among HIV-infected adults. Implementation of physical activity programs and nutritional and other behavioural change counselling could be viable solutions.

Key words: HIV, nutrition, overweight, obesity, anthropometry.

PO2036

DIETARY INTAKE OF PHYLLOQUINONE IS ASSOCIATED TO LOWER CONCENTRATIONS OF METABOLIC MARKERS IN ELDERLY SUBJECTS AT HIGH CARDIOVASCULAR RISK

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Background and objectives: Vitamin K has been related to glucose metabolism, insulin sensitivity and diabetes. Because inflammation underlies all these metabolic conditions, it is plausible that the potential role of vitamin K in glucose metabolism occurs through the modulation of cytokines and related molecules. The purpose of the study was to assess the associations between dietary intake of vitamin K and peripheral adipokines and other metabolic risk markers related to insulin resistance and type 2 diabetes mellitus.

Methods: Cross-sectional and longitudinal assessments of these associations in 510 elderly participants recruited in the PREDIMED centers of Reus and Barcelona (Spain). We determined 1-year changes in dietary phylloquinone intake estimated by food frequency questionnaires, serum inflammatory cytokines and other metabolic risk markers.

Results: In the cross-sectional analysis at baseline no significant associations were found between dietary phylloquinone intake and the rest of metabolic risk markers evaluated, with exception of a negative association with plasminogen activator inhibitor-1. After 1-year of follow-up, subjects in the upper tertile of changes in dietary phylloquinone intake showed a greater reduction in ghrelin (-15.0%), glucose-dependent insulinotropic peptide (-12.9%), glucagon-like peptide-1 (-17.6%), IL-6 (-27.9%), leptin (-10.3%), TNF (-26.9%) and visfatin (-24.9%) plasma concentrations than those in the lowest tertile (all p<0.05).

Conclusions: These results show that dietary phylloquinone intake is associated with an improvement of cytokines and

other markers related to insulin resistance and diabetes, thus extending the potential protection by dietary phylloquinone on chronic inflammatory diseases.

Key words: Vitamin K, inflammation, insulin resistance, diabetes.

PO2037

SERUM FERRITIN IS ASSOCIATED TO OSTEOCALCIN: A POTENTIAL MECHANISM OF IRON-INDUCED INSULIN RESISTANCE

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Background and objectives: Increased iron stores are associated with increased risk of type 2 diabetes; however, the mechanisms underlying these associations are poorly understood. Recent studies have demonstrated a direct and causal effect of iron stores in the modulation of circulating levels of adiponectin. Because a reduction of circulating osteocalcin levels after iron overload has been demonstrated in cell cultures, and osteocalcin is related to glucose and insulin metabolism we analysed the associations between serum osteocalcin or adiponectin concentrations with serum ferritin, soluble transferrin receptor (sTfR) and insulin resistance in elderly subjects.

Methods: We evaluated a total of 423 subjects from the PREDIMED cohort in a population-based cross-sectional analysis. Extensive clinical, nutritional and laboratory measurements, including osteocalcin, adiponectin, ferritin and sTfR, were recorded.

Results: Age- sex and BMI-adjusted serum ferritin was positively correlated with increased glucose and insulin circulating levels but also with HOMA-IR, and was inversely associated with total osteocalcin and adiponectin. A regression analysis revealed that the serum ferritin and transferrin receptor levels were significantly associated with a decrease in total OC and in ucOC. These associations were apparent both in normoglycemic and in subjects with impaired glucose metabolism. Serum sTfR levels were associated with lower ucOC levels in the whole-study subjects and remained significant only in the IGM individuals.

Conclusions: These findings describe for the first time an inverse association between serum ferritin and sTfR with osteocalcin and also with adiponectin, thus supporting that iron metabolism could contribute to the origin of type 2 diabetes mellitus and osteoporosis.

Key words: Ferritin, osteocalcin, insulin Resistance, type 2 diabetes mellitus.

PO2038

URTICACEAE FAMILY HERBAL TEAS AS ANTI-INFLAMMATORY AGENTS

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Background and objectives: Species from Uricaceae family, particularly from genus Urtica and Parietaria, have been used in traditional medicine since ancient times, primarily, as a diuretic to treat urinary, bladder and kidney problems. They are also edible, and have been used as a leaf vegetable and for tea preparations. However, their traditional use have not been examined by modern research. Therefore, in this work the attempt was made to assess the anti-inflammatory potential of teas made from herbs of following species: Urtica dioica, Parietaria judaica, Parietaria vulgaris and Parietaria officinalis.

Methods: The extracts used for analysis were prepared by the standard tea preparation - plant material was mixed with boiling water during 10 minutes, followed by filtration. The anti-inflammatory activity, of obtained extracts, was examined by means of cyclooxygenase-1 (COX-1) and 12-lipooxygenase (12-LOX) inhibition. Formed products were detected using LC-MS/MS. Inhibition curves of PGE2, 12-HHT and TXB2 production were used to investigate inhibition of COX pathway, while 12-HETE was used as indicator of 12-LOX pathway.

Results: Investigated extracts exhibited significant activity (IC50 in range 1.61-5.36 mg/ml for 12-HHT production, 2.76-5.40 mg/ml for 12-HETE, 0.842-4.17 mg/ml for PGE2 and 1.94-3.15 mg/ml for TXB2). The highest potential in inhibiting COX-1 and 12-LOX pathway had the extract of U.dioica herb. For the extract P. judaica herb it was not possible to determine IC50 value for 12-HETE, indicating that there was no inhibition of 12-LOX pathway.

Conclusions: All extracts have demonstrated the ability to inhibit the COX-1 enzyme, while the inhibition of 12-LOX enzyme was not successful only by P. judaica herb extract. The most potent extract was U.dioica herb, thus justifying its long term usage. Acknowledgements: This research is funded by Serbian Ministry of Education, Science and Technological Development research grant Nr. 172058.

Key words: Urticaceae, anti-inflammatory potential.

PO2039

EFFECTIVENESS OF DIET BASED ON SIGE TESTS USED AS SOLE METHOD OR IN COMBINATION WITH CLA IN IBS PATIENTS

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Background and objectives: Irritable bowel syndrome (IBS) is a chronic disease, burdensome for patients. Therapy has often small influence on their well-being improvement. The main objective of the present work was the evaluation of the effectiveness of diet modification based on the presence of sIgE antibodies supplemented or not with CLA.

Methods: Concentrations of sIgE antibodies against eight food allergens were determined among 150 adult patients with IBS. 60 patients were randomly selected for the 12 week intervention study. Based on serological results, an individual diet was recommended to each patient. Apart from the diet, 30 patients (randomly selected) additionally received conjugated linolenic acid (CLA) (3,000 mg/day).

Results: Both therapy methods were effective, especially in patients with the diarrheal IBS. Diarrhea retreated in half of the patients ($p>0.05$) who had suffered from that symptom before diet modification and in 63% of people who were on the diet supplemented with CLA ($p<0.05$). All other outcomes showed trends in favour of the diet supplemented with CLA. Such treatment caused receding stomach pain in nearly half of the patients (15 of 29, $p=0.050$) in comparison to five people treated by sole diet (22%). The number of patients complaining on bloating at level 3rd (severe: symptoms prevent normal functioning) decreased particularly. This change was found in 10 patients who were treated with diet ($p>0.05$) and 15 whose diet was enriched in CLA ($p<0.05$).

Conclusions: Diet modification based on IgE antibodies may be effective in terms of decreasing IBS symptoms. CLA can enhance this effect particularly in the diarrheal IBS form. Further research is needed. Acknowledgements: Research supported by the Polish Ministry of Science and Higher Education (project: N40405231/2712).

Key words: IBS, IgE antibodies, dietary therapy.

PO2040

DIET MODIFICATION BASED ON THE RESULTS OF SIGE CONCENTRATION AGAINST FOOD ANTIGENS AND QUALITY OF LIFE IN IBS PATIENTS

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Background and objectives: Irritable bowel syndrome (IBS) is a prevalent and expensive condition that significantly impairs quality of life (QOL). The aim of this study was the assessment of QOL in IBS patients before and after diet modification based on the results of sIgE concentration against food antigens.

Methods: The study included 28 IBS patients. Every patient was recommended to limit, for 12 weeks, the intake of allergens sources (from among egg white, egg yolk, wheat, rye, strawberry, apple, lemon, nut antigens) for which the elevated concentration of sIgE were detected. Depending on the results, patients limited the consumption of one, two or three sources of allergens. The QOL was assessed on the basis of the SF-36 questionnaire before and after intervention and was compared to QOL of the control group (n=50).

Results: We found that IBS patients scored lower on all eight scales of the SF-36 QOL questionnaire compared to healthy subjects. This applied especially to general health (GH domain) and emotional relationships (RE domain). After the dietary intervention the significant improvement in general health as well as in physical health in IBS patients was noted. Other QOL parameters improved, but without statistical significance. The improvement in the QOL of IBS patients found in this study after dietary intervention was not enough to compensate the statistically significant difference between QOL of IBS and healthy subjects.

Conclusions: Irritable bowel syndrome significantly affects the patients quality of life. The dietary treatment can be the important tool to achieve it's improvement. Acknowledgements: Research supported by the Polish Ministry of Science and Higher Education; research project No. N404 052 31/2712.

Key words: IBS, diet modification, life quality.

PO2041

MARGINAL ZINC DEFICIENCY MAY WORSEN DIABETES IN ZUCKER DIABETIC FATTY RATS

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Background and objectives: Zinc deficiency may be present in diabetes and contributes to hyperglycemia, leading to hypozincemia and hyperzincuria. Many of the symptoms of zinc deficiency and diabetes are the same, and are related to increased inflammation. Zinc supplementation may improve immunity, insulin sensitivity and signalling, and reduce inflammation, which may improve diabetes. The purpose of this study was to determine if marginal zinc deficiency (MZD) worsens and zinc supplementation (ZS) improves the parameters of diabetes and immune cell proportions in Zucker diabetic fatty (ZDF) rats.

Methods: The study used 30 male ZDF rats fed MZD (3 ppm), zinc control ([ZC], 30 ppm), or ZS (300 ppm), and 10 male lean ZDF rats fed ZC diet, for 8 weeks. Assessment of diabetes included obesity, hyperlipidemia, hepatis steatosis, oral glucose tolerance testing, glycemic control, pancreatic islet insulin immunostaining, serum markers of kidney function, and inflammation (serum haptoglobin and monocyte chemoattractant protein-1 [MCP-1]). Immune cell proportions (B-cells, T-cells, monocytes/macrophages, and natural killer cells) were determined by flow cytometry.

Results: ZDF rats fed MZD had significantly reduced peri-renal fat pad mass, improved blood lipid levels (increased high-density lipoprotein cholesterol and decreased triglycerides), and an improvement in the blood urea to creatinine ratio; however, they had pancreatic islet cell hypertrophy, reduced glucose tolerance, and β-cell function. ZS did not change pancreatic islet cell size or number. Obesity and diabetes elevated serum concentrations of haptoglobin and MCP-1. ZC and ZS increased proportions of cytotoxic (CD8) T cells and there was a trend (P=0.09) for ZC and ZS to reduce proportions of helper (CD4) T-cells compared to lean rats. ZDF rats had a lower CD4 to CD8 ratio compared to lean rats. There was a trend for ZS to reduce proportions of recent thymic emigrants compared to ZC and lean ZDF rats (P<0.06).

Conclusions: MZD may exacerbate diabetes, while ZS had no effect on diabetes in ZDF rats.

Key words: zinc, diabetes

PO2042

OBESITY IS ASSOCIATED WITH REDUCED IRON STATUS AND INCREASED HEPCIDIN CONCENTRATIONS IN WOMEN IN SOUTHERN INDIA

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Background and objectives: Rapid urbanization in India has brought about changes in eating habits and lifestyle leading to obesity, but micronutrient (MN) deficiencies still persist. The aim of this study was therefore to assess direct associations between obesity and NM status in middle class women living in an urban area in South India, with a special focus on iron metabolism.

Methods: In a cross-sectional study design, fasting blood samples and anthropometric measures of 18-35 year old middle class women in Bangalore, India were collected. Weight, height, waist circumference and % body fat (using BodPod) were assessed. From the blood samples, inflammatory markers (CRP and AGP), serum ferritin (SF), transferrin receptor (TfR), hemoglobin (Hb), hepcidin, zinc, retinol, folate and vitamin B12 were assessed.

Results: Of the 146 subjects included, 51 were normal weight (NW, BMI<23 kg/m2), 72 were overweight (OW, BMI 23-29.9 kg/m2) and 23 obese (OB, BMI≥;3 0 kg/m2); 19 were diagnosed with the metabolic syndrome. OW and OB subjects had a lower iron status (TfR) compared to NW but showed increased inflammation and hepcidin (p<0.05). None of the other MN (zinc, retinol, folate, B12) or Hb differed significantly between the groups. BMI and body fat were associated with TfR and hepcidin (p<0.05) in univariate correlations. In a multivariate linear regression controlling for CRP and hepcidin only BMI remained a significant predictor of TfR (p=0.032, r= 0.220). Hepcidin was not significantly correlated with TfR (r=0.019, p=0.825).

Conclusions: OW and OB Indian women are at an increased risk to develop iron deficiency while other MN do not seem to be affected. Increased hepcidin points towards an involvement of this protein in the etiology of iron deficiency in obesity, although direct associations are likely to be confounded by inflammation.

Key words: Iron deficiency, hepcidin, obesity, India, micronutrients.

PO2043

EFFECTIVENESS OF THE GLUTEN REDUCTION INTAKE, WITH AND WITHOUT PRIOBOTIC, IN IBS PATIENTS WITH POSITIVE SEROLOGICAL TEST FOR COELIAC DISEASE

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Background and objectives: Irritable bowel syndrome (IBS) treatment is difficult and often ineffective. The objective of this study was to evaluate the effectiveness of a diet with gluten reduction combined or not with probiotic in IBS patients with positive serological tests for celiac disease.

Methods: In 27 IBS patients with elevated antibodies against tissue transglutaminase (anti-tTG) and / or anti - gliadin (AGAs) a 12-week dietary intervention was applied. In 13 subjects the diet with gluten reduction was recommended (intervention RG) and 14 patients were advised to use the same diet, but with probiotic [capsules Lactobacillus rhamnosus GG, 6x109 cfu twice a day] (intervention RGP). The effectiveness of these interventions was evaluated by the changes in the IBS symptoms severity and in the antibodies concentration.

Results: Both the RG and RGP interventions were effective in the vast majority of the subjects. The average severity of pain and bloating decreased significantly after both types of intervention. In the case of diarrhea and constipation, their severity decreased significantly after RGP intervention. In comparison to the RG the RGP intervention was successful in a greater portion of persons suffering from diarrhea (90% vs 67%) and flatulence (71.4% vs 54.5%). In the most patients the normalization of anti-tTG and AGAs concentration was detected (81,8% and 75% subjects respectively).

Conclusions: Gluten intake reduction in IBS patients with positive serological test for celiac disease is justified. It results in clinical and biochemical improvement. Adding probiotics to such diet increases its effectiveness, particularly in IBS patients with diarrhea and flatulence. Acknowledgements: Research supported by the Polish Ministry of Science and Higher Education; research project No. N404 052 31/2712.

Key words: IBS, gluten intolerance, diet modification.

PO2044

PROCYANIDINS EXTRACTED FROM THE LITCHI PERICARP ATTENUATE ATHEROSCLEROSIS AND REGULATE GENES CONTROLLING LIPID METABOLISM IN APOLIPOPROTEIN-E KNOCKOUT MICE

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Background and objectives: Epidemiological studies strongly supported the role for procyanidins-rich beverages and fruits in the prevention of cardiovascular diseases. Procyanidins extracted from the litchi pericarp (LPPC) is a new source of procyanidins isolated and identified in our laboratory which has been proven to possess strong antioxidant activities. The aim of the present study was to investigate the effect of LPPC on atherosclerosis and hyperlipidemia.

Methods: Apolipoprotein-E knockout (ApoE KO) mice fed on a high fat diet (21% fat, 0.15% cholesterol) with or without LPPC intervention for 24 weeks.

Results: The results showed that LPPC intervention alleviated atherosclerosis, fat accumulation and hyperlipidemia in ApoE KO mice. Moreover, LPPC could significantly increase hepatic mRNA expressions of farnesoid X receptor (FXR) and small heterodimer partner (SHP) which emerge as key regulators of lipid homeostasis at the transcriptional level, decrease mRNA expressions of 3-hydroxy-3-Methylglutaryl (HMG)-CoA reductase which mediates cholestrol biosynthesis, and increase mRNA expressions of ATP-binding cassette transporter-1 (ABCA1) which modulates cholesterol efflux.

Conclusions: These findings indicated that LPPC ameliorated atherosclerosis and hyperlipidemia via regulating gene expression involved in hepatic lipid homeostasis in ApoE KO mice fed a HFD. The direct modulation effect of LPPC on signaling pathway may be relevant to explain the health effects ascribed to the regular consumption of dietary flavonoids.

Key words: Procyanidins, atherosclerosis, hyperlipidemia, liver, FXR.

PO2045

ASSOCIATION BETWEEN EATING BEHAVIOR AND NIGHTTIME SLEEP AMOUNT IN OBESE CHILDREN

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Background and objectives: Many studies have shown the relationship among sleep patterns and appetite regulation and increased risk for obesity .The objective of this study was to asses the association between eating behavior dimensions and nighttime sleep amount in obese and normal weight schoolers.

Methods: In a set of 129 schoolers (64 normal weight and 65 obese), ages 9.9 ±1.79 years normal weight and 9.59±1.49 years obese, 57% normal weight and 47% obese boys, we assesed the eating behavior dimensions (Child Eating Behavior Questionnaire) and nighttime sleep amount (Actiwatch®64) in the non-dominant wrist continously for four days. Sleep restriction was considered for sleep amount less than 570 minutes. Obesity was defined as BMI>p95 (CDC). Eating behavior patterns, nighttime sleep amount and frequency of awakenings were compared using ANOVA and chi square. The study was approved by INTA ethics committee and parents signed an informed consent.

Results: Relative to normal weight children, obese children showed a higher score in the pro-ingestion dimension and a lower score in two anti-ingestion dimensions (satiety response and slowness in eating). No differences in sleep amount were found between groups. Obese children that slept less than 570 minutes obtained even less score in the ant-ingestion dimensions compared with obese children who slept more ($p<0.05$).

Conclusions: Obese children present different score in both pro- and anti-ingestion dimensions of the eating behavior compared with normal weight children within the obese group , those who sleep less than recommended for their age show even more marked differences in the anti-ingestion dimensions. We suggest that the relationship between nighttime sleep amount and eating behavior patterns might contribute to the understanding of altered nutrition status in childhood. Acknowledgements: DI 2005 MULT 05/06-2.

Key words: Eating behavior, obesity, nighttime sleep restriction.

PO2046

IS FOOD ALLERGY A CAUSE OF SYMPTOMS WHICH IN IBS PATIENTS OPINION ARE INDUCED BY CONSUMPTION OF CERTAIN FOOD PRODUCTS?

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Background and objectives: It is not clear why some food products are often suspected to cause IBS symptoms. According to one hypothesis it may be due to food allergy. The main objective of the study was to estimate the association between IgE-depended food allergy and gastrointestinal adverse reactions referred by IBS patients due to the ingestion of certain foods.

Methods: The study included 150 IBS patients and 50 control subjects. Questionnaire survey data on food products which in patients' opinion cause IBS symptoms were collected. In the IBS and control groups the sIgE concentration against selected food antigens (egg white, egg yolk, wheat, rye, strawberry, apple, lemon, nut) was determined.

Results: Patients most often connected their IBS symptoms with milk and milk products (50%) and eggs (30%). The fish, cruciferous vegetables, broccoli, legumes, and peppers, citrus fruits, strawberries, nuts were also quite often reported as the cause of gastrointestinal complaints. Most of the subjects from both IBS and control groups had a little elevated concentration of specific IgE against all tested allergens. Moreover, positive results for some allergens (apple, egg yolk, nuts) were even more frequent in the control group.

Conclusions: Our results did not confirm that adverse reactions after ingestion of certain foods in IBS patients are connected with food allergy. It can be assumed, however, that IBS typical visceral hypersensitivity may cause that even a slight increase of sIgE concentrations, that does not result in any complaints in healthy people, may lead to an exacerbation of IBS symptoms in people with this syndrome .

Acknowledgements: Research supported by the Polish Ministry of Science and Higher Education; research project No. N404 052 31/2712.

Key words: IBS symptoms, food products, sIgE.

PO2047

HINOKITIOL SUPPRESSES METASTASIS OF HUMAN HEPATOMA SK-HEP1 CELLS BY INHIBITING MATRIX METALLOPROTEINASE-2/9 AND UROKINASE-PLASMINOGEN ACTIVATOR

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Background and objectives: Hinokitiol is a natural component isolated from Chamaecyparis taiwanensis. Hinokitiol possesses a wide range of biochemical and pharmacological activities, including anti-bacterial, anti-proliferative, and antioxidant capacities, as well as induction of cellular differentiation and apoptosis. Although hinokitiol has been shown to inhibit tumor cell proliferation, the antimetastatic effect of hinokitol on human hepatoma is unknown.

Results: Without a notable cytotoxic effect on SK-Hep1 cells, hinokitol dose-dependently decreased cell migration measured by the Boyden chamber assay. Moreover, hinokitiol significantly decreased enzyme activities and protein expressions of matrix metalloproteinase-9 (MMP-9), matrix metalloproteinase-2 (MMP-2), and urokinase-plasminogen activator (uPA). Additionally, hinokitiol reduced phosphorylation of p38 mitogen-activated protein kinases (p38), phosphatidylinositol-3-kinase/serine/threonine protein kinase (PI3K/Akt), and focal adhesion kinase (FAK). Data from the electrophoretic mobility shift assay showed that hinokitiol significantly repressed nuclear factor kappa B (NF-kB) DNA-binding activity.

Conclusions: hinokitiol inhibited the metastasis of SK-Hep1 cells by reducing expression of MMP-2, MMP-9, and uPA which may be related to its inhibitory effect on activation of p38, PI3K/Akt and FAK as well as transcriptional activity of NF-kB. These findings suggest that hinokitiol could be considered as antimetastatic agent of hepatoma.

Key words: SK-Hep1, hinokitiol, metastasis, MMP-2/9, uPA.

PO2048

ASSESSMENT OF THE RELATIONSHIP BETWEEN IBS OCCURRENCE AND SELECTED FACTORS SUSPECTED TO BE RELATED TO THIS DISEASE

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Background and objectives: Irritable bowel syndrome (IBS) is one of the most common functional gastrointestinal disorders. Its pathogenesis is very complex and not fully understood. The objective of this study was to assess the relationship between the factors in the field of nutritional status and medical history and the IBS development.

Methods: The study involved 150 IBS patients and 50 control subjects. In all of them anthropometric measurements (weight, height and waist circumference) were recorded. Based on their results the BMI was calculated and abdominal obesity prevalence was assessed. Using questionnaire survey data on the prevalence of allergies in the past, allergy in the first-degree relatives, allergy, asthma and skin diseases present today were collected.

Results: We found that abdominal obesity, defined according to NCEP-ATP III criteria, significantly increased the IBS risk development [OR=3.01, 95% CI= [1.0; 9.1], p=0.05]. From another analyzed factors only skin diseases were significantly more common in IBS patients compared to those without the disease (p = 0.005). There was no significant relationship between nutritional status measured with BMI and the IBS prevalence.

Conclusions: Abdominal obesity defined according to the NCEP-ATP III criteria enhances the risk of IBS development. Increased incidence of skin diseases in IBS patients compared to the control group indicates that the autoimmune reactions can play role in the IBS pathogenesis.

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Key words: IBS, risk factors, abdominal obesity.

PO2049

ASSOCIATION BETWEEN GRAIN CONSUMPTION AND SEVERITY OF NON-ALCOHOLIC FATTY LIVER DISEASE (NAFLD)

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Background and objectives: There is evidence that long term dietary habits contribute to the presence and severity of NAFLD. The aim of the present study was to investigate the association between consumption of grains and the clinical and histological characteristics of patients with NAFLD.

Methods: Seventy-three NAFLD patients (inclusion criteria: steatosis on liver ultrasound and/or biopsy, elevated ALT and/or GGT, exclusion of other causes of liver injury) participated in the study. Consumption of grains (total, refined and whole grains) was estimated through a semi-quantitative food frequency questionnaire, while daily energy intake of the participants was estimated through three non-consecutive 24hour dietary recalls. Medical history, anthropometric indices, body composition analysis, physical activity data, biochemical parameters and inflammatory markers were available for all patients. Liver stiffness measurements by transient elastography was performed in 58 and liver biopsy in 34 patients.

Results: Consumption of refined grains was positively correlated to HOMA-IR index (r=0.291, p=0.014) and intreleukin-6 levels (r=0.254, p=0.033), while it was negatively correlated to adiponectin levels (r=-0.342, p=0.004). In contrast, consumption of whole grains was negatively correlated to interleukin-6 levels (r=-0.235, p=0.048), while it was also associated with lower levels of HOMA-IR index (standardized beta coefficient=-0.294, p=0.006) after adjusting for several potential confounders. No significant correlations were observed between consumption of grains and liver stiffness measurements or histological parameters. However, consumption of whole grains was associated with lower likelihood of non-alcoholic steatohepatitis (OR=0.858, 95%CI=0.739-0.996, p=0.045), after adjusting for sex and daily energy intake.

Conclusions: Our results support the detrimental effect of refined grain intake and the beneficial effect of whole grain intake on clinical characteristics of patients with NAFLD. Further research is required to clarify the role of grain intake in the development and progression of the disease.

Key words: Non-alcoholic fatty liver disease, dietary habits, refined grains, whole grains.

PO2050

EFFECT OF ORAL ADMINISTRATION OF DRY PURSLANE LEAVES ON ACUTE INTESTINAL INFLAMMATION INDUCED IN MICE

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Background and objectives: Omega-3 polyunsaturated fatty acids have anti-inflammatory properties and can be beneficial in the treatment of inflammatory diseases, such as ulcerative colitis. The purpose of the current study was to investigate the ameliorative effect of purslane, an omega-3 rich vegetable in the preventive treatment therapy of experimental ulcerative colitis.

Methods: twenty-five C57BL/6J mice were randomly assigned to DSS-control group, high-dose purslane group (24%), medium-dose purslane group (8%), or low-dose purslane group (0.8%) receiving 3.5% dextran sulfate sodium (DSS) in their drinking water for eight days after ten days of receiving the intervention treatment as described above. A negative control group was also employed to received drinking water plus standard diet for the whole duration of the experiment.

Results: animals fed the different concentrations of purslane did not exhibit a statistically significant trend towards histopathological and clinical improvement after day 8 of DSS administration. There was no statistically significant difference observed between groups 8 days post-DSS. Also, no statistically significant decrease in neutrophil infiltration was observed, as depicted by myelohyperoxidase activity. However, plasma fatty acid profile revealed a high concentration of DHA in the high dose group (24%) which was significantly different ($p<0.05$) from the two control groups but not from the other two intervention groups. ALA concentrations were not significantly different between all intervention groups.

Conclusions: our findings do not support a positive role of purslane leaves rich in the omega-3 fatty acids (ALA) supplementation in an experimental model of ulcerative colitis. Further studies are needed in order to investigate the combined role or effect of other compounds in purslane on the ulcerative colitis when given as a dietary supplement. Acknowledgements: The authors are grateful to the Pears Foundation of England for financial support.

Key words: Dextran sodium sulphate, colitis, mice, nutrition, fatty acid.

PO2051

THE PREVALENCE OF OBESITY AMONG FEMALE TEACHERS OF CHILD-BEARING AGE IN GHANA

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Background and objectives: Obesity has become a public health problem in both developed and developing countries. In Ghana, the prevalence of obesity is high particularly among women. This rising trend of obesity is worrying as studies have shown an increased risk of morbidity, disability and mortality associated with it. This study examined the prevalence of obesity among Ghanaian teachers of child-bearing age.

Methods: A cross-sectional survey was conducted on 400 female teachers between the ages of 18-49 years from two sub-metropolitan areas in Accra District, Ghana. A questionnaire was used to gather information on the socioeconomic status, body mass index (BMI), waist-to-hip ratio (WHR), alcohol intake, physical activity and food intake. Correlations and chi-square test were used to determine association between the various variables and anthropometric indices while ANOVA was used for statistical differences between means.

Results: The mean age, BMI and WHR were 35.9 ± 8.2 years, 27.2±5.3 kgm-2 and 0.79±0.07 respectively. About 34% of the women were overweight while 27% were obese with 17.8% centrally-obese. There was a strong positive correlation between BMI and WHR with age. The prevalence of obesity for a woman above 35years was about four times higher than the prevalence among the younger age group (<25years) and two times higher than that of the middle age group (26-35 years). This study found that at any age group underweight, overweight and obesity co-existed. Socioeconomic variables such as marital status, income and parity showed a positive association with BMI and waist circumference. Consumption of fruits and vegetables was low among respondents.

Conclusions: The prevalence of obesity was high among teachers of child bearing age. This study recommends healthy eating guidelines supported with vigorous physical activities established in schools to help teachers maintain healthy body weights and prevent its associated risk.

Key words: Obesity, prevalence, women, teachers, Ghana.

PO2052

EFFECTS OF SOY BAR OR OAT BRAN, ALONE OR ASSOCIATED, ON CHOLESTEROLEMIA AND OXIDATIVE STRESS IN DYSLIPIDEMIC SUBJECTS.

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Background and objectives: Soy isoflavones have proven antioxidant activity as scavenger free radicals. Ingestion of 25 g/day soy protein can be considered an adjuvant treatment of dyslipidemia. Considering the lack of consensus regarding the consumption of soy as cereal bar, oat bran, or their combination in humans, the aim of this study was to evaluate the oxidative stress and lipid profile in dyslipidemic subjects after 45 days treatment with soy snack bar and oat bran.

Methods: Eighty-eight dyslipidemic individuals were assigned to 4 groups. Oat bran group ingested oat bran, soy snack bar group ingested 3 bars per day of soy, soy snack bar/oat bran group ingested 30 g of oat bran plus 3 bars, and control group ingested a hypocholesterolemic diet. Body mass index (BMI), lipid profile, antioxidant parameter (TRAP) and oxidative stress parameters were evaluated. The caloric values and chemical composition of oat bran and soy snack bar.

Results: Individuals of soy snack bar/oat bran showed a significant decrease in total cholesterol (CT) (-3.41%) and LDL cholesterol (LDL-C) (-6.66%) after 45 d. There was a significant increase in HDL cholesterol (10.0%) and a significant decrease in the levels of triglycerides (TG) (-8.68%) in the group that consumed the soy snack bars. CT showed a significant reduction between the groups soy snack bar/oat bran and soy snack bar after 45 d. Association group showed an improvement in antioxidant defenses in relation to all other groups. A significant decrease compared to the remaining nitric oxide (NOx) in the soy snack bar/oat bran after 45 d. And a significant decrease occurred in the group of soy snack bar/oat bran indices TRAP/FOX, TRAP/MDA and TRAP/NOx.

Key words: Soy, oxidative stress, lipid profile.

PO2053

NUTRITIONAL ASSESSMENT IN ONCOLOGICAL AND NON-ONCOLOGICAL HOSPITALIZED PATIENTS

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Background and objectives: Hospitalized patients due to inadequate feeding are often at nutrition risk, causing increase of disease duration, complications, mortality rate and hospital expenses. The aim of this study was to perform a nutritional assessment in hospitalized patients.

Methods: A random group of 52 hospitalized patients was studied: 28 oncological (group A) and 24 non-oncological (group B) patients. The nutritional assessment by a special Nutrition Day Questionnaire and anthropometric measurements was performed.

Results: Our research established a normal body weight of 35.71% in group A and 8.33% in group B, underweight in 14.29% in group A and 8.33% in group B, overweight in 17.86% in group A and 33.34% in group B, obesity in 32.14% in group A and 50.0% in group B. Nutritional risk and need of nutritional support was found in 57.14% in group A and 16.67% in group B. There was a body weight reduction for the last three months in 53.57% in group A and in 20.83% in group B, and a decreased food intake for the last week in 50.0% in group A and in 33.34% in group B. Reduced appetite was reported in 35.7% in group A and in 33.34% in group B. At the end of the survey all patients were on a standard hospital diet and only 32.14% of group A and 8.33% of group B received nutritional support.

Conclusions: Nutritional risk in 38.5% and underweight in 11.54% of the hospitalized patients were found. The current hospital feeding is not corresponding to the nutritional needs in half of the hospitalized patients, and nutritional support was provided only in half of the risk patients. A nutritional assessment and therapy have to be made for all hospitalized patients.

Key words: Nutritional assessment, hospitalized patients, nutritional support.

PO2054

BLOOD LIPID PROFILES OF GHANAIAN SCHOOLCHILDREN

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Background and objectives: Blood lipid profiles have been associated with cardiovascular risk factors and diseases. Data on lipid profiles of Ghanaian children are lacking. This study reports on the lipid profiles of Ghanaian schoolchildren between the ages of 9-15 years.

Methods: Fasting blood lipid profiles were determined in 802 children who participated in the nutritional assessment survey among schoolchildren. Finger-prick blood sample was used to determine total cholesterol, triglyceride, high density lipoprotein (HDL) and low density lipoprotein (LDL) cholesterol levels using the cardio-chek PA system analyzer.

Results: Mean blood lipid profiles for schoolchildren were 146.1±3.6 mg/dl for total cholesterol, 69.4±2.3 mg/dl for triglycerides, 52.8±1.5 mg/dl for HDL, 79.4±2.4 mg/dl for LDL and 3.0±0.1 for total cholesterol/HDL ratio. Using cut-offs for normal values of <200 mg/dl for total cholesterol, <150 mg/dl for triglycerides, >40 mg/dl for HDL cholesterol, <130 mg/dl for LDL cholesterol and <5 for total cholesterol/HDL ratio, the prevalence of children with abnormal values were14% for high total cholesterol, 4% for high triglycerides, 28% for low HDL, 9% for high LDL and 4% for low total cholesterol/HDL ratio.

Conclusions: The majority of Ghanaian schoolchildren had normal lipid profiles. However, the substantial proportion with low HDL levels requires that interventions be put in place to improve physical activity and dietary habits of these children to reduce the risk of cardiovascular diseases in adult life.

Key words: lipid profiles, cholesterol, schoolchildren, Ghana.

PO2055

TOMATOES AS FUNCTIONAL FOOD: ANTI-INFLAMMATORY EFFECTS OF TOMATO KETCHUP AND IT'S MAIN MICRONUTRIENTS.

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Background and objectives: Persistent low grade inflammation is a common characteristic in the cardiometabolic syndrome. Fruit and vegetable consumption in general, but also tomato consumption in particular, have been found to mitigate this inflammatory process. We examined: firstly, if lycopene, vitamins C and E - in quantities as present in tomato and ketchup – reduce the formation of inflammatory biomarkers; secondly, if a combination of these compounds had synergistic effects; and thirdly, the effect of a single consumption of tomato ketchup on cytokine production in healthy volunteers.

Methods: In the first two studies, the anti-inflammatory properties of lycopene, vitamins C and E were studied in vitro using cultured human endothelial cells. In the third, placebo-controlled, study, six healthy male volunteers (aged 33 yrs-old, BMI 26 kg/m2) consumed a single serving of 200 grams of tomato ketchup, naturally containing ca. 30 mg lycopene, 190 mg vitamin C and 3 mg vitamin E. Six hours later, blood was collected from these volunteers. On a separate day, this procedure was repeated using a tomato-free test meal. The ability to adapt to an external inflammatory challenge (i.e. LPS) in these subjects was assessed with a functional bioassay for chemotaxis.

Results: In cultured endothelial cells, vitamins C and E significantly complemented the anti-inflammatory effect of lycopene to an increasing degree. In the ex vivo study, tomato ketchup reduced TNF-α production and a trend was observed for IL-8 inhibition, while tomato ketchup did not alter IL-10 release in blood from healthy volunteers upon addition of LPS ex vivo.

Conclusions: Tomato ketchup consists of a combination of components that have the potential to reduce chronic inflammation. These results strengthen the evidence of the potential protective role of tomatoes and tomato ketchup against cardiovascular diseases.

Key words: anti-inflammatory, tomato ketchup, lycopene.

PO2056

EFFECT OF TOMATO JUICE CONSUMPTION ON LIVER FATTY ACID PROFILE OF RATS WITH HIGH FAT DIET-INDUCED HEPATIC STEATOSIS

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Background and objectives: Nonalcoholic fatty liver disease (NAFLD) encompasses from simple steatosis (reversible and benign) to nonalcoholic steatohepatitis (NASH), cirrhosis and even liver failure or hepatocellular carcinoma. NAFLD is the most common liver disorder worldwide and it is associated with insulin resistance, dyslipidemia and metabolic syndrome. Several studies have shown that tomato could ameliorate the hepatic lipid metabolism dysfunction. Moreover, a recent study pointed out changes in fatty acid composition in mice with or without NAFLD. Taking into account all these data, we aimed to investigate whether tomato juice intake could modify the liver fatty acid profile in hepatic steatosis induced rats.

Methods: sixteen male Sprague Dawley rats were randomly divided into four groups according to the diet and beverage they received: standard diet and water (NA) or tomato juice (NL); and high fat diet and water (HA) or tomato juice (HL). After seven weeks, rats were sacrificed and liver samples were collected in order to carry out a histological examination and analyse the fatty acid profile by gas chromatography.

Results: In rats fed a high fat diet, histopathological examination revealed grade 2 hepatic steatosis, characterized by swelling of hepatocytes and fat accumulation. With regard to the liver lipid profile, the monounsaturated fatty acid content was 3-fold higher in HL and HA groups, compared to NA and NL. The amount of polyunsaturated fatty acid was 6-fold lower in HL and HA groups, while no differences were found for saturated fatty acids. Statistical analyses showed differences upon high fat diet intake but not upon tomato juice consumption.

Conclusions: The differences observed in the fatty acid profile are attributable to fat intake and not due to tomato juice consumption.

Key words: Tomato, fatty acid, liver, NAFLD, gas chromatography.

PO2057

ELEVATED LEVELS OF FERRITIN, TBARS AND EXPRESSION OF HEPCIDIN ARE RISK FACTOR FOR TYPE 2 DIABETES DEVELOPMENT

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Background and objectives: Obesity and type 2 diabetes mellitus share a strong pro-inflammatory profile. It has been observed that iron is a risk factor in the development of type 2 diabetes. The aim of this study was to evaluate the relationship between iron nutritional status and inflammation with the risk of type 2 diabetes development.

Methods: We studied 30 obese men with type 2 diabetes (OBDM); 30 obese subjects without diabetes (OB), and 30 healthy subjects (Cn). We isolated peripheral mononuclear cells (PMCs) and challenged them with high Fe concentrations. Total mRNA was isolated and relative abundance of TNF-α, IL-6 and hepcidin were determined by qPCR. Iron status, biochemical, inflammatory and oxidative stress parameters were also characterized.

Results: OBDM and OB patients showed increased hsCRP levels compared to Cn group (in mg/L, 4.1 vs 3.0 and 1.1, respectively, $p<0.01$). OBDM subjects showed higher ferritin levels than Cn group (in µg/L, 95.5 vs 42.8, $p<0.01$). TNF-α and IL-6 mRNA relative abundances increased in OBDM treated with high/Fe ($p<0.0001$). Hepcidin mRNA increased in OB and OBDM with basal and high iron concentration ($p<0.0001$). We found that the highest quartile of ferritin was associated with an increased risk of type 2 diabetes when it was adjusted to BMI (OR=2.04 CI=5.37-9.17; $p<0.001$) and HOMA-IR (OR=1.19 CI 1.02-1.22; $p<0.014$). This association was independent of the inflammatory status. The highest level of hepcidin gene expression also showed a trend of increased risk of diabetes (OR=4.54 CI 1.95-21.66; $p<0.05$). Levels of hsCRP over 2 mg/L showed a significant trend of increasing the risk of diabetes.

Conclusions: Iron may stimulate the expression of pro-inflammatory genes (TNF-α and IL-6), and both hepcidin gene expression and ferritin levels could be a risk factor for the development of type 2 diabetes.

Key words: Hepcidin, ferritin, diabetes risk, inflammation.

PO2058

SUBJECTIVE PATIENTS' ASSESSMENT OF QUALITY OF FEEDING PRACTICE IN SELECTED POLISH HOSPITALS

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Background and objectives: Hospital diet and feeding practice deeply effects patients well-being. The aim of the project was to study patients' opinion on quality of nutritional service in hospitals.

Methods: Meals were provided as a catering or in-house cooking. 448 patients in various hospitals of the Pomerania Voievodship (Poland) were engaged. Research was done on the basis of the anonymous questionnaire, which included questions on demographic data, the quantity and quality of the hospital nutrition, dietetic supplements of hospital meals; also specificity of the hospital ward were taken into account.

Results: Data pointed out that patients preferred meals prepared by in-house kitchen as opposed to catering. The taste, temperature and consistency as well as quantity of catering meals were assessed negatively; only 34% positive versus 69% positive for in-house cooking. It was not possible to take into account patients' food preferences in any of the hospital under investigations. Regardless of the specificity of the ward, the patients received enrichment by hospital diet to a small extent (6% of patients). The most common supplementation was the supply of physiological fluid infusion. The study also pointed out to insufficient drinking fluids (mineral water, tea, juice) supplied at treatment wards. The study revealed that in the surveyed hospitals, patients were not receiving meals, as recommended, before and after therapeutic procedure (diagnostic or surgery), and nutritional supplementation was rarely provided. The role of nutrition in prevention of hospital malnutrition is still underestimated.

Key words: Quality, hospital nutrition, subjective assessment.

PO2059

ASSOCIATION OF FOOD GROUPS CONSUMPTION WITH CENTRAL OBESITY AMONG IRANIAN WOMEN

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Background and objectives: Central obesity (enlarged waist circumference) is one of the metabolic syndrome`s risk factors. The prevalence of central adiposity has increased precipitously in Iran, especially in women. Evidences suggest a prominent role of dietary intake habits in increasing or decreasing the risk of central obesity. The aim of this study was to define association of food group consumption with central obesity among Iranian women.

Methods: In this cross-sectional study, 460 women aged 20-50 years were selected by stratified random sampling in Tehran. Dietary intakes were characterized using validated 168 items semi-quantitative food frequency questionnaires. Food items were categorized in to 25 food groups based on similarity of nutrient profiles. Weight, height and waist circumstance (WC) were measured with standard methods. Central obesity was defined as WC ≥ 88 cm. Multivariate logistic regression was used to estimate odds ratio (OR) and 95% confidence intervals (CI).

Results: The mean of participants' WC was 84.7 ± 8.5 cm and 171 (38.8%) subjects were centrally obese. After adjusting for confounders(age, smoking, physical activity and energy intake), being in the highest quartile category of consumption of poultries (OR: 0.29, 95% CI: 0.15-0.56), low fat dairies(OR: 0.32, 95% CI: 0.16-0.63), fruit and vegetables (OR: 0.52, 95% CI: 0.29-0.94), nuts (OR: 0.83, 95% CI: 0.49-0.93), and olive (OR: 0.54, 95% CI: 0.30-0.96) was significantly associated with reduced risk of being centrally obese. In contrast, being in the highest quartile of consumption of processed meat (OR: 2.04, 95% CI: 1.10-3.76), visceral meat (OR: 1.89, 95% CI: 1.3-3.48), high fat dairies (OR: 2.14, 95% CI 1.19-3.86), solid oil (OR: 2.58, 95% CI: 1.36-4.87), beverages (OR: 2.20, 95% CI: 1.20-4.08), refined grains (OR: 3.31, 95% CI: 1.76-6.24) was significantly associated with reduced risk, compared to the lowest quartile (p-trend: p<0.01). Other food groups (red meat, fish, eggs, artificial juices,legumes, garlic, potato, whole grains, snacks, sweets, pickles, liquid oil, tea and coffee) were not significantly related with central obesity.

Conclusions: Our findings suggest higher consumption of healthier food groups (fruit, vegetables, poultries, low fat dairies,nuts,olive) may have a protective effect against central obesity in the studied women. However, unhealthy groups (processed meat, visceral meat, high fat dairies, solid oil, beverages and refined grains) may increase the risk.

Key words: Food group, central obesity, women, Iran.

PO2060

THE ASSOCIATION OF DIETARY LIPID PROFILE WITH HAVING HISTORY OF HYPERLIPIDEMIA IN IRANIAN WOMEN

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Background and objectives: Recent researches suggest that saturated fatty acid (SFA) intake increases hyperlipidemia and hypercholesterolemia risk; however, diets high in unsaturated fatty acids (UFAs) and reduced SFAs can prevent the risk of them. The aim of this study was to investigate the associations between intake of SFAs, monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFAs) and hyperlipidemia in women living in Tehran.

Methods: In a cross-sectional study 460 women aged 20-50 y, living in Tehran, were selected by stratified random sampling method. Dietary intake was collected by a semi-quantitative questionnaire. Participants were asked about having history of hyperlipidemia that was defined by a doctor. Nutrient profiles were determined by N4 software. The association between having history of hyperlipidemia with dietary intake of SFAs, MUFAs and PUFAs was assessed by multivariate adjusted logistic regression.

Results: The mean±SD age of participants was 33.5±9.7 y, 24.2% of subjects had history of hyperlipidemia. The mean daily intake of total fat, SFA, MUFA and PUFA and cholesterol was 88.5±45.1 g/day, 35.4±16.9 g/day, 37.9±22.6 g/day, 27.5±23.3 g/day and 246.7±116.9 mg/day, respectively. After adjusting for confounders (age, energy intake, physical activity, body mass index and waist circumstance), the odds of hyperlipidemia increased in individuals in the highest quartile of dietary total fat (OR: 6.4, 95% CI: 1.8-21.6), SFA (OR: 8.3, 95% CI: 2.2-30.4) and cholesterol (OR: 1.4, 95% CI: 1.1-3.4) consumption. Inversely, being in the highest quartile of dietary PUFA

was significantly associated with reduced hyperlipidemia risk (OR: 0.63, 95% CI: 0.43-0.65); also, being in the highest quartile of dietary PUFAs/SFAs ratio reduced the hyperlipidemia risk (OR: 0.42, 95% CI: 0.19-0.91) [p-trend<0.05]. Dietary MUFA, MUFAs/SFAs ratio, UFAs (PUFAs+MUFAs)/SFAs ratio were not associated with having history of hyperlipidemia.

Conclusions: Our findings suggest that having history of hyperlipidemia was associated with greater consumption of dietary total fat, SFAs and cholesterol in studied women. However, higher consumption of dietary PUFAs and higher PUFAs/SFAs ratio decreased the hyperlipidemia risk.

Key words: Dietary profile, history of hyperlipidemia, women, Iran.

PO2061

ROLE OF ANTIOXIDANTS IN THE TREATMENT OF MULTIPLE SCLEROSIS

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Background and objectives: Multiple sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system (CNS). T lymphocytes and macrophages attack cells of the CNS, releasing large amounts of reactive oxygen and reactive nitrogen species. This stress contributes to neuroinflammation, demyelination and disease progression.

Methods: A literature review of antioxidant role in the MS treatment was conducted.

Results: Endogenous antioxidants: In patients with MS, there is a loss of reduced glutathione, leading to a reduction in the activity of glutathione peroxidase. Superoxide dismutase (SOD) converted superoxide into hydrogen peroxide, a less damaging free radical. Reduction of the SOD activity was found in erythrocytes of patients with MS. The quinone oxidoreductase-1 was strongly upregulated in astrocytes of active MS lesions, trying to counteract the adverse effects. Lipoic acid. Its antioxidant action is exerted through several mechanisms. Effective in MS in animal models has been proven. Exogenous antioxidants: Supplementation with 6 g of omega-3/day for 6 months in MS patients and healthy controls decreased the secretion of proinflammatory cytokines, IL-1b, TNF-alpha, IL-2, IFN-gamma, which are elevated in patients with EM. Antioxidant vitamins (α-tocopherol, β-carotene, retinol, and ascorbic acid) were reduced in the serum of MS patients during an outbreak. It may be by the increased oxidative stress due to products of lipid peroxidation. Regarding vitamin D, the prevalence of MS is lower when the consumption of oily fish is higher. Sudden decreases in serum levels of 25 (OH) D were associated with the occurrence of new outbreaks. Saffron reduced the symptoms of autoimmune encephalomyelitis, by preventing oxidative stress and leukocyte migration to the CNS.

Conclusions: Clinical trials which determine radiological and immunological parameters are necessary to confirm the benefit of antioxidants in the development and progression of MS. Acknowledgements: Funded by JCCM-FEDER (POIC10–0195–984).

Key words: Multiple sclerosis, antioxidants, saffron.

PO2062

ARGININE, GLUTAMIN AND β-HIDROXY-β-METHYLBUTIRATE ADDED TO BROCHOPLEUROCUTANEOUS FISTULA TREATMENT

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Background and objectives: The addition of arginine, glutamin and β-hidroxy-β-methylbutirate has demonstrated benefit in eschars, burns and diabetic foot treatment; a great deal of research is reported in medical literature. The aim of this study was to investigate whether this product might be useful in the treatment of brochopleurocutaneous fistula.

Methods: Male patient, 16 years old, diagnosed with polytrauma, closed chest trauma and hemopneumothorax. During outcome subject had septic shock, respiratory distress and high output right brochopleurocutaneous fistula with lung abscess and empiema. After 40 days, patient was referred to Hospital Cetrangolo. He was admitted with severe protein-caloric malnutrition and 23% of normal weight loss (Body Mass Index: 14.6 kg/m^2) at lean body mass and fat body mass expense (Percentile 3 for both assessments). The thoracic wall wound measured 21 cm lenght, 8.5 cm width and 5.5 cm depth. Continuous enteral feeding was administered with specialized formulation for metabolic stress according to patient requirements (2300 ml/2900 kcal) during 15 days, transition was done to a high protein - fiber fortified formulation (2400 ml/2900 kcal) during 35 days until optimal oral intake was reached. From seventh day of enteral feeding, 48 g of specialized formulation were added containing 14 g of arginine, 14 g of glutamin and 2.4 g of β-hidroxy-β-methylbutirate administered by mouth during 6 months.

Results: Subject had good outcome with 27% weight gain (Body Mass Index: 18.6 kg/m^2), fat body mass and lean body

mass recovery (Percentile 10 for both assessments), biochemical parameters normalization, septic focus resolution, thoracic wall wound measure significant decreased (7.4 cm lenght, 2.8 cm width and 1.5 cm depth) with wound edges granulation.

Conclusions: The supplemental arginine, glutamin and β-hidroxy-β-methylbutirate shown effectiveness in the brochopleurocutaneous fistula treatment also contributing to nutritional status recovery.

Key words: Bronchopleurocutaneous fistula, arginine, glutamin.

PO2063

BODY COMPOSITION, CENTRAL ADIPOSITY, BIOCHEMICAL INDICATORS AND BLOOD PRESSURE IN CUBAN ADOLESCENTS

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Background and objectives: Nutritional status is a physical condition related to a broad spectrum of chronic diseases. Total body fat and central adiposity are determinants for identifying metabolic complications of obesity; BMI probably is not the best alternative. The aim of this study was to explore associations between body size and composition, biochemical indicators and blood pressure in adolescents according to biological maturation.

Methods: In 690 adolescents (12-15 years old), weight, height, skinfolds, and circumferences were recorded; BMI, body fat content and distribution according to sexual maturation stage were calculated. Blood pressure, serum triglycerides, total cholesterol, HDL-C, LDL-C, VLDL-C and glucose were measured. Univariate and multivariate analysis were used to describe and compare the nutritional status categories with different anthropometric and biochemical indicators.

Results: Body dimension and composition by sex and maturation stage were different. Underweight prevalence was low and 23,3% of global overweight (overweight-obesity) was recorded. Biochemical indicators were not different between boys and girls; only triglycerides and VLDL were different by maturation stages within sex. Anthropometric measures, body fat and blood pressure increased parallel to BMI increase; nevertheless, more than 30% of adolescents showed excessive body fat and 7% central adiposity at risk levels, in spite of normal BMI. Stepwise Discriminant Analysis evidenced that total body fat and waist circumference in boys, and total body fat, waist and abdominal circumferences in girls, were the main indicators which described their nutritional status.

Conclusions: Total body fat and trunk circumferences are helpful indicators of the adolescent nutritional status, including maturation stages. Metabolic risk was not identified in this group.

Key words: Body composition, central adiposity.

PO2064

COMPARATIVE STUDY OF CHILDHOOD OBESITY IN CHILDREN (6-12YEARS) LIVING IN THE RURAL AND URBAN COMMUNITIES OF ENUGU STATE, NIGERIA

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Background and objectives: Childhood obesity is currently an escalating epidemic that affects many countries in the world. In Nigeria, obesity is not only negatively affecting adults, it affects the younger generation as well. Children are becoming obese at an alarming rate. This study aims at assessing the prevalence of childhood obesity in children (6-12years) living in rural and urban communities of Enugu state, Nigeria.

Methods: A multistage random sampling technique was used in selecting 2000 children used in this study, (1000 each from the rural and urban areas). A structured questionnaire was used to collect information on parents socio demographic status, physical activity pattern of the family, and anthropometric indices of the respondents (using standard methods). Physical exercise was carried out on a sub sample of the obese children. Data was analyzed using anthropometric z scores and categorized using WHO anthro software (2007). Comparison was done using chi square test for categorized variables.

Results: The z scores of all the anthropometric indicators were significantly higher ($p<0.05$) for children in the urban than in the rural. More of the male children in the urban location were obese (70.9%) and overweight (50.4%) while only one female child in the rural area was found obese. Possible risk of getting obese were highest(46.2%) with children whose mothers monthly income was above N46,000 while those whose mothers monthly income was below N7,500 had the least prevalence (12.8%). The total time spent on exercise contributed positively to 6% ($R=0.06$) of the variation in weight loss.

Conclusions: Maternal monthly income of less than N7,500, physical exercise and healthy eating habit were negatively related to childhood obesity while location, sedentary lifestyle, higher consumption of macronutrient rich foods were contributory factors in determining childhood obesity.

Key words: Childhood obesity, urban and rural, epidemic, overweight.

PO2065

LOWER ASPARTATE AMINOTRANSFERASE TO ALANINE AMINOTRANSFERASE RATIO IS ASSOCIATED WITH CARDIOMETABOLIC RISK MARKERS IN OVERWEIGHT AND OBESE CHILDREN

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Background and objectives: More children are obese, exposing them to higher cardiometabolic risk. The study examined the relationships between liver biomarkers and cardiometabolic risk in overweight children.

Methods: Cross-sectional study in 222 overweight children (aged 7-11 years, 56% female, 58% black, 86% obese). Liver biomarkers included serum C-reactive protein (CRP), aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels, and the AST/ALT ratio was computed. Cardiometabolic risk markers included total body fat percentage (dual X-ray absorptiometry), visceral and subcutaneous abdominal adipose tissue (magnetic resonance imaging), fasting glucose and insulin, Matsuda index and insulinogenic index (2-hour oral glucose tolerance test), triglycerides (TG), high-density lipoprotein (HDL) and systolic blood pressure (SBP).

Results: Regardless of race or sex, AST/ALT decreased with the number of metabolic abnormalities and with higher adiposity, visceral and subcutaneous fat, Matsuda index, TG, TG/HDL ratio, SBP, and with lower HDL. The associations between lower AST/ALT and higher insulin, insulinogenic index and SBP were independent of total, subcutaneous and visceral adiposity (r=-.16 to -.22). ALT and CRP increased with the number of metabolic abnormalities. Higher ALT was significantly associated with greater body fat in boys (r=.22) and, independently of body fat, with higher insulin in whites and boys (r=.22 to .26), and with higher TG in blacks (r = .18 to .20). CRP was not associated with any marker of cardiometabolic risk after controlling for adiposity.

Conclusions: Lower AST/ALT was strongly and consistently associated with markers of cardiometabolic risk in overweight children, independent of sex, race, and adiposity. These findings suggest that the AST/ALT ratio should be evaluated further as a potential screening tool in children at risk for diabetes and cardiovascular disease. Acknowledgements: NIH R01 DK60692; R01 HL087923-03S1, P30 DK56336; PR2011-0535 from the Salvador de Madariaga Program of the Spanish Ministry of Education and Science.

Key words: Liver, insulin, adiposity, race.

PO2066

PREVALENCE OF METABOLIC SYNDROME IN THE SOUTHERN CONE OF LATIN AMERICA

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Background and objectives: Metabolic syndrome (MS) is characterized by a clustering of metabolic risk factors, including central obesity, glucose intolerance, hypertension, and atherogenic dyslipidemia, contributing to type 2 diabetes (DM2) and cardiovascular disease (CVD). Since the Southern Cone of Latin America (SCLA), a region completing nutritional transition, is undergoing large changes in lifestyle, epidemiological studies are needed. We aimed to estimate the prevalence and distribution of MS in a general adult population of the SCLA.

Methods: We conducted a population-based cross-sectional study on a multistage-probabilistic sample of 8,000 subjects aged 35-74 years old from four cities of Argentina (Bariloche and Marcos Paz (MP)), Chile (Temuco), and Uruguay (Canelones). MS was defined following NCEPATP III criteria that specifies ≥;3 of: waist circumference ≥;102 cm (men) or ≥;88 cm (women); elevated triglyceride (≥;150 mg/dl) or specific

treatment for dyslipidemia; reduced HDL-cholesterol of <40 mg/dl (men) or <50 mg/dl (women) or specific treatment, and elevated systolic BP (≥;130 mm Hg) or diastolic BP (≥; 85 mm Hg) or antihypertensive treatment; and fasting plasma glucose ≥; 100 mg/dl or self-reported diabetes.

Results: Of the adult population aged 35-74 yrs, 40.6 % (39.6% in men and 41.9% in women) had MS (MP: 42,7%; Bariloche: 38,3%; Temuco: 44,3%; and Canelones: 38,6). Age-specific prevalence of MS was 28.2 %, 40.9%, 50.6 %, and 55.3% among persons of 35-44, 45-54, 55-64 and 65-74 years of age, respectively.

Conclusions: We found a high prevalence of MS across the SCLA that showed little variation among sites, increased directly with age and inversely with level of education. These findings emphasize the urgent need to develop public health strategies for prevention and treatment of MS, to reduce the burden of CVD and DM2 in the SCLA.

Key words: Metabolic syndrome, prevalence, Latin America.

PO2067

EFFECTS OF RICE BRAN OIL AND PERILLA OIL ON DMH/DSS-INDUCED COLON CARCINOGENESIS IN RATS

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Background and objectives: Colon cancer is the third most common cause of cancer death in Taiwan. Dietary n-3 and n-6 fatty acids play important roles in inflammation-associated colon carcinogenesis. Perilla oil is a good source of n-3 fatty acids and rice bran oil has an anti-tumor activity. The purpose of this study was to investigate the effect of varying ratios of dietary n-6 and n-3 fatty acids on colon carcinogenesis using a chemically induced animal model.

Methods: Male Sprague-Dawley rats were fed a modified AIN-93G 14% high-fat diet: groups HF and DHF, 14% soybean oil; group D10, 14% perilla oil and rice bran oil with modified n-6 and n-3 ratio of 10; group D2.5, 14% perilla oil and rice bran oil with modified n-6 and n-3 ratio of 2.5. All rats except for group HF were induced colitis-associated colon carcinogenesis by 1,2-dimethylhydrazine (DMH)/dextran sodium sulfate (DSS). The severity of colitis was assessed using disease activity index (DAI). After 87 days, rats were sacrificed and colon tissues were removed to examine for preneoplastic aberrant crypt foci (ACF) and aberrant crypts (AC). Glutathione (GSH) levels were measured in colon and liver tissues.

Results: The DAI score of groups D10 and D2.5 were significantly lower than that of group DHF. Group D2.5 and D10 had significantly lower numbers of colonic ACF and AC than did group DHF. For antioxidant capacity, groups D2.5 and D10 had significantly higher colonic GSH levels than did group DHF. Moreover, group D2.5 had significantly higher hepatic GSH level than did groups DHF and D10.

Conclusions: These findings suggest that the combination of perilla oil and rice bran oil in diet with modified n-6 and n-3 ratio of 2.5 may delay colon carcinogenesis via anti- inflammatory and anti-oxidative mechanisms.

Key words: Colon cancer, rice bran oil, perilla oil.

PO2068

PREVALENCE AND RISK FACTORS FOR CARDIO-METABOLIC SYNDROME IN YOUNG ADULTS OF TABASCO, MEXICO

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Background and objectives: Currently, it is observed that young population has a high prevalence of metabolic conditions. One of these is the cardiometabolic syndrome (CMS), which has become the prelude to type 2 diabetes, coronary artery disease and stroke, by arteriosclerosis, being the leading cause of death in our country, and increasing the disease burden for health sector in forthcoming years. We aimed to determine the prevalence of cardiometabolic syndrome in young adults.

Methods: The following procedures were performed: Anthropometric measures, presence of Acanthosis Nigricans (AN), blood pressure, biochemical markers, and lifestyle assessment. CMS was diagnosed according to the FID.

Results: Study included 200 subjects (75.5% female and 24.5% male) average age 30.47 ± 10.92 years old. 25% of the population had SCM, 80.9% abdominal obesity, 35.5% AN; there were increases in systolic blood pressure 4.0%, diastolic blood pressure 6.1%, Total cholesterol 35.7%, triglycerides 52.8%; low HDL cholesterol 43.7%, mild physical activity 58.5% and 21.4% consume soft drinks in a daily basis.

Conclusions: Interventions are needed in lifestyle to stop the increasing incidence of SCM in young people, to prevent impairment of life quality and life expectancy.

Key words: Risk Factors, cardiometabolic syndrome, obesity.

PO2069

ORAL TREATMENT WITH GABA IMPROVES THE SPLEEN AND PBMC IMMUNE DISTURBANCE IN OBESE MICE

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Background and objectives: Tregs are potent inhibitors of insulin resistance and chronic inflammation in long-term HFD-induced obesity and T2DM model. Four weeks of oral treatment with GABA gave rise to significant increase of Tregs in spleen, but just short-term of intervention could not compensate the self-defence of the immune system throughly. The aim of our research was to determine whether there was any disturbance in T regulatory cell number and function when we employed the long-term HFD-induced obesity and T2DM model and treated orally with GABA.

Methods: All C57BL/6 male mice were divided into four groups: control group was fed with normal diet, high fat group was fed with high fat diet (containing 20% lard oil) (HFD), two GABA groups were fed with HFD and water containing 2 mg/mL and 0.6 mg/mL GABA, respectively. The percentage of Treg cells and CD4+/CD8+ ratio in spleen and PBMC were evaluated. Each type of cell was separated for real-time RT-PCR analysis.

Results: After 20 weeks of HFD treatment, mice gained significant body weight ($P<0.01$). Tregs in spleen and PBMC were significantly decreased in HFD mice ($P <0.05$), while GABA significantly increased it in both spleen and PBMC ($P <0.05$). HFD significantly decreased CD4+/CD8+ ratio ($P <0.05$) which was reversed by GABA to controls level. Mice weight negatively correlated to the frequency of Tregs both in spleen and PBMC. Several genes that were crucial for Treg structure, function and survial including OX-40, 4-1BB, SOCS2, fas were abnormaly expressed in high fat food fed mice ($P <0.05$). GABA significantly inhibited disorder of these gene expression ($P <0.05$).

Conclusions: GABA improved the long-term HFD-induced immune disturbance.

Key words: Treg, GABA, CD4+/CD8+, immune disturbance.

PO2070

RESVERATROL REVERSED THYROID HORMONES AND LIPID METABOLISM DISORDER INDUCED BY HIGH-FAT DIET: POSSIBLE ROLES FOR GSK-3β AND NRF2

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Background and objectives: The mechanisms by which resveratrol exerts its antioxidative effects on thyroid hormones (TH) and lipid metabolism are not completely understood. Oxidant injury and TH can both activate the PI3K and Akt. GSK3β, a downstream of PI3K/Akt pathway, is a negative regulator of Nrf2 activity. The research tries to clarify the effect of high-fat diet (HFD) with or without resveratrol on TH and lipid metabolism at different periods, and the potential mechanisms related with GSK3β- Nrf2 pathway.

Methods: C57BL/6 female mice were fed control, HFD and HFD plus 0.06% resveratrol, and then they were sacrificed and studied at the end of 1st, 3rd, 6th, 13th and 26th week respectively.

Results: HFD induced TH disorder in plasma, which characterized by significant elevation of plasma T3 and T4 from the 3rd to 13th week and decline at the 26th week, plasma TSH was significantly increased from 1st to 26th week together with type 1 deiodinase activity in liver decreased at 26th week in HFD group. Furthermore, the expression of GSK3β was significantly reduced by HFD at the 6th week, but up-regulated at the 26th week. The mRNA expression of Nrf2 and its target genes were significantly higher in HFD group than those in control group. The balance of redox state in liver was disrupted by HFD at the end of 3rd week, lipid profiles were significantly elevated at the 26th week in HFD-fed mice. Resveratrol significantly relieved TH disorder and oxidative stress, down-regulated GSK3β and Nrf2 and recovered dyslipidemia.

Conclusions: Resveratrol significantly reversed TH level, which could induce GSK3β-Nrf2 pathway by activating PI3K, and this might be one mechanism of recovering dyslipidemia.

Key words: High-fat diet resveratrol thyroid hormone GSK3β, Nrf2.

PO2071

GAMMA-LINOLENIC ACID IMPROVES PALMITATE-INDUCED INSULIN RESISTANCE IN C2C12 SKELETAL MUSCLE CELLS VIA AMPK/AS160 PATHWAY

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Background and objectives: It is well documented that lipid oversupply to skeletal muscle is related to the development of insulin resistance. In this study, we explored the effect of gamma-linolenic acid (GLA), an n-6 polyunsaturated fatty acid, on palmitate (PA) induced insulin resistance in C2C12 skeletal muscle cells.

Results: In presence of insulin, 750 μM PA could decrease glucose uptake via down-regulation of phosphorylation of AMP-activated protein kinase (AMPK), AKT, AS160, and glucose transporter 4 (GLUT4) translocation in C2C12 skeletal muscle cells. Addition of 100 μM GLA improved the PA-induced decrease of phosphorylation of AMPK, AKT and AS160 as well as GLUT4 translocatoin and glucose uptake stimulated by insulin. In skeletal muscle, AMPK plays a critical role in glucose metabolism. Reduction of AMPK expression using lentiviruses infection significantly decreased the ameliorative effects of GLA against PA-induced insulin resistance in C2C12 skeletal muscle cells.

Conclusions: In summary, our data suggested that GLA through AMPK/AS160 pathway diminished PA-induced insulin resistance in C2C12 skeletal muscle cell.

Key words: Gamma-linolenic acid, insulin resistance, AMPK, AS160.

PO2072

DIETARY GERANYLGERANIOL ALLEVIATES ATOPIC DERMATITIS IN NC/NGA MICE

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Background and objectives: Geranylgeraniol (GGOH) is the alcohol form of the side chain of Vitamin K1. GGOH has been shown to decrease NFκB expression and suppress inflammation. NFκB expression is one of the most important factors associated with the onset of atopic dermatitis. Therefore, dietary GGOH is expected to alleviate atopic dermatitis. In this study, our objective was to validate the effect of GGOH on atopic dermatitis.

Methods: Five week-old male NC/Nga mice were assigned to one of 4 dietary groups as follows: (1) Control diet, (2) Control diet with picryl chloride swabbing on the dorsal skin, (3) 0.05% GGOH diet with picryl chloride swabbing, and (4) 0.5% GGOH diet with picryl chloride swabbing. The diets were designed according to the AIN-93G compositions and were provided to the mice ad libitum. The condition of the dorsal skin was monitored throughout the experimental period. The animals were dissected after 6 weeks, and then the livers, white adipose tissue, and spleens were weighed. The plasma levels of IgE, INF-γ, and IL-4 were also determined. Cross sections of the dorsal skin were stained with HE and then observed under a light microscope.

Results: Inflammation in the dorsal skin was significantly reduced in the 0.5% GGOH group than in the other 2 swabbed groups. Dietary GGOH suppressed atopic dermatitis-induced hyperplasia of the epidermis. Moreover, plasma levels of IgE as well as spleen weight were lower in the 0.5% GGOH group than in the other 2 swabbed groups.

Conclusions: Dietary GGOH appears to alleviate atopic dermatitis, and this beneficial effect might be exerted via the suppression of NFκB.

Key words: atopic dermatitis, geranylgeraniol, IgE.

PO2073

INVOLVEMENT OF THE ESTROGEN RECEPTOR AND PI3K/AKT SIGNALING PATHWAYS IN S(-)-EQUOL-INDUCED ACTIVATION OF NRF2/ARE IN ENDOTHELIAL CELLS

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Background and objectives: S(-)-Equol is a natural product of daidzein produced by human gut, which has potential benefits in cardiovascular diseases. We determined whether S(-)-Equol activates Nrf2 during oxidative stress and explored the role of Nrf2 in attenuating the damage of endothelial cells caused by oxidative stress.

Methods: Primary endothelial cells were pretreated with S(-)-Equol (10nM-250nM), dual luciferase reporter gene assay was used to determine the Nrf2-ARE-Luc activity. Nrf2, HO-1 and NQO1 were analyzed using western blot assay and their mRNA levels were analyzed by real-time PCR assay. Cells were pretreated with specific inhibitors for estrogen receptor (ER) (ICI182,780), PI3K/Akt (LY294002), and ERK1/2 (PD98059) followed by treatment with S(-)-Equol, Nrf2, HO-1 and NQO1 levels were analyzed using western blot assay. Cells were preincubated with H2O2 or tBHP followed by S(-)-Equol, cell viability was determined using CCK-8 assay and cell aopoptosis was analyzed using flow cytometry and TUNEL assay. CCK-8

analysis was conducted after Nrf2 gene interfered with siRNA followed by pretreatment with S(-)-Equol and H2O2.

Results: S(-)-Equol treatment resulted in the induction of an ARE-luciferase reporter gene and this upregulation was both dose and time dependent. S(-)-Equol increased Nrf2, HO-1 and NQO1 levels. S(-)-Equol treatment affected Nrf2 mRNA levels only slightly but caused a significant increase in HO-1 and NQO1 mRNA levels. Preincubation followed by co-treatment with S(-)-Equol significantly improved cell survival in response to H2O2 or tBHP. Such treatment also reduced number of apoptotic cells and TUNEL-positive-stained cells. S(-)-Equol-mediated protection of cells against H2O2-induced cell apoptosis was attenuated in cells transfected with an siRNA against Nrf2.

Conclusions: S(-)-Equol attenuated cell oxidative stress-induced injury through Nrf2/ARE antioxidant mechanism involving ER or PIK3/Akt signaling pathway.

Key words: S(-)-Equol, Endothelial cell, Nrf2.

Acknowledgements: Supported by the National Natural Science Foundation of China (No. 81102129) and Chongqing City (No. cstc2011jjA1532).

Key words: S(-)-Equol, PIK3/Akt signaling pathway, estrogen receptor.

PO2074

INITIATION OF AUTOPHAGY THROUGH UNFOLDED PROTEIN RESPONSE DURING CANCER-PREVENTIVE GERANYLGERANOIC ACID-INDUCED CELL DEATH OF HUMAN HEPATOMA CELLS

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Background and objectives: Precision of anthropometric measurements is affected by human error and instrument quality, which influence the magnitude of detectable changes over time and in response to intervention. However, measurement error is rarely reported or even assessed in child growth studies.

Methods: As part of a longitudinal trial to evaluate the impact of zinc supplementation among Burkinabe children 6-30 mo old, 4 teams of 2 anthropometrists were trained to measure height, weight and mid-upper arm circumference (MUAC) according to WHO recommendations. Throughout the 15 mo of study, regular retraining and 13 standardization sessions were completed by recruiting 10-12 children measured twice by each team. The square root of the measurement error variance defined the technical error of measurement (TEM).

Results: TEM for child length across all standardizations (n=132 children) was 0.43 cm; this fluctuated between 0.27 and 0.67 cm throughout the study and permitted detection of a true change of 1.2 cm (range: 0.8-1.9) with 95% confidence (95%DC). The TEM for weight was 45 g (range: 30-105; 95%DC range: 86-297) and for MUAC was 2 mm (range: 1-4; 95%DC range: 2-10). During the intervention, 10,333 16-wk growth intervals and 2,547 48-wk intervals were assessed. TEM accounted for 38%, 19% and 213% of the mean 16-wk changes in length, weight and MUAC, respectively; and 12%, 6% and 69% of the respective mean 48-wk changes.

Conclusions: Regular training, supervision and standardization throughout a 48-wk trial increased the precision of anthropometric measures used for impact evaluation. Despite this, MUAC was inappropriate to measure 16-wk changes. TEM results can be used to select proper outcome indicators, evaluate staff/instrument performance and compare efficiencies of using longer time intervals versus larger sample sizes in planning trials with growth outcomes.

Acknowledgements: Supported by Thrasher Research Fund and Canadian International Development Agency.

Key words: Anthropometry, child, measurement error.

PO2074

INITIATION OF AUTOPHAGY THROUGH UNFOLDED PROTEIN RESPONSE DURING CANCER-PREVENTIVE GERANYLGERANOIC ACID-INDUCED CELL DEATH OF HUMAN HEPATOMA CELLS

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Key words: anthropometry, child, measurement error. Supported by Thrasher Research Fund and Canadian International Development Agency.

PO2075

LYCOPENE CONTENT OF THE EGYPTION FOODSTUFFS, DAILY INTAKE ESTIMATION AND COMPLICATIONS DEVELOPMENT OF TYPE II DIABETES MELLITUS, RATS MODEL

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Background and objectives: In spite of the interest in the role of potent antioxidant properties of lycopene in the prevention of chronic diseases, little is known about the lycopene content of the Egyptian foodstuffs and the contribution of these products to the intake of lycopene. This work aimed to determine lycopene content of Egyptian foodstuffs, estimate daily lycopene intake and investigate the possible role of lycopene in development of type II diabetes mellitus complications, regarding the effects of angiotensin-converting enzyme (ACE) activity.

Methods: The lycopene content was estimated by HPLC method, and provided to Egyptian representative sample population based on national survey to estimate the daily intake. We investigated HbA1C and the expression of ACE in a rat model of type 2 diabetes (D), diabetes + lycopene (DL, 45 mg/kg single-dose streptozotocin, and 10 mg lycopene/kg/day), lycopene (L) and healthy (H) groups for 28 days.

Results: The average intake levels of lycopene in Egypt are higher than the levels required for its beneficial biological effects, with different variations between different populations (socio-economic- rural-urban). The main sources of lycopene were fresh tomatoes with highly percentage contribution of the total amount of this carotenoid in the diet. Blood glucose levels and HbA1c% in (D) and (DL) groups increased significantly compared to (H) and (L) groups. ACE activity in the (H & DL) groups was significantly lower than in the (L &D) groups, respectively.

Conclusions: These results have implications for the evaluation of the daily intake of lycopene in Egypt and raise important questions for establishing a recommendation for optimal daily lycopene intake. Lycopene intake inhibits the plasma ACE activity, a potential marker of development of diabetic complications particularly diabetic renal disease and hypertension.

Key words: lycopene content,egypt,daily intake,type II diabetes,ACE activity

PO2076

EFFECT OF PAPAYA YOGHURT (CARICA PAPAYA) TO SERUM LIPID PROFILE LEVEL OF HYPERLIPIDEMIC SPRAGUE DAWLEY RAT MODEL

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Background and objectives: Hyperlipidemia increases risk of cardiovascular disease. Antihyperlipidemia drugs are quite expensive and have side effects in long term usage; therefore the result of therapy is still not satisfied. An alternative food expected to be an antihyperlipidemia is papaya yoghurt. The objective of the experiment is to understand the effect of papaya yoghurt (Carica papaya) to the lipid profile of hyperlipidemic rats.

Methods: Adult male Sprague-Dawley rats aged 2 mo and weighed 200-250 g were used for this experiment. All 5 groups were received 30days high-fat diet. Per treatment-group 5 rats were tested. Treatment with distilled water to group I, cholestyramine 0.072 mg to group II, papaya yoghurt 4.5 mL/kgBW to group III, papaya yoghurt 9 mL/kgBW to group IV, and papaya yoghurt 18 mL/kgBW to group V, was given for 28 days, three times a day. The observation of lipid profile (total cholesterol, HDL, LDL, and triglyceride) was performed at day 0, 14, and 28, and then was compared between groups.

Results: Papaya yoghurt could optimally decrease serum total cholesterol up to 53,14%, triglyceride up to 37,41%, and LDL level up to 44,20%, and could increase serum HDL level up to 66,12% in all samples for 14 and 28 days treatment ($p < 0,05$). It is known that the mechanisms for improving the lipid profile level are via inhibition of cholesterol absorption and

conversion of cholesterol into coprostanol that is excreted with feces.

Conclusions: Our data show that papaya yoghurt could significantly improve level of the lipid profile in hyperlipidemic rat ($p < 0,05$), but papaya yoghurt could improve level of the lipid profile more efficiently compared to cholestyramine in 14 days treatment, whereas, cholestyramine was still the most effective in 28 days treatment.

Key words: hyperlipidemia, lipid profile, papaya yoghurt.

PO2077

VEGETABLES AND PLANT OIL IMPROVE RISK FACTOR FOR SECONDARY COMPLICATIONS IN SUBJECTS WITH TYPE 2 DIABETES

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Background and objectives: Diabetes is a growing health care problem worldwide. Epidemiological studies emphasize the role of glycemic control in T2DM subjects to prevent later complications. The diet has major impact on the onset and progress of diabetes related complications. Therefore a human intervention study was performed to investigate the ability of a nutritional therapy to modify risk factors associated with diabetes.

Methods: Seventy six diabetic and 21 non-diabetic individuals participated in this parallel, randomized, intervention-study. All participants received information about the importance of a healthy diet, while participant randomly assigned to the intervention group received additionally 300 g of vegetables and 25 ml of plant oil rich in polyunsaturated fatty acids per day for 8 weeks. Glycated hemoglobin (HbA1c) and parameters of lipid metabolism were measured at baseline, after 4 and 8 weeks.

Results: Glycemic control improved significantly after four and eight weeks of intervention in diabetic subjects. Surprisingly HbA1c was also significantly reduced after 8 weeks in diabetic individuals, receiving information about the benefits of a healthy diet. Levels of HbA1c remained constant in healthy subjects. Total cholesterol and LDL were significantly reduced after 8 weeks of intervention in diabetic and healthy subjects. Triglycerides and HDL were not changed during the intervention. There were no significant effects on parameters of lipid metabolism in subjects of the information group.

Conclusions: A nutritional intervention with vegetables in combination with a plant oil rich in polyunsaturated fatty acids has beneficial effects on glycemic control and lipid metabolism of diabetic subjects. Even information about health benefits of a balanced diet has impact on glycemic control.

Key words: diabetes mellitus, glucose metabolism, lipid metabolism

PO2078

DIETARY LIPID DYNAMICS IN THE THORACIC LYMPH REGULATED BY FOOD COMPONENTS AND DRUG IN THE INTESTINAL LUMEN

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Background and objectives: Metabolic syndrome (MetS) is a cluster of metabolic disorders and contributes to the increase in cardiovascular morbidity and mortality. Dietary lipids have been recognized as contributing factors to the development or prevention of MetS. Absorbed dietary lipids in the intestine are secreted into the lymph and then transported to the bloodstream via the thoracic lymph duct. It is unclear how dietary lipid dynamics in the thoracic lymph are associated with the development of MetS. Therefore, we evaluated dietary lipid dynamics in the lymph regulated by a pancreatic lipase inhibitor (kakrol, a cucurbitaceous vegetable native to Bangladesh), an inhibitor of cholesterol absorption via NPC1L1 (ezetimibe, a hypocholesterolemic drug), and a water retention substance (guar gum, a water-soluble dietary fiber), which act in the intestinal lumen using thoracic lymph duct cannulation method.

Methods: Sprague-Dawley rats were trained to consume a control diet twice daily and then operated on to cannulate the thoracic lymph duct. The rats were fed each control diet or experimental diet, and their lymph was collected after feeding to quantify lipid levels. In each experiment, there were no significant differences in body weight and food intake between the control and experimental groups.

Results: Lymphatic triacylglycerol transports in the kakrol- and guar gum-fed rats were significantly decreased. Lymphatic total cholesterol transports in the kakrol, ezetimibe, and guar gum-fed rats were significantly decreased. The pancreatic lipase inhibitor significantly decreased lymphatic lipid transport without changing lymph flow. In contrast, the water retention substance significantly decreased lymphatic lipid transport via the reduction of lymph flow.

Conclusions: As comprehending the differences of dietary lipid transport in the lymph depending on food components and drugs, we may gain new insight into the prevention of MetS via the regulation of lymphatic dietary lipid dynamics.

Key words: lymphatic dietary lipid transport, metabolic syndrome

PO2079

MASTICATION EFFECTS ON GLYCAEMIA: PRACTICAL IMPLICATIONS FOR DIET ADVOCACY

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Background and objectives: The glycemic index (GI) is a well-established dietary tool that enables people to make healthier food choices. However, glycemic variability is a persistent observation that challenges the accuracy and use of the GI. We were interested in seeing if mastication contributed to these variations. The objective of the current study was to determine the role of mastication on glycemic response (GR) and GI. Rice was used as the test food as it is the most common staple eaten in the world and has been implicated in the diabetes epidemic.

Methods: The study adopted a randomized, controlled, cross-over, non-blind design and used 15 healthy subjects (8 males and 7 females, mean (±SD) age 26±6) who returned on five separate days for three glucose and two test rice sessions. At the rice sessions, subjects chewed each mouthful 15 and 30 times. Mastication frequency was measured with real-time electromyograms recorded using bipolar surface electrodes attached to the masseter muscles. Subjective feelings of satiety were measured with visual analogue scales.

Results: Rice chewed to a lesser extent produced a total GR (155 mmol.min/L), peak GR (2.4 mmol/L) and GI (68) significantly lower than when chewed for longer (184 mmol.min/L, 2.8 mmol/L and 88 respectively). There was no effect of mastication on satiety.

Conclusions: The study shows that mastication influences GI and contributes to variations. This is the first record to show that the GI can be affected by an intrinsic human factor although it is by definition a food property independent of such variables. It also shows that rice GR can be reduced by a simple alteration in mastication. This has significant public health implications especially in rice eating societies where it contributes a large glycemic load and increases disease risk.

Key words: glycemic response, gGlycemic Index, rice, mastication, diabetes.

PO2081

EFFECT OF A DIET-INDUCED WEIGHT LOSS PROGRAM ON CARDIOMETABOLIC RISK IN OVERWEIGHT AND OBESE ADULTS

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Background and objectives: Obesity is a risk factor for diabetes and cardiovascular disease. However, small weight losses of 5-7% are associated with significant improvements in health. The goal of this study was to assess the effect of a diet-induced weight loss program on cardiometabolic risk in overweight and obese adults.

Methods: Anthropometric and clinical parameters and body composition (bioelectric impedance) were analyzed before and after a 4 mo diet-induced weight loss program at University of São Paulo´s Hospital, Brazil. Patients that modified their lipid, glucose or blood pressure drugs during the study were excluded. According weight and body fat percentage changes, patients were stratified in three groups. Results were analyzed using Wilcoxon test (SPSS 17.0).

Results: Thirty-five patients participated of the study (80% females). The mean age was 41 y and mean BMI was 33.7 kg/m2. Twenty patients lost weight, with median percent of weight loss (%WL) of 1.83%. Patients with %WL between 0 and 1.83% (%WL median = 0.6%) presented reductions in BMI (p = 0.017) and diastolic blood pressure (DBP) (p = 0.017). Patients with %WL > 1.83% (%WL median = 3.11%) presented reductions in BMI (p = 0.005), waist circumference (CC) (p = 0.005), DBP (p = 0.028), LDL (p = 0.017), glucose (p = 0.036), insulin (p = 0.032) and HOMA-IR (p = 0.013). Regarding body fat percentage variations (%BF), 25 patients showed reduction (median %BF = -0.51%). Patients with %BF between 0 and -0.51% (median %BF =-0.36%) presented reductions in LDL (p = p = 0.019) and DBP (p = p = 0.045). Patients with %BF < -0.51% (median %BF= -0.74%) presented reductions in BMI (p = 0.028), DBP (p = 0.022), LDL (p = 0.002), total cholesterol (p = 0.009), insulin (p = 0.010) and HOMA-IR (p = 0.006). Patients who gained weight or body fat showed no improvements in anthropometric or clinical parameters.

Conclusions: A 3.1% weight loss and a 0.75% body fat reduction due to the weight-loss program were already sufficient to improve cardiometabolic risk in these patients.

Key words: obesity, diet, cardiovascular disease.

PO2082

EFFECTS OF COFFEE INTAKE ON INSULIN SIGNALLING PATHWAY IN SKELETAL MUSCLE OF HIGH FAT DIET INDUCED OBESE MICE

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Background and objectives: Emerging epidemiological studies have reported that coffee consumption may reduce the risk of Type 2 Diabetes (T2D). Our previous experiments in vivo showed that coffee intake suppressed elevated body weight gain and tended to alleviate insulin resistance induced by high fat diet. The objective of this study was to identify potential mechanisms underlying the influences of coffee intake on insulin signal in skeletal muscle.

Methods: 8-week old male C57BL6/J mice were raised for 9 weeks ad libitum on either a normal diet (ND), a high fat diet (HF), or high fat diet containing 2% freeze-dried caffeinated coffee (HFCC), or 2% freeze-dried decaffeinated coffee (HFDC), or 2% freeze-dried green unroasted coffee (HFGC). Protein and total RNA were extracted from skeletal muscle and subjected to Western blotting and microarray analysis (Mouse Genome 230 2.0, Affymetrix), respectively.

Results: Western blotting analysis revealed suppression of insulin-dependent tyrosine phosphorylation of IRS-1 and the levels of IRS-1 bound p85 by high fat diet was ameliorated in HFCC and HFGC. Ser473 phosphorylation of Akt/Pkb was also improved in HFCC. Microarray and qPCR results showed that the expression level of the gene for activating transcription factor 3 (ATF3), which is known to be induced by high glucose and high fatty acids, was down-regulated in HFCC. In addition, the expression level of suppressor of cytokine signalling 3 (SOCS3) which is related to insulin resistance in obese subjects was also decreased in HFCC and HFGC.

Conclusions: Western blotting analyses and gene expression profiles have elucidated that coffee modulates the insulin signaling pathway in skeletal muscle, thereby improving insulin resistance. These findings provide the insight that coffee intake may contribute to better management of T2D.

Key words:coffee intake, insulin signaling pathway, ATF3, SOCS3.

PO2083

SELF-REPORTED RATE OF EATING IS ASSOCIATED WITH ACCUMULATED VISCERAL FAT AND CIRCULATING ALT ACTIVITY IN MIDDLE-AGED APPARENTLY HEALTHY JAPANESE MEN

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Background and objectives: Elevated circulating alanine aminotransferase (ALT) and the accumulation of fat, particularly visceral fat, in healthy and preclinical subjects are reportedly associated with increased risk for metabolic diseases such as diabetes. In this study, we examined whether self-reported rate of eating is associated with accumulated visceral fat and elevated circulating ALT activity in middle-aged men.

Methods: We conducted a cross-sectional study of apparently healthy Japanese men aged 30-64 years who participated in health checkups. Associations between self-reported rate of eating and ALT, other clinical parameters or lifestyle factors were determined in 3,929 men by multivariate logistic regression analyses (MLRA). CT-scan of visceral and subcutaneous fat area was conducted for 320 subjects, and these data were subjected to analysis of covariance (ANCOVA), followed by MLRA with independent variables that included self-reported rate of eating.

Results: ANCOVA showed that self-reported rate of eating was significantly associated with BMI, diastolic blood pressure, LDL-cholesterol, as well as visceral and subcutaneous fat areas after adjustment for age, energy intake, alcohol intake, physical activity and smoking status. MLRA showed that among the lifestyle factors, higher self-reported rate of eating was the only variable that was significantly associated with visceral fat area, while alcohol intake was another major variable associated with subcutaneous fat area. Circulating ALT activity also showed an association with higher self-reported rate of eating, but the association between ALT activity and self-reported rate of eating disappeared after adjustment for BMI.

Conclusions: These results suggest that self-reported rate of eating is positively associated with accumulation of visceral fat, and as a consequence, with circulating ALT activity in middle-aged apparently healthy Japanese men.

Key words: self-reported rate of eating, visceral fat, subcutaneous fat, ALT, health checkups.

PO2084

RUTIN HAS BENEFICIAL EFFECTS IN THE CD4+CD62L+ T CELL TRANSFER INDUCED MODEL OF COLITIS IN THE MOUSE.

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Background and objectives: The flavonoid rutin has colonic antiinflammatory activity in chemically induced models of colitis. However these have been claimed to have important mechanistic differences with the human disease. The CD4+CD62L+ T cell transfer model shares many pathological features with human inflammatory bowel disease and has the advantage of being a strictly chronic and T lymphocyte driven model of colitis. Hence we have investigated the effects of rutin in this model.

Methods: CD4+CD62L+ T cells were isolated from wild type C57B6 mice splenocytes by magnetic separation (Miltenyi Biotec). 106 cells were injected intraperitoneally to RAG1 mice to induce colitis. For comparison, a PBS control was also employed. This colitis model produces a disruption of T cell homeostasis, resulting in large and small bowel inflammation at 5-8 weeks after T cell transfer. Treatment was started in animals with diarrhea and significant body weight loss. Experimental groups: wild type (WT), transference control (injected with PBS), colitis and rutin (28.5 mg/kg). Rutin (or vehicle) were administered by gavage.

Results: the colitis group showed significant changes in all the parameters examined compared with the WT and transference control groups. Rutin was effective in dampening the inflammatory response in the intestine, as evidenced by lower body weight loss (-20.2±2.5 vs -4.4±1.2), significantly decreased mesenteric cytokine expression, especially TNF-α and IFN-γ, (123.4±64.7 vs 94.9±31.5 pg/ml and 401.4±119.7 vs 143.8±8.3 pg/ml) and microscopic parameters. Alkaline phosphatase and myeloperoxidase activities in colon were not significantly reduced.

Conclusions: rutin has beneficial effects in the T cell transfer colitis model in mice, indicating that it has colonic antiinflammatory activity in lymphocyte driven colitis.

Key words: rutin, T cell transfer colitis model, flavonoid, inflammatory bowel disease.

PO2085

EFFECT OF THE INTAKE OF A HIGH-FAT SUCROSE DIET ON GUT MICROBIOTA COMPOSITION IN RATS

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Background and objectives: Intestinal microbiota has been recently considered as an important factor related to obesity. Gut microbiota is altered as a consequence of a long-term dietary manipulation, which could have a metabolic impact and affect host health. In this sense, the understanding of the diet-responsive groups of bacteria could give valuable information to treat diet-induced obesity and accompanying inflammatory complications. Therefore, the aim of this study was to investigate the effect produced by the intake of a high-fat sucrose diet on gut microbiota composition in rats.

Methods: Male Wistar rats were fed on a high-fat sucrose (HFS) diet during 6 weeks. Feces were freshly collected at baseline and at the end of the treatment. DNA was extracted and analyzed by RT-qPCR. Specific primers for the following groups of bacteria were used: Bacteroidetes, Bacteroides-Prevotella, Clostridium coccoides- Eubacterium rectale, Bifidobacterium spp., Lactobacillus group, Enterobacteriaceae and Actinobacteria.

Results: High-fat sucrose diet treatment significantly ($p < 0.05$) reduced the levels of Bacteroidetes and Clostridium coccoides-Eubacterium rectale. However, no statistical differences were found in Lactobacillus spp., Bifidobacterium spp., Bacteroides- Prevotella, Actinobacteria and Enterobacteriaceae levels at the end of the study when compared to the baseline.

Conclusions: This study showed that the intake of an obesogenic diet rich in fat and sucrose induces changes in the populations of gut microorganisms, confirming that diet is shaping the composition of gut microbiota. HFS diet-induced obesity is accompanied by lower levels of one of the major bacterial phyla in mammalian gut microbiota.

Key words: microbiota, diet-induced obesity, gastrointestinal tract, RT-qPCR.

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PO2086

EFFECT OF AHCC ON CD4+CD62L+ T CELL-TRANSFER INDUCED COLITIS IN RAG MICE

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Background and objectives: a major advancement in our understanding of the pathogenesis of inflammatory bowel diseases (IBD) has been the development of mouse models of chronic gut inflammation. The CD4+CD62L+ T cell transfer model shares many pathological features with human IBD and has the advantage of being a strictly chronic and T lymphocyte driven model of colitis. We tested the antiinflammatory effects of active hexose correlated compound (AHCC), a nutritional supplement prepared from the mycelium of edible Basidiomycete fungi that contains a 74% of oligosaccharides, specially β-glucans.

Methods: CD4+CD62L+ T cells were isolated from wild type C57B6 mice splenocytes by magnetic separation (Miltenyi Biotec). 106 cells were injected intraperitoneally to RAG1 mice to induce colitis. For comparison, a PBS control was also employed. This colitis model produces a disruption of T cell homeostasis, resulting in large and small bowel inflammation at 5-8 weeks after T cell transfer. Treatment was started in animals with diarrhea and significant body weight loss. Experimental groups: wild type (WT), transference control (injected with PBS), colitis and AHCC (714 mg/kg). AHCC (or vehicle) were administered by gavage.

Results: the colitis group showed significant changes in all the parameters examined compared with the WT and transference control groups. AHCC treated mice displayed a lower body weight loss (-20.2±2.5 vsvs -6.6±2.2) and intestinal weight/length ratio. A macroscopic evaluation of the intestinal segments also revealed an improved damage score (1.9±0.3 vs 1.7±0.3). Ex vivo production of proinflammatory cytokines by mesenteric lymph node cells was also significantly decreased (TNF-α 123.4±64.7 vs 92.1±30.2 pg/ml; IFN-γ 401.4±119.7 vs 344.9±135.2 pg/ml; IL-17 129.2±14.9 vs 23.3±10.7 pg/ml).

Conclusions: AHCC has beneficial effects in the CD4+CD62L+ T cell transfer model of colitis.

Key words: T cell transfer colitis model, AHCC, inflammatory bowel disease.

PO2087

THE ASSOCIATION BETWEEN BODY MASS INDEX AND BLOOD PRESSURE AMONG SCHOOL CHILDREN IN MALAYSIA

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Background and objectives: Childhood overweight and obesity have become a common nutrition-related health problem and have been associated with a higher risk of hypertension. A cross-sectional study was conducted to determine the prevalence of obesity and hypertension and to evaluate the association between obesity and blood pressure in school children in Malaysia.

Methods: 315 boys and 357 girls aged 9-10 y (mean age, 9.6±0.5 years) in the states of Selangor and Kuala Lumpur participated in this study. Multi-stage stratified random sampling was used to select the participants. The children were classified on the basis of age and sex-specific BMI percentile as normal weight (< 85th percentile), overweight (≥ 85th and < 95th percentile) or obese (≥ 95th percentile) while hypertension was defined using National High Blood Pressure Education Program (NHBPEP) cut-off percentiles.

Results: The mean BMI for boys and girls were 21.4±5.7 and 19.1±4.6 kg/m2 respectively. The mean systolic blood pressure (SBP) for boys and girls were 103±13 and 99±12mmHg respectively while the mean diastolic blood pressure (DBP) for boys and girls were 63±11 and 60±9mmHg respectively. The results revealed a high prevalence of overweight (22.6%) and obese (18.1%) children. The prevalence of hypertension among the children was 10.9%. Obese children were more likely to have hypertension (OR=15.6, $p < 0.001$). Logistic regression analyses showed child's BMI was significantly associated with increased odds of hypertension across gender (all $p < 0.005$) except for SBP in girls.

Conclusions: There is an urgent need of having health intervention programs to address the problem of obesity in children in order to reduce the risk of developing hypertension.

Key words: BMI, childhood obesity, hypertension, children, dietary intake

PO2088

WEIGHT LOSS AND DIET CHANGE AS RESULT OF A 12-WEEK DIET AND PHYSICAL ACTIVITY INTERVENTION IN BREAST CANCER SURVIVORS

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Background and objectives: Observational and experimental evidence suggests that energy restriction from a low-calorie diet and increased energy expenditure induced by physical activity (PA) could promote weight loss/maintenance that might be an important determinant of breast cancer (BC) prognosis. The aim of the present study was to assess the feasibility and effects of a diet and PA intervention designed to induce weight loss in BC survivors.

Methods: The intervention of this 12-week single-arm pre-post pilot study involved group-based sessions: one-hour weekly diet sessions delivered by a nutritionist and 75-minute bi-weekly PA sessions of moderate-to-high intensity led by experienced PA monitors. This intervention, conducted at the Catalan Institute of Oncology (Barcelona, Spain), in spring 2012, was targeted at overweight and obese women, aged 18 to 75 y, who had recently (up to 6 months previously) completed chemotherapy and/or radiotherapy for a non-metastatic BC. Before and after the intervention, anthropometry was measured and three 24-hour recalls were obtained.

Results:A total of 113 BC survivors were identified through hospital records and invited to participate and 42 of them, aged 33 to 70 y, signed the informed consent form and started the intervention. Among the 37 women who completed the intervention, we observed a significant average weight loss of 5.62 kg (sd = 2.04), as well as significant decreases in body mass index, fat mass and waist and hip circumferences. Significant decreases in total energy (-27%), fat (-39%), saturated fat (-44%) and carbohydrates (-24%) were also observed, while no differences were found for protein or fiber.

Conclusions: This pilot study demonstrated the success of a short-term lifestyle intervention based on diet and PA to induce weight loss and promote healthful changes in dietary habits in BC survivors. Further study is needed to determine the possible impact of this lifestyle change on BC prognosis.

Key words: BC, seweight loss, diet.

PO2089

EFFECTS OF ALPERUJO EXTRACT ON β-CELL FUNCTION UNDER STRESS WITH GLUCOSE AND HYDROGEN PEROXIDE.

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Background and objectives: Alperujo, an olive mill waste is a by-product rich in polyphenols, with a role as antioxidants, that could protect the organism against oxidative damage as occurs in Type 2 diabetes. The aim of the study was to investigate the antioxidant properties of alperujo extract (AE) on β-cells challenged with glucose and hydrogen peroxide (H2O2).

Methods: MIN6 cells were cultivated with DMEM as follow: 1) Pre-incubation with 20 μM of total phenol from AE for 3 days and then challenge with glucose (100 mM) or H2O2 (0.15 mM) for 24 hours; 2) Pre-incubation with glucose (100 mM) or H2O2 (0.15 mM) for 5 days with and without AE. After that, we determinate insulin and reactive oxygen species (ROS) production, intracellular iron and mRNA expression of BAX, BCL-2, Thioredoxin and UCP-2 genes by qRT-PCR.

Results: Insulin production increased in pre-incubated cells with AE and in those challenged with glucose and H2O2 for 5 days. ROS generation was increased in the cells pre-incubated with AE and with the stressors. Compared with control, the intracellular iron was increased in cells pre-incubated with glucose, H2O2 and in cells pre-incubated with AE ($p < 0.001$). The mRNA relative abundance of Bax only increased ($p < 0.001$) in cells pre-incubated with glucose, however the Bax/Bcl-2 ratio increased in cells pre-incubated with stressors and with AE. Thioredoxin decreased ($p < 0.001$) in the cells pre-incubated with glucose, H2O2 and with AE. UCP-2 mRNA increased in cells pre-incubated with glucose ($p < 0.05$) and H2O2 ($p < 0.001$) and decreased in the cells pre-incubated with AE.

Conclusions: In this research we found that alperujo extract could be an inductor of apoptosis of β-cell together with a stressor.

Key words: Diabetes mellitus, oxidative stress, iron, Bax/Bcl2 ratio, insulin.

PO2090

PREDICTIVE FACTORS OF ARTERIAL BLOOD PRESSURE IN YOUNG UNIVERSITY STUDENTS, CÓRDOBA, ARGENTINA

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Background and objectives: The university stage could be the first moment to take decisions about health. An increased risk of cardiovascular diseases (CV) has been detected in youth and adolescents, and this risk is different to adults. The purpose of this study was to examine risk and protective CV factors related to arterial blood pressure (BP) among university students in Córdoba, Argentina.

Methods: A random sample based on the clinical records from universitary students attendees to Health Direction (Student Department, Universidad Nacional de Córdoba) was developed during 2012. Data about Body Mass Index (BMI), BP, alcohol and tobacco consumption, age, sex, school and college, family history of CV diseases, and physical activity were analyzed. BMI was classified according to OMS and BP by ESC. Chi2 test was employed to analyze differences between variables, and a multivariate logistic regression analyses was performed. Stata version 11.0 was used for all analyses.

Results: about nutritional status of 401 students (38% male, 62% female), 65.66% were normal, 5.26% low weight, 22.31% overweight, 5.51% grade-1 obesity and 1.21% were grade-2 obese. About BP values, the population under study showed the distribution: 61.85% optima, 23.69% normal, 8.48% high-normal, 4.24% grade-1 hypertension, 0.25% grade-2 hypertension, and 1.25%, isolated systolic hypertension. A higher proportion of women had normal BMI in relationship to men ($p < 0.05$). Also, women had higher proportion on normal BP compared to men ($p < 0.001$). Logistic regression showed a strong correlation between normal BP and normal BMI (OR 3.07, IC 95% 1.55-6.08, $p < 0.001$), adjusted by sex, age, family history of CV diseases, tobacco, alcohol, and physical activity. Female sex had a strong association with normal BP (OR 2.4, IC 95% 1.02-4.07, $p < 0.05$).

Conclusions: normal BMI and female sex can predict normal BP in young university students.

Key words: blood pressure; protective factors; youth.

PO2091

MAPPING OF CIVIL SOCIETY ORGANIZATIONS IN LATIN AMERICA AND THE CARIBBEAN

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Background and objectives: Cardiovascular disease (CVD) is highly prevalent across Latin America and the Caribbean with heart disease and stroke constituting the number one cause of death. Hypertension is the main risk factor for CVD. The reduction of dietary salt strongly correlates with lower blood pressure and reduced risk of heart disease and stroke. Joint efforts from different sectors should be undertaken to guarantee effective salt reduction initiatives. The objective of this study is to identify and describe civil society organizations in the region whose work relates to dietary salt reduction.

Methods: This is a cross-sectional descriptive study that includes the mapping of civil organizations in Latin America and the Caribbean to identify those who are working on dietary salt reduction. We developed a structured questionnaire to be sent to the organizations identified during the mapping phase. Data collection and analysis is based on the grounded approach.

Results: We identified 62 organizations from 16 countries. We received 26 completed questionnaires from 14 countries. From the total number of organizations: 76.9% work on issues related to high blood pressure: 53.8% on research, 53.8% on the promotion of public policies, 65.4% on education campaigns targeted to consumers, patients and health professionals, and 46.1% conduct community-based activities. We found that 88.4% of the organizations specifically work on issues related to salt intake: 50% on research, 23% on advocacy, 57.7% on education, 19.2% on national, regional or local media campaigns linked to salt intake, and 23% on salt-related community-based activities.

Conclusions: This study represents a first step to identify regional civil society organizations involved in dietary salt reduction. As a result of this mapping, the ALASS (Acción Latinoamericana Sal o Salud) network will be strengthened and future collaborations and strategies will be developed.

Key words: civil society organizations,salt,cardiovascular disease,hypertension.

PO2092

EFFICACY OF A NUTRITION EDUCATION PROGRAM FOR RURAL THAI PREDIABETICS

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Background and objectives: Thai National Health Examination Survey IV, 2009 reported the prevalence of impaired fasting glucose (IFG) is 10.7%, in males 11.8%, in females 9.5%. This study was conducted to examine the efficacy of a nutrition education program, involving group intervention among Thai prediabetics living in rural community settings in order to prevent progression to type 2 diabetes.

Methods: A two-group quasi-experimental design was carried out with one-hundred and two pre-diabetic subjects (almost are farmers). They were recruited from rural district in Phetchabun province, in the lower northern region of Thailand. There were 49 subjects in the intervention group and 53 in the control group. Nutrition education program consisted of six sessions with group based learning in a one year follow up. The process covered active learning in nutrition knowledge and skill practice in dietary self-management. Assessments for evaluation included biochemical characteristics, anthropometry and nutrient intakes.

Results: During one year follow-up, prevalence of new type 2 diabetic case in the intervention group was 10.2% (5/49), compared with 13.2% (7/53) in the control group. Data analysis in subjects who do not turn to diabetics showed that subjects in the intervention group (n = 44) increase their self-efficacy in meal plan and in decision of food choice. This resulted in proper total energy and carbohydrate intake. After one year, percentage of prediabetic subjects with BMI >23 kg/m2 (56.8%), FBG >100 mg/dL(63.6%), HbA1c >5.9% (29.5%), triglycerides >150 mg/dL (25.0%), total cholesterol >200 mg/dL (13.6%) in the intervention group were significantly lower than the control group [80.4, 89.1, 52,2, 45.7, 30.4% (total number = 46), respectively].

Conclusions: Results from this study suggested that nutrition education in community based on group intervention is effective at improving diabetes risk factors among rural Thais.

Key words: prediabetes, self-dietary management, rural community.

PO2093

PREDICTORS OF CARDIOVASCULAR DISEASE IN MULTI-ETHNIC ASIAN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Background and objectives: Cardiovascular disease (CVD) is the leading cause of mortality and morbidity in patients with type 2 diabetes mellitus (T2DM). Although patients with T2DM and CVD share common risk factors, the link between these diseases remains largely unexplained. Thus, this study intends to identify the predictors of CVD in Asian T2DM patients.

Methods: We conducted an analytical cross-sectional study on 313 patients aged 30 to 78 diagnosed with T2DM at selected tertiary hospitals upon prior ethical approvals. Systematic random sampling method was applied in patient selection. Socio-demographic data was assessed using a pre-tested interviewer-administered structured questionnaire. Diet (by 24-hour dietary recall), physical activity level [via International Physical Activity Questionnaire (IPAQ)], smoking and alcohol consumption status were ascertained. Anthropometric measurements were performed according to standard procedures. Clinical and laboratory characteristics on cardiovascular risk factors (medical history, treatments, blood pressure, glycemic control, and lipid profile) were collected from medical records, clinical examination and face-to-face interview. All statistical analyses were performed by using SPSS Statistics Version 21.0.

Results: The mean age of study subjects was 55.7±9.2 years, with a mean diabetes duration of 10.1±8.1 years; 52.1% subjects were females; and majority were Malays (47.0%). Approximately one third (36.1%) of the subjects were suffering from CVD. Logistic regression using forward stepwise method showed age

(B = 0.056, adjusted OR95%CI = 1.058, p = 0.004), lower HDL-C level (B = -1.466, adjusted OR95%CI= 0.231, p = 0.003), working status of self-employed (B=1.381, adjusted OR95%CI =3.978, p = 0.002), low (B = 1.164, adjusted OR95%CI = 3.203, p < 0.001) and moderate physical activity levels (B = 1.172, adjusted OR95%CI = 3.227, p < 0.001) compared to high physical activity level were significantly associated with higher CVD risk, upon adjustment for potential covariates.

Conclusions: Increased age, lower HDL-C, low and moderate physical activity levels, and working status appeared to be significant predictive factors of CVD among the T2DM patients studied.

Key words: cardiovascular disease, type 2 diabetes mellitus, predictors.

PO2094

DIETARY COMPLIANCE, DIETARY SUPPLEMENTATION AND TRADITIONAL REMEDY USAGE AMONG TYPE 2 DIABETIC PATIENTS WITH AND WITHOUT CARDIOVASCULAR DISEASE: AN UPDATE

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Background and objectives: Cardiovascular disease (CVD) is the principal cause of death in patients with type 2 diabetes mellitus (T2DM). A growing body of evidence revealed that diet is a key modifiable factor in preventing and reducing CVD risks. However, there is scant data addressed on dietary intake and complementary medicine usage of type 2 diabetic patients among multi-racial groups of Malaysia. This analytical cross-sectional study aimed to intensively examine and compare the dietary compliance, dietary supplementation and traditional remedy usage of type 2 diabetic patients with and without CVD from selected tertiary hospitals in Malaysia.

Methods: Socio-demographics, dietary intakes, dietary supplementation, traditional remedy use, health history, anthropometric measurements and clinical characteristics were collected during the face-to-face interview.

Results: 313 patients treated for T2DM participated in this study, in which 36.1% of them had CVD. The mean age of study subjects was 55.7±9.2 years (mean diabetes duration 10.1±8.1 years) and 52.1% were females. On the whole, mean total energy intake of patients was 1674±694 Kcal/day. Patients with CVD consumed higher total calories (p = 0.001). Likewise, mean carbohydrate, protein and total fat intake of CVD patients were significantly higher than non-CVD patients (p < 0.05), while mean intakes of cholesterol, fiber, minerals and vitamins were comparable between CVD and non-CVD groups. Regardless of CVD status, a notably high proportion of the patients did not meet the recommendations of the Medical Nutrition Therapy Guidelines for T2DM for total energy, carbohydrate, protein, total fat, and fiber intakes. Meanwhile, 52.4% used at least one dietary supplement and 12.1% took single traditional remedy or in various combinations.

Conclusions: Despite the dietary compliance, traditional remedies and supplement intakes did not differ between CVD and non-CVD patients, our dietary investigations warrant a better insight of the current dietary status of diabetics.

Key words: cardiovascular disease, type 2 diabetes mellitus, dietary status.

PO2095

ASSOCIATIONS BETWEEN DISORDERED EATING AND BODY WEIGHT STATUS AMONG ADOLESCENTS IN KUALA LUMPUR, MALAYSIA

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Background and objectives: Disordered eating and overweight are major public health problems among adolescents. The aim of this study is to determine the relationship between disordered eating, eating behaviors and body weight status among adolescents in Kuala Lumpur, Malaysia.

Methods: A cross-sectional multistage study was carried out in four selected schools in the Federal Territory of Kuala Lumpur. A total of 569 Malaysian students (male:42%; female: 52%) between the ages of 13-17 years completed the Eating Attitude Test-26 (EAT-26) that measures the symptoms and characteristics of disordered eating and Three Factor Eating

Questionnaire (TFEQ-R) which was used to measure restrained eating, uncontrolled eating, and emotional eating. Body weight and height of students were measured and BMI-for-age by sex was used to determine the body weight status.

Results: The prevalence of overweight and obesity (26.0%) was almost four times higher than the prevalence of thinness (7.0%) although 67.0% adolescents were normal weight. About one in five (24.4%) adolescents was engaged in disordered eating. It was found that the highest prevalence of disordered eating (39.3%) was found among obese adolescent followed by overweight (29.8%), normal weight (21.8%) and underweight (20.0%) adolescents ($X=12.4$, $p < 0.05$). Adolescents reported a mean score of 12.16±3.29, 19.56±5.07, 5.08±2.24 in the cognitive restraint, uncontrolled eating and emotional eating respectively. All four predictor variables were significant in explaining the BMI-for-age among adolescents ($F(4, 564) = 27.55$, $p < 0.05$). Restrained eating ($t = 6.91$, $p = < 0.05$), disordered eating ($t = 4.65$, $p < 0.05$), uncontrolled eating ($t = 2.59$, $p = <0.05$), and emotional eating ($t = 2.51$, $p < 0.05$) contributed significantly towards BMI-for-age among adolescents.

Conclusions: This study suggests that future intervention programs should implement healthful eating behaviors as it is needed to prevent obesity and eating disorders in adolescents.

Key words: Disordered eating, eating behavior, body weight status, adolescent.

PO2096

NUTRITION KNOWLEDGE AND DIETARY LIFESTYLE AS CANCER RISK FACTORS AMONG UNIVERSITY OF IBADAN UNDERGRADUATES, NIGERIA

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Background and objectives: Nutrition knowledge and attitudes have effect on eating habits. Many healthy lifelong practices begin in adolescent. The aim was to determine the undergraduate students of University of Ibadan's knowledge of nutrition, lifestyle and dietary pattern as risk factors to cancer.

Methods: A total of 407 undergraduates (206 males and 201 females) were selected from four male and three female halls of residence in the University using non probability sampling technique. A pre-tested, interviewer administered semi-structured questionnaire was used to obtain information on demographic, knowledge of nutrition and risk factor of cancer (20 points), lifestyle, dietary pattern, and anthropometric indices were taken. Nutritional status was determined using the World Health Organization growth standard. Descriptive statistics and Chi-square test were performed on data at 5% level of significance.

Results: Mean age of respondents was 21.42±2.58 (male) and 20.44±2.36 (female). Mean nutrition knowledge score in relation to risk of cancer was 10.72±4.34 and 11.77±4.75 male and female respectively ($p < 0.05$). No significant difference existed in awareness of risk factors of cancer between male and female. Respondents' physical activities were moderate: 19.4% daily, 8.1% 4-6 times/week, 21.6% 2-4 times/week and 50.9% less than 2 times/week. Mean BMI was 22.16 ±3.13 (male) and 22.60±3.52 (female). 35.7% and 64.3% male and female were obese ($p < 0.05$). Fried foods, smoked fish, cured meat consumption was high while consumption of fruits and vegetables was low.

Conclusions: Health promotion activities that aim to enhance student's awareness of good nutrition and risk factors of cancer should be promoted among the undergraduates.

Key words: nutrition knowledge, lifestyle, dietary pattern, cancer.

PO2097

GENDER MODERATES THE RELATIONSHIP BETWEEN PSYCHOLOGICAL DISTRESS AND DISORDERED EATING AMONG MALAYSIAN UNIVERSITY STUDENTS

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Background and objectives: Recent studies have shown that Asian students are at higher risk of developing disordered eating than previously believed. This cross-sectional study aimed to examine gender differences in the relationship between psychological distress and disordered eating among Malaysian university students.

Methods: A total of 584 university students (59.4% females and 40.6% males) completed a self-administered questionnaire on the Eating Attitudes Test-26 (EAT-26) and Depression, Anxiety and Stress Scale-21 (DASS-21).A multi-group analysis in Structural Equation Modeling which was the simultaneous analysis on both male and female students was performed to examine if the model was statistically equivalent across gender by comparing the unconstrained model, which allowed the path between psychological distress and disordered eating to vary across genders with another model, which constrained the path between genders to be equal. The model fit statistics with and without such constraints were compared.

Results: The fit indices for the unconstrained model were $F= 49.90$, $df = 37$, $CFI = 0.995$, $SRMR = 0.035$, $RMSEA = 0.017$ (90% CI = 0.009–0.027); while the fit indices for the constrained model were $F = 65.70$, $df = 44$, $CFI = 0.991$, $SRMR = 0.045$, $RMSEA = 0.021$ (90% CI = 0.009–0.030). Results showed that

there was a significant difference in the fit for the two models (F= 15.8, p<0.05), indicating that the path between psychological distress and disordered eating differed by gender. Gender was a moderator in this relationship, in which the relationship was stronger in females (P = 0.82) than in males (P = 0.61).

Conclusions: Interventions related to psychological distress targeted at preventing disordered eating should be planned differently for both genders.

Key words: Psychological distress, disordered eating, gender, moderator

PO2098

NATURAL KILLER T CELLS IN OBESITY -RELATED LIVER DISEASE

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Background and objectives: Liver involvement in obesity falls within a clinical entity called NAFLD. Potential steps involved in the pathogenesis of NAFLD include abnormal patterns of cytokine production among other inflammatory and lipid abnormalities. Although studies suggested that NKT cells may have a protective role in animal models of NAFLD, yet results have been reported to be controversial. NKT cells were reported to be correlated negatively to disease severity and in other studies being increased promoting the liver injury. The objective of this work was to determine the obesity related complication markers and the percentages of NKT cells in the peripheral blood of obesity related liver disease.

Methods: The study was conducted at the outpatient clinic in Ain Shams University on 30 patients with NAFLD along with 20 healthy controls. They were subjected to thorough clinical examination, anthropometric measurements, blood glucose level, hs-CRP, HOMA-IR and percentages of NKT cells by flow cytometry.

Results: This study revealed a statistically significant elevation of the mean FBS, HOMA, hs-CRP and lipid profile in patients group when compared to normal healthy controls. The median percentage of NKT cells [CD3+/CD56+] was significantly lower in patients group when compared to control group. A negative statistical significant correlation was found between the NKT cells and the fasting blood glucose.

Conclusions: This study concluded that NAFLD was associated not only with the obesity related complications markers but also with significant decrease of NKT cells.

Key words: NAFLD: Nonalcoholic fatty liver disease NKT cells: Natural Killer T cells,HOMA-IR: Homeostasis model assessment of insulin resistance.

PO2099

POTENTIAL IMPACTS ON NUTRITIONAL MANAGEMENT IN CANCER: COMPLEMENTARY AND ALTERNATIVE THERAPY USAGE IN A SCOTTISH PAEDIATRIC COHORT

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Background and objectives: The use of complementary and alternative therapies (CAT) in paediatric oncology patients is popular worldwide, yet data from the UK is scarce. CAT which are biological in origin can interact with conventional cancer treatment. Our objectives were to determine the usage of CATin the paediatric oncology population of SE Scotland and to establish both the reasons forits useandperceived benefits.

Methods: A retrospective survey was performed using a previously piloted questionnaire, which was distributed between 2006-2009. Eligibility criteria included children aged <18 years, diagnosed with a first time cancer and managed by the SE Scotland paediatric service. Demographic and clinical data were collected and descriptive statistics were employed to establish frequencies. Univariate associations were established by means of χ^2-test.

Results: 169 families were approached and 74 (43.7%) returned completed questionnaires. Of these, 41 (55.4%) reported having used CAT whilst their children were receiving conventional cancer treatment. Higher socioeconomic statuswas significantly associated with an increased use of CAT (χ^2 = 46.718, p <0.001). Of the biological CAT, the most popular were vitamin and mineral supplements (n=22; 52.6%) followed by fish oils (n=12; 29.2%) and herbal remedies (n=11; 26.8%). 72% of families perceived CAT to be beneficial and the most common reasons for CAT use were to improve quality of life (n=15; 36.5%) and to reduce both stress and side effects (n=10; 24.4%).

Conclusions: The use of CAT is highly prevalent in this cohort.Although, this is the largest retrospective study in the UK,more epidemiological and high quality interventional studies are required to provide clinicians with evidence based guidance on the safety and efficacy of different CAT, particularly the effects of biological based therapies and their potentialinteractions with conventional treatments.

Key words: complementary therapy, children, cancer

PO2100

THE LONG-TERM GREEN OR BLACK TEA DECOCTION CONSUMPTION IMPROVED OMEGA N-3 FATTY ACIDS COMPOSITION OF PLASMA AND LIVER IN RATS

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Background and objectives: The effect of green or black tea decoction (GTD, BTD) on dietary omega n-3 polyunsaturated fatty acids (EPA and DHA), known by their high cardiovascular disease protect is still unknown. Our objective was to study the influence of the long-term GTD and BTD consumption on the omega-3 fatty acids composition of plasma and liver in rats fed high-fat diet (HFD) containing omega n-3 (7% of total PUFA).

Methods: Male Wistar rats were used during 10 weeks. The rats of the group 1 received the HFD+ distilled water (CGr), the group 2 received the HFD +GTD (GTGr) and the group 3 received the HFD+BTD prepared from 50g/L (BTGr). At the end of the experimental period, blood was collected for determination of plasma lipids. The liver was removed, weighed and conserved. The extraction of lipids from the HFD, the plasma and the liver was determined using Folch method. The fatty acid methyl esters were analyzed on a Gas Chromatograph with a flame ionization detector and a capillary column. Values are means of triplicates analyzes for each sample±S.E.M. Results are expressed in % of total fatty acids and compared by ANOVA.

Results: After 10 weeks treatment, GTD and BTD significantly increased plasma polyphenols (CGr: 31±3.3 vs GTGr: 101.3±6 and BTGr: 76.6±9.4 μg/mL, $p < 0.05$). Additionally, they increased plasma EPA + DHA (CGr: 8.4±0.5 vs GTGr: 23.5±0.5 and BTGr: 27.2±0.4 %, $p < 0.05$) and liver EPA + DHA (CGr: 9.9±0.6 vs GTGr: 16.5±0.6 and BTGr: 21.2±0.4 %, $p < 0.05$).

Conclusions: Taking long-term GTD or BTD significantly improved the profile of plasma and liver EPA+DHA composition which could be an effective way to reinforce the protect against cardiovascular diseases.

Key words: Black tea, green tea, omega n-3 polyunsaturated fatty acids, liver, plasma.

PO2101

ANTI-INFLAMMATORY EFFECTS OF FARNESOL, A SESQUITERPENE, ON OVALBUMIN-SENSITIZED AND -CHALLENGED ASTHMATIC MICE

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Background and objectives: Farnesol, that is a sesquiterpene (C15H26O) widely exists in fruits, vegetables, herbs and essential oils was found to have a relative Th1-inclination property on immune cells in vitro, suggesting that it may be applied to improve Th2-skewed allergic asthma. To investigate the protective effect of farnesol on asthmatic inflammation, farnesol was administered to ovalbumin (OVA)-sensitized and -challenged mice.

Methods: Three farnesol doses, including low dose (0.003%), medium dose (0.017%) and high dose (0.067%), were extra-added into the AIN76 feed consumed by the OVA-challenged mice continuously for 5 weeks. The experimental mice sacrificed and their body weights, feed intakes and weights of visceral organs were analyzed. Cytokine and inflammatory mediator levels in bronchoalveolar lavage fluid (BALF) and the supernatant of peritoneal macrophage cultures from the experimental mice were determined.

Results: The results showed that there were no significant differences in body weights, feed intakes and visceral organ weights between farnesol supplementation groups and dietary control group, suggesting that farnesol supplementation at the indicated doses shows no apparent toxicity to the experimental mice. However, farnesol supplementation decreased interleukin (IL)-6/IL-10 ratios in BALF, suggesting an anti-inflammatory effect of farnesol on the lung and the airways. Furthermore, OVA sensitization and challenge significantly ($P < 0.05$) inhibited IL-1β], IL-6, tumor necrosis factor (TNF)-α\ and IL-10 productions by peritoneal macrophages. Importantly, farnesol supplementation significantly increased the suppressed cytokines levels, but slightly decreased TNF-α, IL-10 (pro-/anti-inflammatory) cytokine secretion ratios, indicating that farnesol may enhance immunity but inhibit inflammation in asthmatic mice.

Conclusions: In conclusion, farnesol supplementation at appropriate doses showed no toxic side effects on asthmatic mice, but might improve immunity and allergic inflammation.

Key words: allergic asthma; anti-inflammatory effects; cytokines; farnesol; sesquiterpene.

PO2102

GLUCOSE DISPOSITION INDEX BASED ON THE ORAL GLUCOSE TOLERANCE TEST IN CHILEAN ADULTS

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Background and objectives: Insulin secretion and insulin sensitivity indexes derived from intravenous glucose tolerance tests are mathematically related by hyperbolic functions. This type of relation allows the calculation of the glucose Disposition Index (DI) as the product of the acute insulin response and the insulin sensitivity index. Our objectives are to evaluate the hyperbolic relation between insulin secretion and insulin sensitivity indexes calculated from Oral Glucose Tolerance Test (OGTT) and to assess the discriminatory capacity of an Oral Disposition Index (ODI) in Chilean adults with different range of glucose tolerance.

Methods: A sample of 744 adults (age: 48±14 years; 83% women) completed an OGTT with glucose and insulin measurements. Subjects were classified into 5 groups: Normal Glucose Tolerance (NGT; n = 369), Impaired Fasting Glucose (IFG; n = 114), Impaired Glucose Tolerance (IGT; n = 167), IFG+IGT (n = 46) and Diabetes Mellitus (DM; n = 48). The Insulinogenic Index, the First-Phase Stumvoll Index and the Insulin-to-Glucose Area-Under-Curve ratio (AUCIns/Glu) were used as insulin secretion indexes, while ISI-Comp index was used as a measure of insulin resistance. Adjustment to hyperbolic function was assessed after logarithmic transformation and statistical evaluation of the negative slope (m = -1) by Deming regression.

Results: An satisfactory statistical adjustment for an hyperbola was found between AUCIns/Glu and ISI-Comp Index in all groups (NGT, m = -1.04; 95%CI: -1.2,-0.8; IFG, m = -2.3; 95%CI:-3.8,-0.9; IGT, m = -0.98; 95%CI: -1.2,-0.7; IFG+IGT, m = -1.03; 95%CI: -1.5,-0.5; and DM, m = -0.94; 95%CI: -1.5,-0.5). ODI showed differences across study groups ($p < 0.01$): NGT, 472±176; IFG, 476±1130; IGT, 233±68; IFG+IGT: 166±49; DM: 136±65. Receiver Operating Characteristic (ROC) analysis showed adequate discriminatory capacity of ODI (AUCROC=0.98; 95%CI: 0.97-0.99; NGT versus diabetes).

Conclusions: ODI constitutes a simple surrogate of insulin secretion relative to insulin sensitivity that replicate mathematical properties of DI showing discriminatory capacity in Chilean adults with varying degree of glucose tolerance.

Key words: insulin, glucose, disposition index, diabetes.

PO2103

TYPE OF VEGETARIAN DIET AND PREVALENCE OF DIABETES IN ADULT MEN AND WOMEN IN INDIA

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Background and objectives: Vegetarian diets may play a beneficial role in promoting health and preventing diabetes epidemic in developing countries. We examined the prevalence of diabetes among adult men and women in India following different types of vegetarian diet compared with that in nonvegetarians.

Methods: Analysis is based on a population based cross sectional data of 99,574 women and 56,742 men aged 20-49 years included in India's third National Family Health Survey, conducted during 2005-06. Information on socioeconomic, demographic, anthropometric, lifestyle and self-reported medical conditions were collected by face to face interview. Associations between type of vegetarian diet (vegan, lacto-vegetarian, lacto-ovo vegetarian, pesco-vegetarian, semi-vegetarian and non vegetarian), categorization based on frequency of consumption (daily, weekly, occasionally and never), and self-reported diabetes were estimated using multivariate logistic regression.

Results: Prevalence of diabetes varied from 0.9% each in lacto-vegetarian, lacto-ovo vegetarian and semi-vegetarian to 1.2% in nonvegetarians and highest in pesco-vegeterian diets (1.4%). After adjustment for age, education, household wealth, rural/urban residence, religion, caste, smoking, alcohol use, television watching and BMI, lacto-vegetarian (OR:0.67; 95%CI:0.58-0.76;$p < 0.0001$), lacto-ovo vegetarians (OR:0.69; 95%CI:0.50-0.95;$p = 0.023$) and semi-vegetarians (OR:0.76; 95%CI:0.60-0.98;$p < 0.033$) had a lower risk of diabetes than non-vegetarians.

Conclusions: In a large sample of adult men and women in India, variants of vegetarian diets such as lacto-vegetarian and lacto-ovo vegetarian were associated with 30% or more reduction in risk of diabetes. Semi-vegetarian diets were associated with intermediate risk reduction, about one-quarter than non-vegeterian diets. The protection afforded by lacto-vegetarian was strongest. These findings are important for public health interventions in diabetes care in India but warrants replication in studies with different methods of measuring dietary intake and objective assessments of diabetes.

Key words: type of vegetarian diets; diabetes; men; women; NFHS-3; India

PO2104

EFFECT OF CONSUMPTION OF DARK CHOCOLATE ON THE EXPRESSION OF PROINFLAMMATORY CYTOKINES IN OLDER ADULTS WITH DIABETES MELLITUS II

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Background and objectives: The feeding behavior of the elderly and immune senescence are risk factors for Inflammation. Healthy elderly show chronic inflammation, which can be modulated by the use of anti-inflammatory foods that modulate the secretion of pro-inflammatory cytokines. Consuming foods such as dark chocolate (polyphenols) modulates the transcription and secretion of pro-inflammatory cytokines. The aim of this study was to determine the effect of chocolate consumption for 4 weeks on the plasma concentrations of IL-2, IL-5, IL-12, IL-13 and TNF-α in older adults with diabetes mellitus II.

Methods: We performed a clinical intervention study, involving 11 older adults with type II diabetes self-reported; 3 controls (average: 65 years old, glucose 112 mg/dL) and 8 experimental (average: 69 years old, 143 mg glucose/dL). Older adults were instructed to consume 20 g of dark chocolate (Rey Amargo)/day (200 mg polyphenols) for 4 weeks. Cytokine expression was evaluated using the Human Flow Cytomix Kit eBiosciences 13 plex by flow cytometry.

Results: We compared the average plasmatic cytokines of two groups after to treatment: control and experimental via a statistical analysis of T-test for independent samples, there was not statistically significant to IL-2 ($p = 0.604$), IL-5 ($p = 0.526$), IL-12 ($p = 0.706$), IL-13 ($p = 0.567$) and TNF-alpha ($p = 0.755$). It may be that there was no difference because the BMI for controls was 30 and 29 for experimental, which indicates overweight. Perhaps to observe the effects of anti-inflammatory polyphenols in dark chocolate, in older adults with diabetes II, must increase the g of chocolate consumed per day, the number of participants and intervention days.

Conclusions: The consumption of 20 g of dark chocolate for 4 weeks does not decrease the concentration of proinflammatory cytokines in plasma of older adults with diabetes II compared to the control group.

Key words: dark chocolate, proinflammatory cytokines, Inflammation, diabetes mellitus II.

PO2105

DIETARY PATTERNS AND BMI AND SERUM LIPIDS IN A POLISH WOMEN

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Background and objectives: BMI, biochemical parameters have been recognized as an emerging risk factor for cardiovascular disease. Associations between dietary patterns and cardiovascular disease risk factors remain unclear. The objective of this study was to evaluate the association between dietary patterns and BMI and the levels of serum lipids in a Polish women.

Methods: A total of 453 women aged between 39 and 59 years were included in this study. The evaluation of the eating manner was made using the individual 24-hour recall method, repeated 7 times, and made in irregular terms of time. To establish dietary patterns, factor analysis was performed, which led to characterization of the Varied and Fatty dietary patterns.

Results: Individuals in the top quintile of the Varied dietary pattern had lower BMI [odds ratio (OR), 0.62; 95% CI, 0.48–0.81] than those in the lowest quintile. In contrast, the Fatty dietary pattern was associated with higher BMI (OR, 1.54; 95% CI, 1.03–2.29). The major dietary patterns and the levels of lipid profiles were not associated. The lack of a significant association between the major dietary patterns and the level of serum lipids in our study is surprising, but it must be taken into account that dietary patterns are not the single determinant of serum lipid profiles. Other factors such as physical activity, and smoking should also be considered.

Conclusions: Dietary patterns were associated with being overweight or obese but not associated with the level of lipids in a Polish women.

Key words: dietary patterns, women, lipids, cardiovascular disease.

PO2106

PREVALENCE OF ANEMIA IN CHILDREN AND ADOLESCENTS AFTER NUTRITIONAL INTERVENTION

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Background and objectives: Anemia and overweight are considered the major public health problems in children and adolescents who may have a negative impact in their current and future life. According to the WHO, anemia affects 30% of the world population, and 50% can be attributed to iron deficiency. The objective of this study was to describe the prevalence of anemia in children and adolescents with weight excess before and after nutritional intervention.

Methods: A descriptive observational study was conducted with a sample of children and adolescents that were recruited to take part in a clinical trial in pediatric nutrition clinic of a university hospital. Were selected children above 2 years of age with an IMC≥p85 coupled with the presence of alterations in lipid profile and/or blood pressure. After the first visit, before and after intervention, a complete blood count was performed for diagnosis of anemia with the following criteria: hemoglobin (Hg<11g/dL), MCV <80fL, MCH <27pg and RDW <13%. The study was conducted for 6 weeks (PO and P6). Descriptive statistics and paired t sample test and the significance level were 0.05. The sample consisted in 135 aged 10.2 ± 2.8 years, 50% male and weight 57,3±21,8kg at PO and 55.1± 21,5kg at P6 both indicating obesity, but with a significant reduction. The values of Hg, MCV, MCH and RDW at PO and P6 were, respectively: 13.2±1.1g/dL/13.2±0.9g/dL, 27.0±1.8fL/27.3±2.0fL, 81.4±5.2/81.2±4.7 and 14.1±1.0pg/14.2±1.4pg. No significant changes occurred between the two periods ($p < 0.05$) except for HGM that had a small improvement. There was reduction of BMI and weight and increase in HGM, but no statistical change of the other indices related to iron status, despite the use of oat flakes. This success can be attributed to the guidance provided at baseline regarding factors activators and inhibitors of iron absorption.

Key words: anemia; obesity; children; intervention

PO2107

INTERNET-BASED WEIGHT LOSS PROGRAMS: A REVIEW

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Background and objectives:: The high prevalence of overweight and obesity among adults is a concern in public health because of their strong relation with heart disease, stroke, diabetes and cancer. Programs for weight reduction via web are viable, affordable and complementary to the consensual pharmacological and surgical therapies. In addition, many studies have been showed that internet-based program designed for third generation computers could promote tailoring nutrition education. The scope of this review was to evaluate the potential impact of internet-based programs on weight reduction.

Methods: A search of articles published between 2002 and 2012 at MEDLINE and EMBASE was conducted using the key words internet, overweight, obesity, body weight changes, food habits, web-based, computer tailoring, nutrition education and adults and only randomized controlled trials were included.

Results: 201 articles were found, of these 15 trials were selected for analysis. 78% of studies recruited obesity patients (BMI 30-34.9 kg/m2), from both genders and between 36 to 50 y. 33% of these studies presented 6 months follow-ups and 60% had more than 20% losses at the end. The weight reduction achieved by web groups ranged considerably from 0.9 to 8.8 Kg. Despite this, studies with web programs designed for third generation computers seemed to be able to promote more than 5% of weight loss than the others web interventions.

Conclusions: This review highlights the need of new studies that focus on improving the treatment adherence and on giving assistance during weight loss maintenance period. However, the internet-programs appear to be a new and viable tool on nutritional clinical practice.

Key words: weight loss, web-based, computer-tailoring.

PO2108

OBESITY HAS LEVELED OFF IN FINLAND: FORTY-YEAR TRENDS OF OBESITY FROM THE NATIONAL FINRISK STUDY

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Background and objectives: The proportion of obese adults has reached an epidemic scale worldwide, moving steadily away from the Healthy People 2010 goal of 15 % prevalence of obesity (BMI>30kg/m2). Obesity is one of the leading risk factors for the global disease burden, and its importance has increased over the last decades.

Methods: This study is part of the National FINRISK Studies, which have been carried out regularly every five years to monitor the cardiovascular risk factors in Finland. The cross-sectional representative samples included 8000-10000 working-age adults from 2-5 geographical areas (participation rates 60-90%). We investigated the long-term trends (1972-2012) and recent changes (2007-2012) in BMI by age groups and area. Weight and height were measured by a standardized international protocol.

Results: The BMI trend increased among Finnish men from the 1970's and among women from the 1980's. Although the newest results from 2012 showed that the prevalence of obesity has leveled off over the last ten years, 66% of men and 46% of women had BMI at least 25 kg/m2, and of those one in five were obese (BMI≥30kg/m2). The mean BMI was 27.1 kg/m2 for men and 26.0 kg/m2 for women. In general, overweight subjects carry an average of 10 kg and obese subjects of 30 kg excess fat load compared with normal weight subjects. The participants who lived in the metropolitan area were thinner than the others. The BMI differences between age groups were higher in women than in men.

Conclusions: Finland is among those few countries where obesity trends have appeared to be leveling off over the last years. However, the prevalence of obesity has consistently remained high. The National Obesity Prevention Program 2012-2015 is established in order to lower the prevalence of obesity and obesity-related diseases.

Key words: BMI, obesity, survey, trends.

PO2109

NUTRITIONAL ASSESSMENT, SUPPORT AND DIET INDICATED IN ONCOLOGY INPATIENTS.

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Background and objectives: The aim of the study was to assess the nutritional status, nutritional support and the prescriptive diet of oncology inpatients.

Methods: A cross-sectional study was performed at the oncology and hematology wards. A patient generated subjective global assessment (PG-SGA) was carried out including the type of nutritional support given. In parallel the hospitalized diet system was analyzed of those patients evaluated, i.e. the indicated diet was the most appropriated for the clinical situation and if there was any mistranscription until the diet is served on the ward.

Results: 46 patients were evaluated (21 men and 25 women). After the PG-SGA, 67.4% of patients were malnourished or at risk of malnutrition, 21.7% of which were severe malnourished. Between the oncology and hematology wards there were no statistically differences on malnutrition. Malnutrition was present in 62% of the patients hospitalized for less than 10 days versus 76.4% in patients with longer length of stay. Despite high percentage of malnutrition only 21.7% has been assessed by the clinical nutrition unit. Regarding the prescription of the diets, 28.3% had mistakes in the indicated diet and 3 mistranscriptions from the ward to the catering were found.

Conclusions: Patients admitted to a cancer hospital have a high degree of malnutrition. This figure rises with prolonged hospital stay. We need awareness of health professionals of our center for screening and subsequent nutritional consulting the nutrition unit to patients during hospitalization. It is important to conduct training sessions on the wards for proper indication of the diets.

Key words: nutritional assessment, diet, cancer.

PO2110

INTERMITTENT FASTING MODULATION OF THE DIABETIC NEPHROPATHY SYNDROME IN STREPTOZOTOCIN-INJECTED RATS

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Background and objectives: Intermittent fasting miming Ramadan fasting was previously reported to exert a beneficial effect on hyperglycemia and pancreatic parameters on streptozotocin-induced diabetic rats. Our aim was to afford several new pieces of information concerning intermittent fasting effect on diabetic nephropathy.

Methods: Wistar rats were injected intraperitoneally with streptozotocine (STZ) (65 mg/kg body wt.) freshly dissolved in a citrate buffer (50 mM, pH 4.5). Control rats were injected with the citrate buffer. Only rats displaying a glycemia in excess of 16.7 mM were kept for further investigations. Control and STZ rats were either given free access to food throughout the experimental period (NF: non-fasting), deprived of food from 5 p.m. to 8 a.m. (IF: intermittently fasting) or given access onwards to an amount of food comparable to that ingested by the IF rats (CR: calorie-restricted). Relative to the food intake in NF rats, such a caloric restriction represented a 20% and 40% decrease in food intake respectively in the control animals and STZ rats. Plasma creatinine and urea concentration was measured. Renal sections were stained with Schiff periodic acid and immunostaining for PCNA detection.

Results: Kidney histology revealed that, in the streptozotocin rats, intermittent fasting prevented such anomalies as the presence of Armanni-Ebstein cells in proximal tubules. The kidney PCNA index was lower ($p < 0.04$) in the IF and CR STZ rats (150.3±12.5 10-4; n = 80) than in the NF STZ rats (209.3±30.5 10-4; n = 40). A comparable situation prevailed in the case of the plasma concentration of urea and creatinine in IF and CR STZ rats.

Conclusions: Improvement of hyperglycemia and beta cell mass by intermittent fasting may exert a favorable effect on diabetic nephropathy.

Key words: streptozotocin-induced diabetic rats, diabetic nephropathy, PCNA, intermittent fasting.

PO2111

IDENTIFICATION OF NUTRITION TRANSITION IN PATIENTS TREATED BY DIALYSIS IN A BRAZILIAN HOSPITAL

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Background and objectives: It is known that the nutritional state is a strong determinant of the prognosis of individuals with chronic kidney disease, treated by dialysis. The nutritional transition which took place over the past years also reached the dialysis population, creating a common paradox "overweight and nutritional deficiencies". This study had as aim verify the nutritional state of patients treated by hemodialysis in a Brazilian hospital.

Methods: the study included 42 patients with average 51.31±15.5 years old (from 23 to 79), of which 57% is represented by the male gender, and with an average of dialysis therapy of 41.14±38.56 months (from 5 to 185 months). Were used anthropometric parameters [after-dialysis weight, stature and Body Mass Index (BMI)] and laboratorial (serum albumin and total proteins).

Results: the results pointed a BMI average of 24.94±6.06kg/m^2 on adults, classifying them at the upper limit of eutrophia. Among the individuals, two were defined as malnourished, with one of them classified as critical. Eleven adult participants presented overweight and one was classified as obese level II. The individuals beyond 60 years old shown an average BMI of 25.21±4.06 kg/m^2, revealing themselves eutrophics in the majority according to the Pan American Health Organization (PAHO). Still considering the PAHO, four elderly individuals were classified underweight and five were overweight. The average of serum protein of all participants (5.21±0.59 g/dL) did not show impairment of the nutritional state, as well as the average of the total proteins (9.64±1.3 g/dL). There was no correlation between the BMI and serum albumin ($p = 0.45$).

Conclusions: the patients treated by dialysis reflects not just the current epidemiological transition, but also the nutritional transition, being necessary follow the serum concentration of vitamins and minerals in order to analyze if they also follow the verified trend.

Key words: chronic kidney disease, nutritional state, albumin.

PO2112

NUTRITIONAL KNOWLEDGE AND ASSOCIATION WITH DIETARY PRACTICES AMONG CANCER PATIENTS: A CASE STUDY OF KENYATTA NATIONAL HOSPITAL CANCER TREATMENT CENTER.

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Background and objectives: The main objective of the study is to assess the nutritional knowledge and determine its association with dietary practices of cancer patients. Also to determine the socio- economic and socio-demographic characteristics of cancer patients attending the cancer treatment center at KNH. To determine nutritional knowledge among cancer patients attending cancer treatment center at KNH. To determine dietary practices among cancer patients attending cancer treatment center at KNH. The hypothesis is that there is no association between nutritional knowledge and the dietary practices of the cancer patients.

Methods: This study was cross-sectional design. The study involved patients attending the cancer treatment center for a period of 3 weeks where patients were interviewed through questionnaires related to nutritional knowledge, food frequency and dietary diversity.

Results: Pearson's correlation coefficient showed a positive correlation between nutrition knowledge and dietary diversity score r = 0.392, n = 130, p = 0.000.. The odds ratio between nutritional knowledge and fruit frequency, 10 using binary logistic regression, P = 0.018..

Conclusions: There is association between nutritional knowledge and the dietary practices of the cancer patients.

Key words: cancer, nutritional knowledge and dietary practice.

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PO2113

ASSOCIATION BETWEEN IRON NUTRITION AND INFLAMMATION WITH TYPE 2 DIABETES DEVELOPMENT

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Background and objectives: Type-2 diabetes mellitus (T2DM) patients present increased iron storage and high levels of oxidative stress parameters. Also, T2DM share with obesity a pro-inflammatory profile. The aim was to evaluate mRNA expression of genes related to iron nutrition and inflammation in patients obese with or without T2DM and to evaluate its association with type-2 diabetes development.

Methods: We studied 48 obese men (OB); 40 diabetic patients (DM), 44 obese diabetics subjects (OBDM) and 43 healthy subjects (Cn). Glucose, insulin, lipid profile, oxidative stress parameters, and iron nutrition were evaluated. In peripheral mononuclear cells (PMCs) we isolated RNA and we studied the expression of TNFα, hepcidin, TLR4, TLR2, NFkβ, and mTOR by qPCR.

Results: Ferritin levels were higher in OB; DM and OBDM than Cn groups (in g/L: 89.7; 76.2; 92.8 and 71.1, respectively. One way ANOVA $p < 0.005$). Total body iron (TBI) and hs-CRP showed the same behave (One way ANOVA $p < 0.01$ and < 0.0001, respectively). Oxidative stress parameters were high in OB; DM and OBDM (One way ANOVA: heme oxygenase $p < 0.0001$ and TBARS $p < 0.003$). The expressions of genes related to inflammation (TNFα, TLR2, NFkβ, and IL6) were higher than Cn group (One way ANOVA $p < 0.001$). The main differences were between controls with obese subjects and obese with DM and OBDM patients. Hepcidin mRNA expression was increased in all the groups compared to controls (One way ANOVA $p < 0.001$). mTOR was different between OBDM and controls (One way ANOVA $p < 0.04$). Higher levels of ferritin (quartile 4) were associated as a risk factor for diabetes mellitus.

Conclusions: High iron levels (ferritin and TBI) and inflammation (TNFα, IL6 and TLR2) induce the expression of hepcidin. High levels of ferritin are a risk factor for T2DM development.

Key words: ferritin, oxidative stress, inflammation, diabetes mellitus, obesity. Funded by Grant Fondecyt 1110080.

PO2114

METABOLIC SYNDROME AND ITS COMPONENTS, AND ADHERENCE TO THE MEDITERRANEAN DIET AMONG THE BALEARIC ISLANDS' ADULT POPULATION

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Background and objectives: Lately, the Metabolic Syndrome (MetS) has been subject to a great deal of interest and at-

tention. The aim of this study was to determine the prevalence of MetS and its components among the Balearic Islands' adult population, and to assess its association with the Mediterranean diet (MD).

Methods: A cross-sectional nutritional survey was carried out in the Balearic Islands adult population (16-65 years) in 2009-2010. A random sample (n = 232, 68.5% women) provided a fasting blood sample and anthropometric measurements. The MetS prevalence was defined by the NCEP/ATP-III criteria. Diet was assessed using a validated semi-quantitative food frequency questionnaire and two non-consecutive 24h diet recalls. Adherence to the MD was obtained by the modified-Mediterranean Diet Score.

Results: The overall MetS prevalence was 13% (men 16.4%, women 11.4%). The MetS criteria were met in 60.0% of obese and 12.9% of overweight subjects. No normal-weight subject met the MetS criteria. Overall, at least one MetS component was found in 60.9% of adults, and the five components were found in 1.4% of them. Abdominal obesity (92.6%), hypertension (88.9%), low HDL cholesterol level (77.8%), high triglyceride level (44.4%) and high fasting glycaemia (40.7%) were common among adults with MetS. Higher adherence to the MD was associated with significant lower risk for high triglyceride level (OR=0.31, 95%CI: 0.15-0.63, p = 0.001).

Conclusions: MetS prevalence was 13%, higher in men than in women. High triglyceride level, which was found in 44% of adults with MetS, could be reduced by high adherence to the MD. The other MetS components were not associated with adherence to the MD.

Key words: metabolic syndrome, mediterranean diet, adult population, balearic islands

PO2115

TEN-YEAR TRENDS IN THE PREVALENCE OF OVERWEIGHT AND OBESITY, AND EXCESS ABDOMINAL FAT AMONG THE BALEARIC ISLANDS' ADULT POPULATION (1999-2010)

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Background and objectives: Overweight and obesity constitute an important public health problem. The aim of this study was to assess trends in overweight and obesity, and excess abdominal fat prevalence (1999-2010) in Balearic Islands adult population.

Methods: Two independent cross-sectional nutritional surveys were carried out in the Balearic Islands adult population (16-65 years) in 1999-2000 (n = 1200) and 2009-2010 (n = 1388). Body mass index (BMI) and waist-to-height ratio (WHtR) were measured. BMI was classified as normal-weight (<25 kg/m2), overweight (25-29.9 kg/m2) and obesity (>30 kg/m2). WHtR was classified as normal (<0.5), elevated (0.5-0.59) or abdominal obesity (AO) (>0.6).

Results: The prevalence of overweight and obesity remained constant across all age groups in both sexes over the 10-year period. Contrarily, the prevalence of elevated abdominal fat decreased in <45 years men, and the prevalence of AO decreased in >46 years women. Logistic regression model adjusted for age showed that obesity prevalence increased in men (OR=1.71, 95%CI: 1.09-2.68, p < 0.05) while the prevalence of elevated abdominal fat decreased in them over the 10-year period (OR=0.55, 95%CI: 0.38-0.79, p < 0.01). In women, decreased the prevalence of AO (OR= 0.50, 95%CI: 0.33-0.78, p < 0.01). After adjusting for age and sociodemographic variables, only the increase of obesity prevalence observed in men remained significant (OR=2.33, 95%CI: 1.25-4.34, p < 0.01).

Conclusions: An increase of obesity prevalence in men has been observed over the 10-year period. Contrarily, the prevalence of excess abdominal fat, a major factor for the clustering of cardiovascular risk factors, decreased in both sexes over the 10-year period. These results also reflect the limitations of BMI as abdominal fatness marker.

Key words: overweight, obesity, balearic islands, adult population

PO2116

ACID ACETYLSALICYLIC AND DECREASE OF HIGH-SENSITIVITY C-REACTIVE PROTEIN IN INDIVIDUALS TREATED BY DIALYSIS IN A BRAZILIAN HOSPITAL

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Background and objectives: Studies point the C-reactive protein (CRP) as an important inflammatory indicator in individuals treated by dialysis. The aim was to evaluate the effect of acid acetylsalicylic (ASA) usage in serum concentrations of high-sensitivity CRP in individuals treated by dialysis.

Methods: the population of the study was composed by 42 patients with average age of 51.31±15.5 years old, of which 57% is represented by the male gender, and with an average of renal substitution therapy of 41.14±38.56 months. The patients made usage of 300 mg of ASA for two months. In the meanwhile, blood samples were collected in three moments:

before the medicine intervention, at the 30th and at 60th day after medication start.

Results: the results did not indicate differences between the CRP serum concentrations before the medicine intervention (8.3±9.09 mg/dL) and at the 30th day of ASA usage (7.88±8.95 mg/dL), as well as between the serum concentration at the 30th and at the 60th days of the medicine ministration (6.37±8.90 mg/dL). However, occurred a difference (p = 0.01) between the serum concentration before the medicine intervention and the one at the 60th day of study, indicating that even using a lower dosage than those pre-established as anti-inflammatory, the ASA seems to reduce inflammatory markers. There was positive association between the dialytic therapy and the high-sensitivity CRP serum concentrations, reinforcing that the dialytic procedure provide the increase of the inflammatory state.

Conclusions: can affirm the need to investigate the ASA effects in others inflammatory markers in patients under dialyses treatment, once they are exposed to the usage effects of a variety of others medicines which can have an indirect repercussions towards the prognosis. Beyond that, it is recommended the development of specifics medicines for the chronic kidney patients, as long as its inflammatory situation is complex and requires comprehensive care.

Key words: kidney disease, inflammation, medicines.

PO2117

NUTRITIONAL ASSESMENT IN PATIENTS WITH CHRONIC MALNUTRITION AND ANXIETY

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Background and Objectives: Anxiety can affect many aspects of human life as the food choice and the food intake which in turn could impair the nutritional status. The aim of our study was to conduct nutritional assessment and to evaluate the frequency of food intake and metabolic changes in female patients with chronic malnutrition and anxiety.

Methods: A group of 47 females with malnutrition and anxiety hospitalized, aged from 18 to 55 years, 22 underweighted, 25 overweighed and 20 healthy controls, were examined. Anthropometric measurements, clinical examination, hematological and biochemical tests, food frequency questionnaire and Hamilton anxiety scale were conducted.

Results: The patients' nutritional assessment showed important deviations compared to controls. The mean BMI was 16,7 kg/m2 in underweighted and 31.8 kg/m2 in overweighed and the mean Fat mass /BIA/ - 6.5 kg in underweighted and 37.9 kg in overweighed. Mild severity anxiety in 77% of the underweighted and 76% of overweighed was found. Examination of food frequency discovered that 50% of overweighed and only 35.3% of underweighted consume white bread more than once a day. Overweighed consume more frequently vegetables but less fruits. Underweighted consume more chicken meat, nuts, sausages, but less pork, milk and cheese than overweighed. More people of the both groups use sunflower oil. Some hematological abnormalities were found in 18.2 % of underweighted and in 28 % overweighed. There were also metabolic abnormalities - low values of urea but still in reference in 27,3% underweighted and 20% overweighed, dyselectrolytemia in 9% and hypoalbuminemia in one underweighted. The dysglycemia, dyslipidemia and hyperuricemia predominate in the overweighed.

Conclusions: Chronic malnutrition as overweight and underweight, some slight variations in hematological and metabolic parameters and disturbed food frequency was found in females with mild anxiety compared to healthy controls.

Key words: malnutrition, food frequency, anxiety, nutritional assessment

PO2118

SENSITIVITY ANALYSES ON HEALTH IMPACT ASSESSMENT OF SALT REDUCTION: EFFECTS OF MODIFYING SALT INTAKE, BLOOD PRESSURE OR RELATIVE RISKS

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Background and objectives: Excessive salt intake is associated with hypertension and subsequently with cardiovascular diseases. In the European region, salt intake is substantially above the WHO population goal of 5 grams per day. We assessed the health impact of salt intake reduction towards the population goal in four European countries, and studied whether the health impact assessment could be simplified.

Methods: Through literature research we obtained current age-specific salt intake and systolic blood pressure levels of Italy, Netherlands, Spain and UK. The DYNAMO-HIA model

was used to predict the prevalence of stroke for each country, estimating the effect of salt reduction through its effect on blood pressure levels. The country-specific relative risks between salt intake and stroke depended on country-specific blood pressure data. In additional sensitivity analyses, the three input parameters (salt intake, blood pressure and relative risks) were modified (specific vs average) to identify the consequences on the outcomes.

Results: The prevalence of stroke reduced by 8.9% in Spain (current mean salt intake 10.0 g/d), using age-specific salt intake and blood pressure. When average salt intake but age-specific blood pressure was used the prevalence of stoke reduced by 9.6%. Average salt intake and average blood pressure lead to a substantial lower health impact estimate for stroke (5.4%). Average relative risk hardly modified the estimates compared with country-specific relative risks and age-specific blood pressure levels. In this analysis, the prevalence of stroke reduced stroke by 9.0% using age-specific salt intake estimates and by 9.6% using average salt intake estimates. Similar patterns were observed among the other countries.

Conclusions: Average data on salt intake and relative risks is sufficient to perform health impact assessment compared with age-specific salt intake or country-specific relative risks. This will simplify the health impact assessment when expanding to more countries.

Key words: health impact, salt, sensitivity analyses

PO2119

DIETARY INDICES, CARDIOVASCULAR RISK FACTORS AND MORTALITY IN MIDDLE-AGED ADULTS: FINDINGS FROM THE AEROBICS CENTER LONGITUDINAL STUDY

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Background and objectives: Recent reports indicate that cardiorespiratory fitness may confound diet-mortality relationship. However, none of the studies using a predefined dietary index to predict mortality have explored the influence of fitness. We examined the association between three predefined dietary indices and cardiovascular disease (CVD) risk factors; and their ability to predict long-term mortality in adults from the Aerobics Center Longitudinal Study.

Methods: Between 1987-1999, a total of 12 449 (9 544 male) participants aged 20-84 years completed a clinical examination in which dietary intake was measured by 3-day diet records. After 11.6 years of follow-up, 358 deaths occurred: 102 (28.5%) from CVD and 134 (37.4%) from cancer. The dietary indices used were: the Ideal Diet Index (IDI), the Diet Quality Index (DQI) and the Mediterranean Diet Score (MDS). CVD risk factors measurements included body mass index (BMI), total cholesterol, fasting glucose, blood pressure and cardiorespiratory fitness. We calculated hazard ratios from Cox regression analyses, adjusting for potential confounders including physical fitness.

Results: Higher IDI, DQI and MDS scores were consistently associated with lower BMI, cholesterol and glucose levels, and diastolic blood pressure, and higher cardiorespiratory fitness (all $p < 0.05$). However, after adjusting for age, sex, energy intake, and baseline examination year, the indices were not significantly related to all-cause, CVD or cancer mortality. No association was found in fully-adjusted models, after additional adjustment for fitness.

Conclusions: In middle-aged adults, these dietary indices are cross-sectionally associated with CVD risk factors; however, they may not be useful predictors of mortality in long-term follow up.

Key words: dietary patterns, all-cause mortality, cardiovascular disease, cancer, physical fitness.

PO2120

INFLAMMATORY AND OXIDATIVE EVALUATION OF INDIVIDUALS TREATED BY DIALYSIS IN A BRAZILIAN HOSPITAL

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Background and objectives: The inflammatory state and the oxidative stress are described as a constant condition in patients with Chronic Kidney Diseases (CKD) in dialysis, based on several manifestations presents in those individuals, what may lead to a hyper production of inflammatory makers and free radicals. The aim of the study was to verify the inflammatory and oxidative state of individuals under dialysis treatment in a Brazilian hospital.

Methods: the studied population was composed by 42 patients with average 51.31±15.5 years old (from 23 to 79), of which 57% is represented by the male gender, and with an

average of dialysis therapy of 41.14±38.56 months (from 5 to 185 months). The main causes of the renal function loss was hypertensive nephrosclerosis and diabetic nephropathy. The involved patients had a regular usage of C-Vitamin and folic acid, in agreement to the dialysis service standardization. Analysis of serum concentrations of the inflammatory biochemistry markers [high-sensitivity C-reactive protein (hs-CRP)] and the oxidative stress [malondialdehyde (MDA) e hydrogen peroxide (H2O2)] were carried out.

Results: the results indicated a high inflammatory level throughout an average of 8.3±0.09g/dL of hs-CRP (0.36 a 46.2g/dL) and a high production of free radicals according to the average of hydrogen peroxide (18.23±6.7umol/gP) and MDA (0.04±0.02umol/gP).

Conclusions: in conclusion, despite of the action taken to attenuate the oxidative effects of CKD, it is still necessary to evaluate others alternatives that decrease the inflammatory state and the oxidative stress, as long as these conditions interfere negatively in the patients clinic state.

Key words: inflammation, chronic kidney diseases, oxidative stress.

PO2121

ASSOCIATION BETWEEN FOOD PATTERNS AND BIOMARKERS OF ENDOTHELIAL FUNCTION: A SYSTEMATIC REVIEW

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Background and objectives: It has been suggested that dietary factors can be involved in endothelial dysfunction, increasing risk of cardiovascular diseases (CVD). We aimed to summarize the findings on the associations of food patterns (FPs) and endothelial biomarkers.

Methods: An electronic literature search from 1990-2012 in Medline, Embase, Lilacs, Google Scholar, and reference lists and consulting experts was conducted. We combined search terms related to the exposure (i.e., food pattern, diet) and outcomes of interest (endothelial markers, CVD, endothelium). Studies without dietary intervention such as cohort studies, case-control studies, case series, surveillance, and cross-sectional studies without language restrictions were also considered. PRISMA guidelines were employed. Methodological quality, i.e. study design, sample size, bias, and statistical analysis, was assessed by STROBE.

Results: 532 references were identified, of which 10 were finally included. Four articles were cross-sectional cohort studies, two cohort studies, one nested case-control, and three cross-sectional studies. FPs was defined as usual consumption of food combinations in individuals and groups. In 90% of the articles, usual dietary intake was determined by food frequency questionnaire, and FPs were identified by factor analysis. Several FPs were identified. All articles presented some degree of association between several markers and FPs. Healthy FPs (such as olive oil and vegetables, whole grains and fruits, and Prudent) had a beneficial impact on endothelial function as estimated by circulating levels of biomarkers such as CRP, sICAM-1, sVCAM-1 and sE-selectin, molecules related to endothelial dysfunction. Westernized patterns (e.g. High-fat and processed meat, Western) were positively associated to inflammation molecules and atherogenic promoters.

Conclusions: Major FPs are associated with markers of endothelial dysfunction and inflammation. The study of FPs in relation to endothelial function contributes to the development of dietary recommendations and lifestyle in general, to promote improved cardiovascular health.

Key words: food patterns, endothelium, biomarkers.

PO2122

DOES VITAMIN D STATUS PREDICT ERECTILE DYSFUNCTION AND CARDIOVASCULAR RISK IN AGEING MEN? A NEW ZEALAND PILOT STUDY

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Background and objectives: Suboptimal vitamin D status is associated with increased risk of cardiovascular disease (CVD) and poor cardiovascular outcomes in epidemiological studies. Erectile dysfunction (ED) is increasingly accepted as an early marker of occult CVD; vasculogenic ED is synonymous with endothelial dysfunction. This study investigated whether vitamin D status is associated with ED and other CVD markers.

Methods: We conducted a pilot study in 35 healthy men aged 40-70 years in the Manawatu region, New Zealand. Self-selected participants volunteered with written consent. Participants attended the Nutrition Research Unit for assessment of medical history, height, weight, waist circumference, waist:hip (WHR), waist:height, percentage body fat (%BF) and android:gynoid fat using Dual-energy X-ray absorptiometry, blood pressure, pulse wave velocity using SphygmoCor CPV, fasting lipid profile, vitamin D status (serum 25-hydroxyvitamin D) and ED severity (International Index of Erectile Function 5-item (IIEF-5)). Framingham scores were calculated.

Results: Vitamin D status correlated with HDL-c (r2 = 0.414 p = 0.013), T:HDL-c (r2 = -0.342 p = 0.045) and pulse (r2 = -0.373 p = 0.027). A positive trend was observed with IIEF-5 score (r2 = 0.328 p = 0.055), and negative trends with %BF (r2 = -0.320 p = 0.065) and android:gynoid fat (r2 = -0.308 p = 0.072). IIEF-5 score correlated with age (r2 = -0.429 p = 0.01), WHR (r2 = -0.417 p = 0.013), android:gynoid fat (r2 = -0.368 p = 0.03) and pulse (r2 = -0.427 p = 0.011).

Conclusions: The sample size limited power to detect a statistically significant relationship between vitamin D status and ED. A strong trend was observed and further sampling is underway. Vitamin D status negatively correlated with T:HDL-c, a biomarker of CVD risk. ED negatively correlated with abdominal adiposity, an anthropometrical marker of CVD risk. Identification of vasculogenic ED could support early intervention in ageing men. A randomized controlled human intervention trial is warranted to investigate whether improving vitamin D status in men with vasculogenic ED ameliorates ED and reduces the risk of CVD.

Key words: erectile dysfunction, IIEF-5, vitamin D status, CVD risk.

PO2123

ASSOCIATION BETWEEN RS1137100 SNP IN LEPR GENE AND WAIST-TO-HEIGHT RATIO IN BRAZILIAN OVERWEIGHT CHILDREN AND ADOLESCENTS

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Background and objectives: Genetic factors participate in the complex ethiopathogenesis of obesity and increase the risk of developing eating disorders such as binge eating (BE), which are influenced by neural and hormonal defects in appetite and satiety control. Nevertheless, the relationship between single nucleotide polymorphisms (SNPs) in the leptin receptor gene (LEPR), binge eating and the risk of obesity remains controversial. Our aim was to verify the influence of the rs1137100 (A>G, K109R) in LEPR over BE symptoms, adiposity and cardiometabolic risk factors in overweight children and adolescents.

Methods: The study included 333 subjects aged 7 to 18 years. The rs1137100 was determined by TaqMan genotyping assay. The BE Scale was used to assess BE symptoms, anthropometric measures comprehended ZBMI, percentage of fat mass (%FM), waist-to-height ratio (WHtR) and cardiometabolic risk factors comprised levels of fasting glucose, HOMA-IR, HDL-cholesterol, triglycerides, leptin and blood pressure percentiles. Statistics were performed using Qui-square test, ANOVA and Kruskal-Wallis Test with level of significance set at $p < 0.05$.

Results: Population was in Hardy-Weinberg equilibrium (AA: 64.9%, AG: 29.6%, GG: 5.5%, p = 0.12). The A/A homozygous group presented a lower WHtR mean value when compared to A/G heterozygous individuals (0.67±0.07 vs. 0.65±0.07, p = 0.029), though no statistical difference was found with the G/G homozygous group (p = 0.44). Furthermore, mean values of anthropometric measures and cardiometabolic risk factors were not statistically different between groups.

Conclusions: Our study showed that A/A homozygous for the rs1137100 SNP in LEPR present a lower WHtR than the A/G heterozygous group, although it seems not to be involved with other anthropometric and cardiometabolic risk factors in our sample of Brazilian overweight children and adolescents.

Key words: LEPR, rs1137100, inge eating, waist-to-height ratio.

PO2124

RS1137101 SNP IN LEPR GENE IS NOT ASSOCIATED WITH BINGE EATING AND CARDIOMETABOLIC RISK IN BRAZILIAN OVERWEIGHT CHILDREN AND ADOLESCENTS

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Background and objectives: Leptin plays a crucial role in body weight regulation and satiety signaling, exerting its effects through the interaction with leptin receptor. Common single nucleotide polymorphisms (SNPs) in the leptin receptor gene

(LEPR) such as the rs1137101 (A>G), a non-synonymous mutation, has been associated with increased risk for binge eating, obesity and related metabolic disturbances, though this association is not well established in children and adolescents. Our aim was to determine whether the rs1137101 SNP in LEPR is associated with binge eating, anthropometric measures and cardiometabolic risk factors and in overweight children and adolescents.

Methods: The study population comprehended 333 overweight youngsters aged 7 to 18 years old (46.8% boys; 12.4±2.7 years old, ZBMI 3.23±0.65). TaqMan assay was used for rs1137101 genotyping. Binge eating (BE) was assessed through the BE Scale score. Anthropometric measures were ZBMI, percentage of fat mass (%FM), waist-to-height ratio (WHtR), whereas cardiometabolic risk factors included levels of fasting glucose, HOMA-IR, HDL-cholesterol, triglycerides (TG), leptin and blood pressure percentiles (BPP). Statistics were performed using Qui-square test, ANOVA and Kruskal-Wallis Test with level of significance set at $p < 0.05$.

Results: Population was in Hardy-Weinberg equilibrium (AA: 26.7%, AG: 50.5%, GG: 19.5%, $p = 0.38$). No statistical significant differences were found between the different genotype groups with BES score ($p = 0.09$) and anthropometric measures: ZBMI ($p = 0.81$), %FM (0.54), WHtR ($p = 0.46$). Furthermore, cardiometabolic risk factors also did not differ among groups: glucose ($p = 0.83$), HOMA-IR ($p = 0.50$), HDL-cholesterol ($p = 0.62$), TG ($p = 0.41$), leptin ($p = 0.31$), systolic BPP ($p = 0.68$) and diastolic BPP ($p = 0.85$).

Conclusions: Our results suggest the lack of association of the rs1137101 SNP in LEPR with binge eating, anthropometric measures and cardiometabolic risk factors in Brazilian overweight children and adolescents.

Key words: LEPR; rs1137101; Binge eating; Overweight

PO2125

THE DIETS' NUTRITIONAL VALUE OF WOMEN WITH NORMAL WEIGHT BUT OBESE

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Background and objectives: The aim of the study was to compare the diets' nutritional value of women with different body fat content and different weights.

Methods: The study included 450 women aged 20-45 with BMI>18.5 kg/m2. Body weight, height and thickness of skinfolds were measured. The women were classified into three groups: normal body weight (NW: BMI=18.5-24.9 kg/m2 and FM<32%), normal weight but obese (NWO: BMI=18.5-24.9 kg/m2 and FM>32%) and overweight (OW: BMI=25.0-29.9 kg/m2). A three-day dietary record was used. Two of those days were working days and the third a day off. The underestimation of the energy intake was verified by the Goldberg method (1991) and corrected by neural networks according to body fat and age of women. Finally, 303 women had a correct estimation of the energy intake.

Results: Women with NWO, NW, and OW were 32%, 57%, 11% of the sample, respectively. Women with NWO had higher mean only of vegetable protein (relative difference: 4.6%), carbohydrates (5.8%) and fiber (6.6%) intake compared to women with OW. There was no statistical difference in the eating habits between women with NWO and OW. Women with NWO compared to women with NW had a higher average of intake of animal protein (13.5%), fat (10.4%), SFA (9.4%), MUFA (13.7%), cholesterol (13.5%), sugar (18.2%), sodium (10.6%), potassium (10%), iron (9.5%), but also vitamins: B1 (8.5%), B2 (12.1%), B12 (31.8%), A (30.9%) and D (23.8%). More women with NWO than NW were not eating the dinner (16.7% vs. 1.4%).

Conclusions: Women with normal weight but obese consumed more nutrients of plant origin compared to obese women and more nutrients of animal origin compared to women with normal weight.

Key words: body fat, diets, women.J.W. Szczepanska was supported by the European Union within The European Social Fund

PO2126

ASSOCIATIONS BETWEEN ADIPOSITY AND MICRONUTRIENT DEFICIENCIES IN MEXICAN WOMEN

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Background and objectives: Micronutrient status may play a role in adipogenesis and fat deposition in the body. We addressed whether obesity as characterized by BMI, waist circumference and waist to hip ratio is associated with micronutrient deficiencies among Mexican women.

Methods: Body mass index (BMI), waist circumference (WC), and waist to hip ratios (WHR) were determined for 1056 women aged 12-49 years who were included in the 1999 National Nutrition Survey of Mexico (ENN-99). Determinations of serum zinc, serum retinol, serum ascorbic acid and C-reactive protein (CRP) were made from a single blood sample collected from these women. Linear and logistic regression were carried out to determine linear associations between micronutrient

serum concentrations and BMI, WC, and WHR and between and micronutrient deficiencies and categories of these indices, respectively.

Results: Serum concentrations of all three micronutrients were associated with obesity and abdominal fat though the direction of these associations differed for each. Vitamin C serum concentrations were inversely associated with greater BMI, greater WC and greater WHR ration while serum zinc was inversely associated with greater WHR in women. In contrast, vitamin A concentrations were positively and strongly associated with greater BMI and greater WC but not WHR. There was also a strong association between vitamin C deficiency and obesity and abdominal fat.

Conclusions: These findings suggest that increased obesity and abdominal fat have significant influences on the serum concentration of micronutrients but that these effects are micronutrient specific in terms of direction and obesity measure. The supplementation of obese women should be an important public health priority.

Key words: obesity; zinc; vitamin A; vitamin C.

PO2127

LOW VITAMIN B12 AND FOLATE SERUM CONCENTRATIONS, AND B-VITAMIN INTAKE ARE ASSOCIATED WITH GREATER ADIPOSITY IN MEXICAN AMERICAN CHILDREN

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Background and objectives: Studies investigating associations between vitamin B serum concentrations and B-vitamin intake with adiposity have reported inconsistent findings. We examined associations between serum concentrations of vitamin B12 and foliate, and intakes of B-vitamins with body fat among Mexican American children.

Methods: We used data on 1,131 Mexican American children 8-15 years of age included in the 2001-2004 National Health and Nutrition Examination Surveys (NHANES). Children's body mass index (BMI), truncal fat mass (TrFat) and total body fat mass (TBF) were used as body adiposity measures (BA). Intake of B-vitamins was collected based on 24-hour dietary-recall. Associations of BA with vitamin B12 and folate serum concentrations and B-vitamin intake were determined using linear and multinomial regression models.

Results: B12 and folate serum concentrations were inversely associated with BMI (r=–2.58; 95% CI=–3.54 –1.62; r= –1.27; 95% CI=–2.19 –0.36), with TrFat (r= –1.58; 95% CI=–2.11 –1.06; r= –0.85; 95% CI=–1.46 –0.26) and with TBF (r= –3.05; 95% CI=–4.55 –1.56; r= –2.05; 95% CI–3.29 –0.81). Thiamine and riboflavin intake was inversely associated with BMI (r=–1.25, 95% CI=–2.33 –0.17; r=–1.32; 95% CI= –2.39 –0.30; r=–1.11; 95% CI=–2.12 –0.11) and TrFat (r=–0.84; 95% CI=–1.63 –0.05; r=–1.26; 95% CI=–2.36 –0.15; r=–1.37; 95% CI=–2.40 –0.35). Folate intake showed similar but less significant associations.

Conclusions: Vitamin B12 and folate status may be important in determining body adiposity. Similarly, inverse associations between thiamine and riboflavin intake and adiposity may reflect the role of these micronutrients on energy balance.

Key words: obesity, body fat, B-vitamins, children.

PO2128

EFFECT OF OBESITY ON SELF-ESTEEM IN SECONDARY SCHOOL-AGE STUDENTS OF NORTHERN REGION OF THAILAND

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Background and objectives: Self-esteem is important to the success, especially in adolescence, because physical, mentality, social and thinking process are developed in this age group. Many studies in adolescents found obesity leads to risk of chronic diseases and psychosocial problem, i.e., low self-esteem and lack of confidence. This research aimed to study about self-esteem in Northern Thai adolescents according to their body weight. Method: A prospective study carried in 60 secondary school-age students of Srinagarindra The Princess Mother School, Phayao, aged 12-18 years. These subjects classified by body weight, i.e., under, normal, and over body weight, consisted of 20 subjects/group. Body composition analysis were measured by Tanita BC-420, and dietary intake were assessed by 24 hour-dietary record 3 days/week at weeks 0, 8, 16 and 24. The Five-Scale-Test of Self-Esteem for children questionnaires were used for self-esteem test.

Results: Mean self-esteem score of 60 students was 56.8 (range 38.0-75.0). No significant differences of mean self-esteem score among 3 groups: underweight (55.7), normal weight (59.5) and overweight (55.3). When high self-esteem score was defined as >57.0, 60% of normal weight group had high self-esteem score which were higher than overweight group (50%) and underweight group (35%). According to their body weight groups and sex, we found that most of females and males of underweight groups had low self-esteem score. The most of females and males in normal weight groups had high self-esteem score.

Conclusions: Our study show that body weight status had effects on self-esteem, thus this evidence should be concerned in nutritional therapy for weight reduction and improving self-esteem.

Key words: body weight, self-esteem, adolescent.

PO2129

MICRONUTRIENT STATUS AND IMMUNITY: A CASE STUDY AMONG INDONESIAN ACTIVE PULMONARY TUBERCULOSIS PATIENTS

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Background and objectives: Poor nutritional status is highly prevalent among tuberculosis patients. Vitamin A, vitamin D, and zinc play an important role in the production of cathelicidin, an antibacterial peptide to fight against tuberculosis bacillus. The objective was to investigate the role of micronutrients in the immune system of active pulmonary tuberculosis patients.

Methods: A cross sectional study, involving 27 Indonesian healthy adults and 44 newly diagnosed tuberculosis patients with normal liver and kidney functions, was conducted in Indonesia. Body Mass Index (BMI), polymorphism of vitamin D receptor (VDR) gene Fok I, serum retinol, calcidiol, zinc and cathelicidin concentrations were assessed.

Results: Tuberculosis patients were more prone to low BMI ($p < 0.0001$), low serum concentrations of retinol ($p < 0.0001$), calcidiol ($p < 0.0001$) and cathelicidin ($p < 0.0001$) compared to healthy subjects. Sex ($p = 0.019$; 95% CI: -16.5 to -1.5) and serum retinol concentration ($p = 0.003$; 95% CI: -38.7 to -8.2) play a significant role in serum cathelicidin concentration.

Conclusions: Micronutrients status of tuberculosis patients was lower compared to healthy subjects. Sex and serum retinol concentration play an important role in the immune function of tuberculosis patients.

Key words: vitamin A, vitamin D, zinc, tuberculosis

PO2130

VITAMIN D STATUS OF HEMODIALYSIS PATIENTS IN KOREA

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Background and objectives: Vitamin D deficiency is highly prevalent among hemodialysis patients and contributes to secondary hyperparathyroidism. The objective of this study is to investigate the status of 25(OH)D3, 1,25(OH)2D3 and intact parathyroid hormone(iPTH) in hemodialysis patients, and its relation with vitamin D intake and exposure to sun light.

Methods: This study included 46 patients (19 male and 27 female) with renal disease on hemodialysis, and their blood was obtained for 25(OH)D3 and 1,25(OH)2D3 analysis in October and November (fall season), 2012. The prevalence of vitamin D deficiency defined as serum 25(OH)D3 levels of less than 15 ng/ml. The biological parameters, iPTH, hs CRP, albumin, creatinine and eGFR (ml/min), were analyzed according to level of 25(OH)D3, sex and age. Vitamin D and calcium intakes of these subjects were estimated by using 3-day dietary records and FFQ.

Results: The percentage of vitamin D deficiency (<15ng/ml) in the study subjects was 71.7% (n = 33), 63.2% of male and 77.8% of female. The average concentrations of serum 25(OH)D3, 1,25(OH)2D3 and iPTH were 13.6 ng/ml, 20.8 pg/dl and 301.3 pg/ml, respectively. There was no association between serum 25(OH)D3 status and age, sex, time spent outdoors, the use of sunscreen and the duration of hemodialysis. The intakes of vitamin D were not significantly different between the vitamin D deficient subjects and the others. However, the calcium intake was significantly higher in vitamin D deficient subjects than the others ($p = 0.043$). Serum albumin and creatinine levels were significantly lower in female subjects than male ($p = 0.035$, $p = 0.010$), and eGFR (ml/min) and hsCRP levels were significantly higher in elderly over 65 years old ($p = 0.016$, $p = 0.006$).

Conclusions: A high prevalence of vitamin D deficiency was observed in Korean hemodialysis patients, consequently iPTH levels were severely elevated in these subjects.

Key words: Hemodialysis, 25(OH)D3, 1,25(OH)2D3, iPTH, deficiency.

PO2131

METABOLIC AND BONE DISORDERS IN VERTICALLY HIV-INFECTED CHILDREN

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Background and objectives: Life expectancy of children infected with human immunodeficiency virus (HIV) has increased due to Highly Active Antiretroviral Therapy. Studies have reported that metabolic disorders and changes in bone mineral density (BMD) are common in adult patients with HIV. There are few studies exploring metabolic and bone involvement in children infected. The aim of this study was to evaluate metabolic disorders and BMD in vertically HIV-infected children in two Chilean medical centers.

Methods: A total of 34 children (19 females), 11.8 years (3.8 to 18.5), with HIV infection were evaluated. We determined weight, height, BMI, zBMI, zheight/age and BMD. Intake of energy, protein and calcium was calculated using a 24 hours dietary recall. The percentage of dietary adequacy was estimated according RDI.

Results: 2 patients were at stage A1, 8 in B1, 2 in B2, 6 in B3, 3 in C1, 2 in C2 and 5 in stage C3. The highest percentage of patients (68%) was eutrophic (23/34), 2 were at risk of malnourished, 6 overweight and 3 obese. Despite the above 44% had body fat > 30% and 49% elevated triglycerides. 36% had a height/age <-2 SD. 15% (5/34) patients had a BMD < -1.5 SD and 12% (4/34) < -2 SD in column. 30% (10/34) had BMD < -1.5 SD and 6% (2/34) < -2 SD in hip. All patients consumed about 2.5 times their protein requirements, however, 42% and 72% of patients consume less than 75% of its energy and calcium requirements respectively. We found a significant correlation between stage of disease and increased triglycerides, decreased CD4% and lower hip BMD ($P < 0.05$).

Conclusions: Our data indicate that pediatric patients with perinatal HIV infection have a high percentage of body fat mass, triglycerides and early engagement of BMD. This is higher in more advanced stages of the disease.

Key words: HIV children, metabolic disorders, bone mineral density.

PO2132

EFFECT OF SWEETENERS ON THE PEYER'S PATCHES OF THE SMALL INTESTINE OF BALB/C MICE

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Background and Objectives: In recent years the trend towards health, body image and physical fitness have increased, so there is the need to find a sugar substitute with a similar flavor, but providing less energy intake. The incorporation of sweeteners in the diet and their relationship with the immune system, particularly the gastrointestinal tract associated lymphoid tissue (GALT), has been rarely studied. The objective of this study was to determine the effect of sweeteners on Peyer's patches of small intestine from Balb/c mice.

Methods: Thirty-two 60-day old Balb/c mice, weighing 20-25 g, were divided into 4 groups of 8 animals each: control (without sweetener), sucrose, stevioside or sucralose, were administered in drinking waterfor 6 weeks; weight was measured weekly. Lymphocytes were obtained from the Peyer's patches of the small intestine by enzymatic chemical method and then quantified by flow cytometry: T-lymphocytes (CD3+, CD4+ and CD8+), B-lymphocytes (CD19+) and IgA+ cells.

Results: No significant differences were found in T-cells; B CD19+ cells were significantly different between groups (49.27% +- 4.8 sucrose, 41.13% +-stevia, 36.25% +- 5.6 sucralose) compared with the control group (51.09% +- 6.24), with an $F = 14.77$, $p < 0.003$; IgA+ cells were higher in the control group (5.26% +- 0.483), 5.34% +- 0.168 sucrose, 5.80% +-0.411 sucralose and 6.49% +-0.269 stevia, with $F = 20.22$, $p < 0001$.

Conclusions: humoral immunity was modified by increasing IgA+ cells, natural and artificial sweeteners alter the percentage of CD19+ lymphocytes which has been associated with inflammatory bowel disease. Acknowledgements: This project was financed by UAEM.

Key words: Sweeteners, immunity, GALT

PO2133

NUTRITIONAL AND DIETARY FACTORS AND RISK OF HIP FRACTURES IN ELDERLY CHINESE: A MATCHED CASE-CONTROL STUDY

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Background and objectives: The effects of nutritional factors and risk of osteoporotic fractures remains unclear. We examined the association of nutritional and dietary factors with risk of hip fractures in elderly Chinese men and women.

Methods: 581 (M/F: 148/433) incident cases of hip fractures were enrolled from four hospitals, with 581 sex- and age-matched (±3 years) controls from hospitals or communities in Guangdong, China during 2008.1- 2012.6. Face-to-face interviews were conducted to collect general information, habitual dietary intake (by FFQ) and various covariates.

Results: Multivariate conditional logistic regression analyses showed: A dose-dependent decreased risk of hip fractures was associated with greater intakes of fruit & vegetables, seafood, skin-free poultry, β-carotene and other antioxidative nutrients, K and Mg, but lower consumption of red meat, pickled vegetables, oils and fat, and net endogenous acid production (NEAP). The adjusted odds ratios (95%CI) of hip fractures for various foods and nutrients comparing their consumption levels of extreme quartiles were: total fish & shell fish: 0.47(0.28-0.79), seafood: 0.31(0.18-0.52), fresh-water fish: 0.80(0.48-1.31), total fruit & vegetables: 0.22(0.13-0.39), vegetable: 0.29(0.17-0.52), fruit: 0.62(0.36-1.08), skin-free poultry: 0.52 (0.34, 0.82),β-carotene: 0.15(0.06-0.34), vitamin C: 0.28(0.13-0.61), K: 0.27(0.13-0.53), Mg: 0.30(0.14-0.65), tea drinker (Y/N): 0.72(0.54-0.95), red meat: 2.74(1.61, 4.67), organ meat: 1.54(1.07, 2.23), pickled vegetable: 3.49(1.72-7.10), oil & fat: 4.48(2.15-9.34), and NEAP: 4.94(3.16-7.73), respectively. Dietary pattern analyses suggested that "healthy dietary pattern" was associated with lower hip fracture risk, whereas "high-fat dietary pattern" might increase the risk.

Conclusions: Greater intakes of fruit & vegetables, seafood, skin-free poultry, antioxidative nutrients, K and Mg, but lower consumption of red meat, pickled vegetables, fat, and NEAP may be protective against hip fractures in elderly Chinese.

Key words: nutrition; dietary factor; hip fracture; case-control study; chinese.

PO2134

ASSOCIATION OF DIETARY FACTORS AND DIETARY QUALITY WITH RISK OF NASOPHARYNGEAL CARCINOMA IN CHINESE ADULTS: A CASE-CONTROL STUDY

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Background and objectives: To examine the association of dietary factors and dietary quality with risk of nasopharyngeal carcinoma (NPC) Chinese men and women.

Methods: 600 (M/F: 448/152) incident nasopharyngeal carcinoma (NPC) cases (47+/-9y) were enrolled from hospitals, with 600 sex- and age-matched (±3 years) controls from hospitals or the community in Guangzhou, China during 2009.7-2011.3. Face-to-face interviews were conducted to collect general information, habitual intake of foods and nutrients (by a 79-item FFQ) and various covariates. Dietary quality was evaluated according to the Diet Quality Index-International (DQI-I), Alternate Healthy Eating Index (AHEI) and alternate Mediterranean Diet Score (aMED). Subjects were classified into quartiles (Q1~Q4) by the consumption of each food/food group item or the quality scores.

Results: Multivariate conditional logistic regression analyses showed: a dose-dependently decreased risk of hip fractures was associated with greater intakes of fruit & vegetables (particular those with dark color), low-fat dairy products, lower consumption of seafish and shell-fishes, pickled vegetables, processed fish and meat, or higher quality diet. The multivariate adjusted odds ratios (95%CI) of NPC for various foods comparing their consumption levels of extreme quartiles were: total fruit & vegetables: : 0.37(0.25-0.55), vegetable: 0.33(0.22-0.50), dark-color vegetable: 0.30(0.20-0.45), light-color vegetable: 0.77(0.53-1.13), fruit: 0.70(0.47-1.04), dark-color fruit: 0.50(0.32-0.76), low-fat dairy (Yes vs. No): 0.52(0.28-0.95), sea fish: 1.87(1.29-2.70), shellfish: 1.61(1.07-2.41), pickled vegetables: 2.31(1.54-3.46), and processed fish and meat: 1.80(1.21-2..66). ORs (95%CI) of NPC for dietary quality scores (Q4 vs. Q1) were: DQI-I: 0.64(0.45-0.93), AHEI: 0.490.33-0.72), and aMED: 0.58(0.37-0.92).

Conclusions: Greater intakes of fruit & vegetables, low-fat dairy products, lower consumption of sea fish and shell-fishes, pickled vegetables, processed fish and meat, or increased total dietary quality may be helpful for the prevention of NPC Chinese adults.

Key words: nutritional and dietary factors; nasopharyngeal carcinoma; case-control study; chinese.

PO2135

BINGE EATING DISORDER IN OBESE WOMEN: A QUALITATIVE STUDY IN BRAZIL

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Background and objectives: The Binge Eating Disorder (BED) is characterized by the ingestion of large amounts of food in a short period of time with a sensation of lack of control. It is a new nosological entity that has a narrow relation with obesity and therefore, with chronic diseases. The prevalence and etiology of BED is not sufficiently known but the literature recognizes that specific and differentiated assistance is needed. This study aims to analyze perceptions and experiences of obese women who suffer from BED, focusing on body related aspects, and also to analyze the public assistance model offered to this group in the municipality of Rio de Janeiro (Brazil).

Methods: This study was based on the qualitative health research approach. A total of 15 non-directive interviews were conducted with obese women who suffer from BED, aged 18-55 years, assisted by a specialized program in a public hospital. The qualitative material was analyzed and categorized in thematic axles.

Results: Social prejudice directed towards the obese body is a possible aggravating factor for BED and obesity. The biography of the interviewed women confirmed literature data and went beyond showing evidences such as: chemical dependency of first degree relatives; difficulties in the individuation process; social stigmatization; conflictive family dynamic; and lack of personal autonomy. Negative experiences with diet formulas were reported to be associated with susceptibility to the beauty standards appeal promoted by media, leading to social isolation and low self-esteem.

Conclusions: Obesity is an important public health challenge, especially when associated to BED. The BED multidimensional etiology indicates that psycho-affective and social components are involved in its complex genesis. The assistance offered, by an interdisciplinary team, should include those aspects in order to facilitate adhesion to treatment and refrain the problem to become chronicle.

Key words: obesity, binge eating, nutrition.

PO2136

THE EFFECT OF FRUIT INTAKE ON BLOOD LIPID PROFILE IN HEMODIALYSIS PATIENTS

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Background and objectives: To evaluate the association between fruit intake and blood lipid profile in hemodialysis (HD) patients.

Methods: This is a cross-sectional study. All subjects were outpatients from two dialysis centers in Taipei and Keelung in Taiwan. Thirty-eight HD patients were completed this study. The dietary intake was calculated from the average of 3-day dietary record. Fasting predialysis blood samples were drawn from all subjects and measured by Department of Laboratory Medicine of Taipei Medical University Hospital. The lipid profile (serum total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, non-high-density lipoprotein cholesterol, triglyceride), nutritional markers (dry body weight and serum albumin), and concentration of hemoglobin and potassium were measured.

Results: twenty-two of HD patients usually ate fruits, and the mean intake of fruits was 0.8 servings (95% confidence interval 0.5-1.1 servings). Comparing with patients without fruits intake, patients ate fruits with significantly higher dietary fiber intake, and lower level of serum low-density lipoprotein cholesterol, non-high-density lipoprotein cholesterol and triglyceride, but the lipid profile did not achieve statistical significance. Eating fruits did not significantly affect the level of blood potassium, hemoglobin and albumin.

Conclusions: HD patients in this study eating fruits had significantly increased dietary fiber intake without elevated the concentration of serum potassium. However, we need more and bigger future studies to document the benefit of fruits intake of HD patients.

Key words: hemodyalisis, lipid profile, fruit intake.

PO2137

GENDER DIFFERENCE IN DIETARY PATTERN BETWEEN NON-DIALYSIS DAY IN WEEKDAY AND WEEKEND OF HEMODIALYSIS PATIENTS IN NORTH TAIWAN.

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Background and objectives: To find out the effect of gender on dietary intake of hemodialysis patients between non-dialysis day in weekday (NDWD) and weekend (NDWE).

Methods: One hundred and ten adult hemodialysis patients from 3 hemodialysis centers in North Taiwan were recruited in this study, and 51 were male(46%). All subjects were under in-center hemodialysis treatment for at least 2 months, and without any parenteral nutrition therapy. Three days dietary record was collected for dietary information, including one hemodialysis day, one non-dialysis day in NDWD and NDWE.

Results: Age, hemodialysis vintage and severity of comorbidity were no significant different between male and female patients. Comparing with male subjects, female had significantly lower cereal, meat, fish, eggs and soy protein, and dietary protein, fat, cholesterol, iron, zinc, polyunsaturated fatty acid, niacin, and vitamin B6 and B12 intake ($p < 0.05$). Both genders had higher phosphorus and iron intake in Sunday than NDW, but did not attend significantly difference. Only female subjects had significant higher vitamin A intake in Sunday than NDWD ($p = 0.04$). The evaluated variables of dietary pattern and nutrients intake in male patients were no significantly different between NDWD and NDWE

Conclusions: In this study, dietary intake in patients with hemodialysis treatment was not significantly different between NDWD and NDWE, except vitamin A intake in female patients.

Key words: hemodialysis, Taiwan, dietary pattern .

PO2138

INCREASE OF SERUM CHOLESTEROL LEVEL INDUCED BY DIETARY CHOLSTEROL INVOLVES SECRETION OF TRIACYLGLYCEROL FROM LIVER IN EXHC RATS.

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Background and objectives: Clinically, high serum total cholesterol levels have been identified as risk factors for atherosclerosis and cardiovascular disease for decades. Cholesterol in serum derived from de novo synthesis in the liver and diets. Exogenously hypercholesterolemic (ExHC) rats, the model animal of diet-induced hypercholesterolemia, develop hypercholesterolemia only when dietary cholesterol is loaded. We previously showed that ExHC rats develop symptoms of hepatic low triacylglycerol (TAG) levels compared with Sprague-Dawley (SD) rats, the original strain, concurrently with hypercholesterolemia when dietary cholesterol is loaded. In this study, we compared ExHC and SD rats to explore a relationship between hypercholesterolemia and lower hepatic TAG levels in ExHC rats. This study provides new insight into regulation of cholesterol metabolism.

Methods: ExHC and SD rats were fed a 1% cholesterol diet for 1 week. Hepatic and serum lipid parameters, gene expressions and enzymatic activities related to lipid metabolism in the liver were measured.

Results: We reproducibly observed higher serum cholesterol and lower hepatic TAG levels in ExHC rats. The livers in ExHC rats developed Golgi apparatus to secrete beta-very low density lipoprotein (beta-VLDL) that contained higher cholesterol ester (CE) and lower TAG contents than those secreted by SD rats. Gene expressions related to fatty acid and TAG synthesis in ExHC rats were lower than that in SD rats. Enzymatic activities for fatty acid synthesis were also lower in ExHC rats. Moreover, according to fatty acid compositions of hepatic and serum CE in ExHC rats, these CEs were not modified after secretion from the liver.

Conclusions: Low production of liver TAG and secretion of CE-rich and TAG-poor lipoprotein of beta-VLDL without modification in the circulation caused hypercholesterolemia induced by dietary cholesterol in ExHC rats.

Key words: ExHC, triacylglycerol, beta-VLDL

PO2139

DNA MICROARRAY STUDY REVEALING THE GENE ALTERATIONS UNDER ANTI-DIABETIC EFFECT OF DECAFFEINATED COFFEE ON DIABETIC KKAY MICE

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Background and objectives: Many epidemiological studies have suggested the risk-reducing effects of coffee consumption on diabetes, while the detailed mechanisms are poorly understood. Our previous experiments using C57BL/6J mice fed a high-fat diet showed that coffee intake suppressed hepatic fat accumulation, which is one of the important upstream events of type 2 diabetes. The present study was conducted to obtain information on the alterations in gene-expression to clarify molecular mechanisms underlying the effects of coffee on genetically-diabetic mice.

Methods: Male KK-Ay mice at 5 weeks of age were fed a high-fat diet (HF) or HF containing 2% powders of decaffeinated coffee (DC) for 3 weeks. Global gene expression profile of liver and adipose tissue were analyzed by DNA microarray.

Results: The results showed that DC prevented body weight gain and fat accumulation of mice. DC group showed a tendency of alleviated insulin resistance evaluated with an insulin tolerance test. The amount of plasma glucose, plasma free fatty acids and hepatic fat accumulation were lower in mice of DC group. DNA microarray analysis on adipose tissue revealed that the expression of genes involved in inflammation (MCP-1, CCR2 and LCN2) and extracellular matrix (Col8a1) were down-regulated by the intake of DC. Furthermore, the hepatic gene expression profile showed that the expression of Gclc gene, the deletion of which leads to hepatic steatosis with mitochondrial injury, was up-regulated by the intake of DC. These alterations were further validated by quantitative RT-PCR.

Conclusions: The present study suggests that the intake of DC may suppress inflammation of adipose tissue and dysfunction of its extracellular matrix, and suppress steatosis with mitochondrial injury in liver. These alterations may lead to the suppression of insulin resistance, and these findings provide significant insights into the association of the coffee intake and prevention of diabetes.

Key words: Coffee, diabetes, transcriptomics.

PO2140

EFFECT OF CHIA (SALVIA HISPANICA L) CONSUMPTION ON TNF-α LEVELS AND NUTRITIONAL STATUS IN BREAST CANCER PATIENTS

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Background and objectives: Breast cancer is the second cause of death in women in Mexico. Factors involved in cancer progression are increased levels of pro-inflammatory cytokines such as TNF-α and nutritional status. Chia is a seed rich which provides nutrients like antioxidants, proteins, vitamins, minerals and omega-3, it is a good nutritional alternative in cancer patients due to levels reduction of inflammation. Our objective was to associate the chia effect consumption on the levels of TNF-α and nutritional status in patients with breast cancer.

Methods: In 60 patients with breast cancer who were diagnosed in the period September to December 2012. In this period we divided the study in two phases; first, nutritional status was measured by body weight, body mass index, waist hip index, 24 hour recall and questionnaire nutrition. In serum samples, TNF-α were evaluated by ELISA. Then, subjects received 25 g of chia to consume three times a day for a month. After 1 month we did repetitions of previous experiments to evaluate chia effects on nutritional status and levels of TNF-α.

Results: We found decreased levels of TNF-α levels after consumption of chia and improving the nutritional status of patients with breast cancer.

Conclusions: Chia is a food endemic in Mexico used since pre-Hispanic times as medicine and has nutritional potential because it is rich in omega-3, has some properties to reduce levels of pro-inflammatory cytokines in patients with breast cancer, enhance the appetite and reduce weight loss. This food could be an alternative to breast cancer treatment.

Key words: Chia, breast cancer, nutritional status, TNF-α.

PO2141

PROTEOMIC ANALYSIS OF GLUCOSE AND LIPID METABOLISM IN LIVER OF DIABETIC MICE FED WITH TOONA SINENSIS LEAF ETHANOL EXTRACT

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Background and objectives: Hepatic insulin resistance has been implicated in the hyperglycemia and dyslipidemia in the diabetic patients. Toona Sinensis leaf ethanol extract (TSL-E) has been reported to improve the hyperglycemia and dyslipidemia in in vivo and in vitro models. However, the mechanism of TSL-E on the glucose and lipid metabolism in liver remains unclear. Therefore, the aim of the present study is to investigate the mechanism of TSL-E on the liver metabolism.

Methods: The liver of diabetic mice and FLB3 hepatocytes were used to investigate the effects of TSL-E on liver metabolism. Proteomic analysis, Western blot and real-time PCR were used to analysis the changes of hepatic protein and RNA expression. The oil red O stain was used to examine the lipid accumulation in hepatocytes.

Results: Proteomic analysis results showed that TSL-E inhibited the sorbital dehydrogenase (SDH), UDP-6 glucose dehydrogenase (UDH), and glutamate dehydrogenase (GDH) protein expression, leading to the reduction of gluconeogenesis in the liver of diabetic mice. Results of Western blot and real-time PCR demonstrated that TSL-E (100 μg/mL) increased the level of PPARγ, uncouple protein-3 (UCP), carnitine palmityl transferase 1 (CPT) and acyl-CoA oxidase (ACO) protein/RNA expressions, indicating that TSL-E increased the fatty acid β oxidation in hepatocytes. The results of oil red O stain showed that TSL-E inhibited the lipid accumulation in hepatocytes.

Conclusions: TSL-E decreased SDH, UDH, and GDH protein expression and increased PPARγ, UCP, CPT and ACO expressions, leading to the reduction of gluconeogenesis and the induction of fatty acid oxidation in hepatocytes. These results suggest that TSL-E can be developed into a supplement for diabetic patients to improve the glucose and lipid metabolism of liver.

Key words: Toona Sinensis, liver, gluconeogenesis, fatty acid oxidation, diabetes.

PO2142

INDEPENDENT CONTRIBUTION OF NECK CIRCUMFERENCE TO THE RISKS OF CARDIO-METABOLIC SYNDROME IN PEOPLE OF SOUTHERN CHINA

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Background and objectives: The aim of this study was to investigate and compare neck circumference as screening tool of cardio-metabolic risks with existing classical anthropometric indices as Body Mass Index (BMI), Waist Circumference (WC) and Waist to Hip Ratio (WHpR) in a large population of southern China.

Methods: A total of 4201 participants (2508 men and 1693 women) age 20-85 years were recruited from the routine health check-up department. Anthropometric indices, bio-chemical and clinical parameters were measured. Receiver-operating characteristic curves were performed and area under the curve (AUC) of anthropometric indices were calculated to evaluate the prediction of cardio-metabolic risks. Partial correlation and logistic regression analysis were employed to determine the association and likelihood of anthropometric indices and cardio-metabolic risks.

Results: NC positively correlated with SBP and DBP (r=0.250 and 0.261), fasting blood glucose (r=0.177), TG (r=0.240), TC (r=0.143) and LDL-C (r=0.088) and negatively correlated with HDL-C (r=-0.202) in male (all $p < 0.01$), Similar results were found in female with the exception of TC. Compared with the classical anthropometric indices, The AUCs of NC for all risk factors of cardio-metabolic syndrome were the lowest. However, the adjusted ORs (95% CIs) in men and women of NC for MS-rf were 1.39 (1.14-1.68) and 1.84 (1.39-2.43); for high BP were 1.32 (1.09-1.59) and 1.48 (1.12-1.93); for increased TG were 1.23 (1.02-1.48) and 1.72 (1.29-2.28); for increased FBP were 1.33 (1.03-1.70) and 1.44 (1.01-2.04); for decreased HDL-C only in women (OR; 1.47).

Conclusions: Neck circumference was significantly associated with cardio-metabolic risk factors and independently contributed to predict cardio-metabolic risks beyond the classical anthropometric indices in adults of southern China.

Key words: Cardio-metabolic risk factors, neck circumference, central obesity. [This study was supported by grants from National Natural Science Foundation of China (81072302 and 81273050) and Natural Science Foundation of Guangdong Province of China (10151008901000207)]

PO2143

COMPARATIVE ASSEESSMENT OF NUTRITIONAL STATUS OF PATIENTS WITH END STAGE RENAL DISEASE ON HAEMODIALYSIS AND CONSERVATIVE THERAPY IN IBADAN, NIGERIA

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Background and Objectives: Many experimental and clinical studies have shown that end stage renal disease patients are wasted or malnourished. This study was carried out to determine and compare the nutritional status of patients with end stage renal disease (ESRD) on hemodialysis and conservative therapy.

Methods: The study was an analytical study and it involved thirty (30) patients with ESRD (experimental group) and age and sex-matched apparently healthy subjects (control). Socio-demographic characteristics, medical history, lifestyle, anthropometric indices, dietary intake using 24-hr dietary recall and biochemical indices such as urea, creatinine, electrolyte (sodium and potassium) and packed cell volume (PCV) were obtained.

Results: The mean±SD age of the patients on conservative therapy, hemodialysis and controls were 49.7±14.4 years, 46.5±14.9 years and 44.4±12.3 years respectively. Majority (63.3%) of the patients had ESRD within one year, low proportion (15.6%) and (31.1%) of the patients had ever smoked cigarette and drank alcohol respectively. The mean±SD BMI of the patients on conservative therapy, hemodialysis and controls were 24.18±3.44 kg/m2, 22.28±4.03 kg/m2 and 24.86±5.03 kg/m2 respectively while the mean±SD waist-hip ratio were 0.89±0.07, 0.90±0.05 and 0.86±0.06 respectively. The energy, protein, fat, retinol, ascorbic acid, zinc and iron intakes of the experimental groups were lower than the recommended daily allowance ($p < 0.05$). The serum urea (138.00±63.09 mg/dl, 104.80±41.57 mg/dl) and creatinine (5.93±2.62 mg/dl, 4.75±1.53 mg/dl) levels of the patients on conservative therapy and hemodialysis were high but better in hemodialysis group while their PCVs were low when compared with reference values. Potassium levels of the patients on conservative therapy were also high but normal for patients on hemodialysis.

Conclusions: For improvement of nutritional status of these patients there should be periodical assessment of nutritional status and appropriate measures taken to improving the quality of life and disease outcome.

Key words: End stage renal disease, biochemical indices, anthropometric indices.

PO2144

ASSOCIATIONS BETWEEN DIETARY FAT AND SERUM LIPID PROFILE DEPEND ON BODY FAT AND GENDER IN EUROPEAN ADOLESCENTS: THE HELENA STUDY

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Background and objectives: Dietary and body fat are associated with adverse serum lipid profile and higher cardiovascular diseases (CVD) risk in adults. The aim of this study was to investigate the relationship between fat intake and body fat and serum lipid profile in European adolescents from eight European cities participating in the cross-sectional (2006-2007) HELENA study.

Methods: Weight, height, waist and hip circumferences, skinfolds thicknesses, total cholesterol (TC), high density lipoprotein-cholesterol (HDL-c), low density lipoprotein-cholesterol (LDL-c), triglycerides, apolipoprotein B and A1 were measured in 454 adolescents (44% boys) aged 12.5-17.5 years. TC/HDL-c, apolipoprotein B/apolipoprotein A1, waist-to-hip and waist-to-height ratios were calculated. Fat intake was assessed by two 24-hour dietary recalls. Associations were evaluated by multilevel analysis stratified by gender.

Results: After adjustments for potential confounders, a negative association was observed between dietary fat (g/day) and triglycerides, TC, TC/HDL-c ratio, LDL-c, apolipoprotein B and apolipoprotein B/apolipoprotein A1 ratio among female adolescents. Moreover, the ratios waist-to-hip and waist-to-height were positively related to triglycerides and TC/HDL-c ratio and negatively with HDL-c. A positive association was also found between waist-to-height ratio and apolipoprotein B and apolipoprotein B/apolipoprotein A1 ratio. No significant associations were observed in boys. An interaction was found between fat intake and body fat-related variables. Indeed, considerable adverse serum lipid profile was observed across tertiles of fat intake for those adolescents with higher sum of skinfolds and waist-to-hip and waist-to-height ratios compared to those with lower values for body fat measures.

Conclusions: Our results suggest that fat intake and body fat are associated with serum lipid profile and that this association differs according to gender and initial body fat status. These findings should be considered when developing strategies to prevent CVD risk among adolescents since serum lipids are major markers of CVD risk.

Key words: fat intake, body fat, gender, adolescents

PO2145

PINE BARK EXTRACT ATTENUATES COX-2 EXPRESSION IN INFLAMED CACO-2 CELLS

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Background and objectives: There is evidence that French maritime pine bark extract (PBE), used as ingredient of polyphenol-enriched fruit juices improves inflammatory symptoms in vivo and in vitro. Cyclooxygenase-2 (COX-2) catalyzes the enzymatic conversion of arachidonic acid to prostaglandins and is induced in response to inflammatory stimuli, being demonstrated as a major molecular target for the prevention of cancer. In this study, we determine the effect of pine bark extract on the relative COX-2 mRNA expression in colon cancer cells.

Methods: Caco-2 cells and LPS stimulated Caco-2/RAW 264.7 cells, as model of intestinal inflammation, were exposed 2 h daily (4 days) to 4% of 0.5 g.L-1 PBE aqueous solution. Total RNA was isolated using RNeasy Mini kit (QIAGEN). The relative quantification of COX-2 expression was determined by qPCR with ABI PRISM® 7900 HT Instrument (Applied Biosystem) using SYBR Green and JumpStart™ Taq Ready Mix kit (SIGMA). α-actin gene was used as reference. Data were collected and processed with SDS2.2 software. Results were expressed as fold induction compared with the relative COX-2 expression in untreated cells (DMEM) considered as control. Data were expressed as mean±SEM. Statistical analysis was performed by using paired t-test ($p < 0.05$).

Results: The in vitro inflammatory model determines an increase in COX-2 expression (about 3 times of untreated control cells). Following 4 days of PBE exposure, an inhibition of COX-2 gene expression in inflamed Caco-2 cells was observed. In fact PBE supplementation seems to be associated with a lack of induction of COX-2.

Conclusions: Future studies should elucidate the molecular effects of PBE on the translation of COX-2 enzyme in colonic cell lines in response to pro-inflammatory stimuli. This would help to better understand the kinetics of prostaglandin synthesis involved in the anti-inflammatory activity of PBE.

Key words: pine bark extract, Caco-2/RAW 264.7, COX-2

PO2146

LONG TERM INTAKE OF CARBOXYMETHYL-LYSINE GIVE RISE TO LOW-GRADE GUT INFLAMMATION

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Background and objectives: The purpose of this study was to unravel the effect of a high long-term intake of carboxymethyl-lysine (CML), an advanced glycation compound produced in the Maillard reaction during the heat processing of foods, over the development of low-grade inflammation at the gut level.

Methods: Bovine serum albumin (BSA) was glycated with glyoxylic acid to produce a glycated BSA (G-BSA) enriched in CML. It was added to the AIN-93G diet to reach a final concentration of 3%. Wild type. BALB/c mice were fed for three months, monitoring the evolution of permeability, anti- proinflammatory cytokines and chemokines (IL1β, IL6, IL10, IL18, TNF-α, CCL5), ocludin, NLRP6 inflammasome, RAGE and GPR43 expression, mBD-3 defensin as well as gut microbiota composition were assayed.

Results: CML intake increased production of proinflammatory cytokines and RAGE expression, whereas a decrease on GPR43 and NLRP6 expression was observed. At longer times, a two-times increase on mBD-3 defensin and CCL5 produced changes in gut microbiota, decreasing commensal bacteria such as Faecalibacterium prausnizii and increasing more detrimental ones like Prevotella spp. Then, a higher production of mucus degrading sulphatases gave rise to an increase of intestinal permeability and inflammation.

Conclusions: Dietary CML influences gut metabolism and immunity, producing a low-grade inflammation. Then, a high intake of severely heat-treated foods could increase the risk of inflammatory bowel disease development in those people with genetic susceptibility due to an immune system deregulation.

Key words: Carboxymethyl-lysine; gut; RAGE; GPR43; inflammation.

PO2147

PROPIONIC ACID AND CARBOXYMETHYL-LYSINE REGULATES THE INFLAMMASOME AXIS IN GUT CELLS

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Background and objectives: This study aims to study the effect of carboxymethyl-lysine (CML), an advanced Maillard reaction product found in the heat-processed foods, over the inflammasome axis in gut epithelial cells and neutrophils.

Methods: Neutrophils and gut epithelial cells obtained from BALB/c mice were cultured in RPMI 1640 medium supplemented with heat-inactivated 10% fetal bovine serum. Crystalline CML, propionic acid, LPS or ATP were added to the culture medium to assess their activity. IL1β, IL18, proIL1β, proIL18, NLRP3 and NLRP6 content were assessed with ELISA kits after cellular lysis.

Results: Epithelial cells produced a larger amount of IL18 than neutrophils because of IL18 sustains gut epithelium regeneration. Propionic acid stimulated NLRP6 inflammasome production whereas CML blocked this effect. However, CML increased the release of proinflammatory IL1β upon activation with LPS and ATP of the NLRP3 inflammasome. Taken together, these results indicate that propionic acid and CML competes in the inflammasome axis with opposite activities over NLRP3 and NLRP6.

Conclusions: Short chain fatty acids, produced after fermentation of dietary fiber, maintains gut homeostasis at the epithelium level through the activation of the NLRP6 axis, with an increase of IL18 release after danger stimuli such as ATP. However, CML coming from heat-treated foods produce an inverse effect, giving rise to release of inflammatory mediators (IL1β) upon NLRP3 activation. Then, an imbalance on the dietary fiber and Maillard reaction products intake could trigger gut inflammation.

Key words: Inflammasome; carboxymethyl-lysine; short chain fatty acids; gut; inflammation.

PO2148

A RAT MODEL OF GENETIC OBESITY SHOWS CHANGES IN SECRETION OF CYTOKINES (BASAL AND CON A STIMULATED) BY SPLEEN LEUCOCYTES

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Background and objectives: Obesity is characterized by a low and chronic inflammatory state due to the increased secretion of pro-inflammatory cytokines (PI) by the adipose tissue. Zucker rats (fa/fa), which carry the homocygotic mutation in the leptin receptor gene, are a model of genetic obesity. Previous studies have shown that these animals at adult age show a premature immunosenescence. It is well known that with ageing there is an imbalance in the secretion of cytokines, with higher levels of PI (such as TNF-α and IL-1β) and lower levels of the anti-inflammatory (AI) (for example, IL-10) and IL-2 cytokines. For this reason, we have investigated the secretion of these cytokines by spleen leucocytes in these obese rats.

Methods: Male genetically obese rats (fa/fa), lean heterocygotic (fa/+) and Wistar rats fed with a standard diet were used. The spleen leucocytes of these animals at six months of age were obtained and maintained in a basal and stimulate culture with the T lymphocyte mitogen, concanavaline A (Con A). After 48 hours the culture medium was collected and the secretions of IL-2, IL-10, IL-1β, and TNF-α were measured by luminometry.

Results: The results showed that the basal secretions of IL-10 and TNF-α were higher, and those of IL-2 lower, in obese animals compared to lean and Wistar rats. In response to Con A the levels of IL-10 and IL-2 in fa/fa rats were lower, and those of TNF-α higher, in comparison with the lean and Wistar rats.

Conclusions: Thesecretion of cytokines in obese rats, in response to the mitogen, seems to corroborate the premature immunosenescence in these animals, especially in the T cell response against infections, and their inflammatory state (high and low levels of PI and AI, respectively).

Key words: Obesity, Cytokines, Rats, Immunosenescence, Inflammation. Support:MCINN(BFU2011-30336); UCMResearchGroup(910379); RETICEF(RD12/0043/0018)ISCIII-FEDER(European Union).

PO2149

WEIGHT LOSS METHODS IN RELATION TO WEIGHT MAINTENANCE STATUS: FOCUS GROUPS RESULTS

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Background and objectives: Weight loss experiences may affect weight loss maintenance. We qualitatively explored experiences during weight loss and potential differences between weight loss maintainers and weight regainers.

Methods: 44 volunteers (41% males) formed 8 Focus Groups, 4 of maintainers and 4 of regainers. Participants had intentionally lost at least 10% of their starting weight and kept it off for at least 1 year (maintainers), or had regained most of the weight initially lost (regainers).

Results: Maintainers compared to regainers were younger (27±7 vs. 42±16 yrs, p = 0.002) and had a lower BMI (24.1±2.8 vs. 31.2±4.3 kg/m2, p < 0.001). Reports on weight loss methods differed between the groups, with maintainers stating losing weight mostly on their own and regainers reporting seeking professional help. Maintainers applied modest diet changes, e.g. limiting intake of sweets and junk food, increasing eating frequency, increasing fruit/vegetable consumption, reducing portion sizes, and relied on self-monitoring techniques, e.g. keeping a diet diary, calorie counting, and regular weighing. In contrast, regainers had tried more extreme approaches, namely diet pills, detox/fasting diets, and meal substitutes. It is also of interest that the "experts" to whom regainers referred in order to lose weight, were not always accredited health professionals. Another prominent difference between the groups was physical activity experiences. Maintainers stressed the importance of exercising during weight loss, while regainers gave mixed remarks.

Conclusions: Maintainers and regainers reported differences in weight loss experiences. Maintainers made modest changes, on their own, while regainers tried more extreme approaches. Modest changes may be sustainable in the long-term, hence leading to weight loss maintenance. Moreover, the ability to self-regulate diet and physical activity behaviors, contrary to having to seek external help, could be a feature positively influencing maintenance.

Key words: focus groups, weight loss maintenance, maintainers, regainers.

PO2150

CONSUMPTION OF PHENOL-RICH VIRGIN OLIVE OIL IMPROVES HIGH FAT DIET-INDUCED TYPE 2 DIABETES MELLITUS

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Background and objectives: Mediterranean dietary pattern appears to decrease the risk of type 2 diabetes (DM2).However, it is unclear whether the consumption of extra virgin olive oil (EVOO),alone, is able to improve DM2. Thus,we evaluated the differential effects of saturated, monounsaturated and phenol-rich monounsaturated (5-times higher levels of phenolic compounds) high fat diets (HFD) on endocrine function and glucose homeostasis.

Methods: 5-week-old male C57BL/6 mice were fed (3 months) with a HFD (48% energy from saturated fat; n= 90) and 9 months with standard diet (11% fat; control group; n= 30). Then,HFD mice were divided into 3 groups and fed 6 months more with: i) saturated HFD (HFD/SAT; n=30); ii) EVOO HFD (HFD/EVOO; n= 30) and iii) phenol-rich EVOO HFD(HFD/EVOOP; n= 30).We measuredbody weight (BW), fasting blood glucose, serum insulin, intraperitoneal glucose tolerance test, insulin tolerance test, insulin resistance and insulin sensitivity, at different times. Moreover, we tested pancreatic islets insulin content, glucose stimulated insulin release (GSIR) and β-cell mass, at the end of the study.

Results: After 3 months, HFD mice developed obesity andDM2 with significantly (p< 0,01; n= 90) hyperglycemia, hyperinsulinemia, glucose intolerance, lower insulin response and insulin resistance, lower islet insulin content and GSIR and lower β-cell mass. Six months later, HFD/EVOO and HFD/EVOOP mice significantly (p< 0,05; n= 20) reduced their BW, glycemia and insulinemia, improved their insulin response and insulin resistance. Moreover, their islet insulin content, GSIR and β-cell mass significantly (p< 0,05; n= 20) increased.

Conclusions: These data support thatmonounsaturated and phenol-rich monounsaturated HFD improved BW, β-cell function and glucose homeostasis in a model of diet-induce

DM2. No special effects were observed with the presence of significantly higher (p< 0,01; n= 3) levels of phenolic compounds.

Key words: Olive oil, diabetes, insulin, obesity, pancreatic islet

PO2151

S- ADENOSYLMETHIONINE AS A MODULATOR OF HEPATOCYTE SURVIVAL IN NON- ALCOHOLIC FATTY LIVER DISEASE IN RATS

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Background and objectives: Chronic excessive fructose intake causes obesity, intrahepatic lipid accumulation, liver oxidative injury and Non-alcoholic fatty liver disease (NAFLD). Therapeutic approach to increase hepatic autophagy can prevent the progression of NAFLD from steatosis to steatohepatitis and liver diseases. Recent data suggest that pathologically activated apoptosis suppresses autophagy, which in an environment of oxidative stress and overfeeding should serve as a mechanism for hepatocyte survival. The aim of this study was to investigate the role of S- adenosylmethionine (SAM-e) (nutrient with antioxidant and antiapoptotic effects) in the mechanism of hepatocyte injury leading to cell death or survival.

Methods: Male Wistar rats (n = 21) were used in the experiment. They were divided into 3 groups: control, fructose fed (35 %, 16 weeks), fructose fed and treated with SAM-e (20 mg/kg b.w., 16 weeks). The expression of hepatic Bax (proapoptotic protein) and Beclin 1 (initiating autophagy protein) using light immunohistochemistry and malondialdehyde (MDA) as markers of oxidative stress were investigated. Liver histopathology was observed on light microscopy.

Results: The results showed microvesicular steatosis, increase liver MDA levels ($p < 0.05$), activation of Bax protein and diminished Beclin 1 expression in fructose fed rats compared with control group. In the group treated with SAM-e the expression of Beclin 1 was significantly higher while steatosis, MDA levels ($p < 0.001$) and Bax expression were reduced compared with fructose fed rats.

Conclusions: Our data showed that high fructose diet induces oxidative injury, apoptosis and steatosis in the liver. The administration of SAM-e inhibited oxidative damage and apoptosis suppressed autophagy in hepatocytes and it may be critical in the elimination of lipid accumulation in hepatocytes and the prevention of high fructose-induced steatosis.

Key words: apoptosis, autophagy, NAFLD, fructose.

PO2152

PREDICTIVE POWER OF DIFFERENT ANTHROPOMORPHIC MEASUREMENTS OF CENTRAL FAT DISTRIBUTION IN HAEMODIALYZED PATIENTS

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Background and objectives: Increased central fat deposition is associated with inflammation, insulin resistance, hyperadipokinemia, dyslipidemia and oxidative stress, and a cardiovascular risk factor in general population as well as in hemodialysis (HD) patients. The study aimed to assess the predictive power of anthropomorphic measurements of central fat distribution [BMI, waist circumference (WC), Conicity index (Ci) and Waist-to-height ratio (WHR)] in HD patients.

Methods: Cross-sectional study in 80 HD patients (52 males, 65%) aged of 68±14.4 y. Primary etiology of chronic kidney disease was diabetes mellitus (15.8%). Mean time on HD: 42.2±39.6 months. Each participant underwent clinical assessment including anthropomorphic central fat distribution measurements (BMI, WC, Ci and WHR). Patients were classified by gender (men vs women). We also studied additional nutritional and inflammatory markers and were compared the interaction between them. Statistical analysis was performed by SPSS.

Results: By comparing variables adjusted by gender significant differences were found in standard body weight, WC, fat mass index, Ci (all, $p < 0,001$); and total cholesterol, C-HDL, CRP (all, $p < 0.05$). Multivariate analysis model showed significance association with WC and Ci ($p < 0.01$). The best anthropomorphic predictors of central fat distribution by analyzing ROC curves (95% CI) were both for men and women WC and Ci ($p < 0.01$). BMI and WHR took over areas under curves with no statistical differences between these indicators in both sexes (BMI, $p = 0.68$; WHR, $p = 0.77$).

Conclusions: Anthropomorphic measurements that include measure of central fat deposition are more reliable factors in HD than BMI alone. WC and Ci were the only predictors found to be related to central fat deposition in both sexes.

Key words: central fat deposition, inflammation, conicity index, hemodialysis.

PO2153

LEUCINE AND GLUTAMINE AS KEY AMINO ACIDS IN THE PREVENTION OF CANCER, RHEUMATISM, HIGH BLOOD PRESSURE AND DIABETES

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Background and objectives: After decades of neglect of metabolites and nutrients in clinical and epidemiological research, we are witnessing a renewed interest in the application of these nutrients metabolites. Especially leucine and glutamine in clinical nutrition and sports are admitted as anabolics. Consumption of leucine and glutamine or its precursors (glutamine) provided by statistical and epidemiological data, if the assumption is consistent with the facts, should be found in both observational studies and intervention.

Methods: Search the PubMed database using keywords leucine, glutamine, oncology, epidemiology, rheumatology, diabetes, hypertension. The restriction on the last 6 years. Includes systematic reviews, clinical trials, meta-analysis.

Results: The selected bibliography suggest a central role for these two amino acids in these pathologies and exercise. Even certain nutritional interventions are questioning that glutamine and leucine might act negatively on expectations of healing.

Conclusions: It begins a discussion of nutrition policy in the community and in the clinic to undertake a more effective prevention of diseases such as cancer, metabolic (diabetes, dyslipidemia), rheumatic and hypertension. A new design of foods with leucine and glutamine (or their precursors) with the correct content should start studying.

Key words: leucine, glutamine, oncology, rheumatology, metabolism

PO2154

FREE INTAKE OF SOME VEGETABLES AND FRUITS IN TREATMENT OF PHENYLKETONURIA (PKU).

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Background and objectives: Phenylketonuria (PKU) treatment consist in a restricted phenylalanine (Phe) intake, mainly based on special formula, vegetables, fruits and few amounts of cereals. The Phe levels must be maintained below 8 mg/dl. The aim was to evaluate if free intake of some vegetables and fruits alters Phe level.

Methods: 8 PKU patients 3–15 years old, were included in a longitudinal study. Phe intake was maintained and children could consume as free food all the fruits and vegetables with less than 75 mg Phe/100g. Phe intake record was done daily and Phe levels were measured once a week (mass spectrometry method).

Results: 4 patients were males (6.5±2.4 years) and 4 females (7.6±4.6 years). Before the study Phe intake was 453.6±104.6 mg/d, post intervention increased to 555.7±134.8 mg/d ($p < 0.05$). They ate 30% additional Phe intake from cereal, vegetables and fruits with more than 75 mg Phe/100 g ($p < 0.05$). Had 102 mg extra Phe intake from vegetables and fruits with less 75 mg Phe. Phe levels before study were 4.1±0.8 mg/dl, and increased to 5.3±0.9 mg/dl during the study ($p < 0.05$), (normal range: 2–8 mg/dl).

Conclusions: Study suggests that the liberation of vegetables and fruits containing less than 75 mg Phe does not increase Phe level above the normal range.

Key words: PKU, phenylalanine, PKU treatment.

PO2155

EFFECT OF SUPPLEMENTATION WITH OMEGA-3 ON DYSLIPIDEMIA IN CHILDREN AND ADOLESCENTS INFECTED WITH HIV ON ANTIRETROVIRAL TREATMENT

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Background and objectives: The extended life expectancy in HIV patients favored the development of metabolic abnormalities that contribute to the accelerated progression of cardiovascular disease (CVD), dyslipidemia being the most frequent abnormality in the pediatric population. Effective dyslipidemia treatment could help reduce the risk of premature CVD. The aim of the study was to investigate the effect of supplementation with n-3 polyunsaturated fatty acid on dyslipidemia and atherosclerosis in HIV patients on antiretroviral therapy highly effective.

Methods: Prospective, interventional. We analyzed variables related to illness, anthropometric, laboratory and intima-media thickness (IMT) assessing the effect of daily administration of 2 g of polyunsaturated fatty acids n-3 for 6 months in a group of 25 patients between 8 and 18 years with dyslipidemia and HIV infection controlled, monitoring at the Hospital Garrahan.

Results: Adherence was measured by dosage of DHA and EPA in erythrocyte membrane, with a statistically significant increase for both 2.6% and 5.1% DHA and 0.18% to 0.42% EPA ($p < 0.001$). Triglycerides, total cholesterol, LDL-cholesterol and HDL-cholesterol showed no significant differences after 6 months of supplementation. The IMT of the carotid arteries (0.50 mm basal - 0.51 mm 6 months $p = 0.36$) did not show a significant decrease, either. A significant decrease in fatty acid precursors of the inflammatory mediators AA (20:4 w6) and dihomo-gamma-linolenic acid (20:3 w 6), in the erythrocytes membrane, was showed as a secondary outcome.

Conclusions: There was no evidence a favorable change in dyslipidemia and / or subclinical atherosclerosis in this group of patients with good adherence. This study showed a statistically significant decrease in the precursors of some inflammatory markers involved in CVD.

Key words: HIV, cardiovascular disease, dyslipidemia, omega 3

PO2156

NUTRITIONAL PROFILE OF PATIENTS TREATED IN AN ENDOCRINOLOGY OUTPATIENT CLINIC IN SOUTHERN BRAZIL

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Background and objectives: Considering that non-communicable chronic diseases (NCDs), such as diabetes mellitus (DM), cardiovascular diseases (CVDs), systemic arterial hypertension (SAH) and obesity have become the main priority of Brazilian public health system and that the most afflicted have low purchasing power[1] and sedentary habits, like inadequate food intake, this study intended to characterize the nutritional profile of patients treated in endocrinology an outpatient clinic in southern Brazil.

Methods: The follow-up of patients occurred once a week in a reference hospital. The referral for nutritionists was made by endocrinologists. In the first appointment, information about gender, age, abdominal circumference and occurrence of DM and SAH (subject to prior medic diagnosis) were collected. This data was utilized for characterization of the nutritional profile presented in this work, and is related to the period from March 2012 to February 2013.

Results: 55 first appointments were made, being 64% (n = 35) women and 36% (n = 20) men, all with average age of 52.7 years. According to the abdominal circumference data, 91.4% (n = 32) of women and 65% (n = 13) of men presented very increased risk for CVDs. In total, 74.5% (n = 41) of the patients were diagnosed with DM, being 60.97% (n = 25) women and 39.02% men. 69% (n = 38) of the patients were diagnosed with SAH, being 63.15% (n = 24) women and 36.84% (n = 14) men.

Conclusions: Although the results refer to a segment of risk of the population, the high prevalence of DM, SAH and risk for CVDs found shall serve as alert for the public health system. Besides, the bigger portion of women with pathologies, even if the analysis is only focused on individuals of the same gender and doesn't refer to the total number of individuals, might instigate association studies between gender, income and NCDs prevalence.

Key words: chronic disease, obesity, outpatient clinic.

PO2157

DIETARY INTAKE IN ADULTS WITH CHRONIC HEPATITS C

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Background and objectives: Liver disease patients may have low food intake, it may result in nutritional deficiencies and malnutrition, influencing their prognosis. The aim of the study was to describe the prevalence of inadequacy dietary intake in of patients infected with hepatitis C virus (HCV).

Methods: The is a cross-sectional study conducted among 94 outpatients, aged 30 to 76 years, both sexes, infected with hepatitis C virus non-cirrhotic and non-transplanted. We measured weight, height and calculated body mass index (BMI). The 24 hours recall has been applied to evaluate the food intake.

Results: Mean age among was 52.6 years and 46 were males.. Mean weight was 70.2 kg and BMI=26.3 kg/m2 The energy intake below the recommended levels was detected in 49 (52.1%) individuals and low protein intake in 44 (46.8%). We found inadequate intake of Calcium, Potassium, Zinc and Vitamin C in 92.6%, 97.9%, 63.8% and 60.6% of the sample, respectively, and excessive consumption of sodium occurred in 53.2%.

Conclusions: Most patients with HCV has low energy and protein intake and high intake of sodium.

Key words: nutritional status, dietary intake, liver disease.

PO2158

CARDIOVASCULAR OUTCOMES OF REFINED CARBOHYDRATES ARE INFLUENCED BY THE TYPE OF DIETARY FAT

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Background and objectives: Recent reviews of evidence show that a reduction in saturated fat intake leads to a modest reduction in cholesterol, but not in incidence of cardiovascular disease. Conversely, the advice to replace of dietary fat with carbohydrates, notably those with a high glycemic index, has inadvertently exacerbated weight gain, obesity, insulin resistance and metabolic syndrome in humans, and is associated increased cardiovascular risk. It is also possible that the type of dietary fat may influence the metabolic outcomes of refined carbohydrates. The aim was to evaluate the effects of potential dietary matrix interactions between refined carbohydrates and different dietary fatty acids (monounsaturated and saturated) on the development of cardio-metabolic abnormalities including body composition (e.g. fat and lean mass), tissue fatty acid composition, blood pressure (BP), vascular function and vulnerability to cardiac arrhythmia and sudden cardiac death.

Methods: Rats were fed standard diets consisting of either high oleic sunflower oil (HOSO) or anhydrous milk fat (MF) as the source of fat (7% w/w) and further supplemented with fructose (60% w/w). Diets were matched for linoleic acid content. After 8 week of feeding body composition determined by DEXA scanning, BP monitored by tail-cuff and the animals were subjected to in vivo coronary artery ligation to induce myocardial ischemia and arrhythmia outcomes quantified.

Results: High fructose diet increased BP in the HOSO group (BP 14mmHg, $P < 0.001$ vs control) but not in the MF-fed rats. Compared to the diet rich in MF, HOSO feeding was associated with a lower vulnerability to cardiac arrhythmia that was increased by the presence of fructose. The higher incidence of arrhythmia outcomes associated with MF was not further influenced by fructose. Considerable differences in tissue fatty acids were noted between dietary groups.

Conclusions: Cardiovascular outcomes of refined carbohydrates are modulated by type of fatty acid in the diet.

Key words: diet, carbohydrates, fat, cardiovascular disease.

PO2159

RESVERATROL PROTECTS VASCULAR ENDOTHELIAL CELLS FROM HIGH GLUCOSE-INDUCED APOPTOSIS THROUGH INHIBITION OF NADPH OXIDASE ACTIVATION DRIVEN OXIDATIVE STRESS

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Background and objectives: Hyperglycemia induced oxidative stress has been implicated in diabetic vascular complications in which NADPH oxidase is a major source of reactive oxygen species (ROS) generation. Resveratrol is a naturally occurring polyphenol which has vasoprotective effects in diabetic animal models and inhibits high glucose-induced oxidative stress in endothelial cells. We aimed to examine whether high glucose (HG)-induced NADPH oxidase activation and ROS production contribute to glucotoxicity to vascular endothelial cells and the effect of resveratrol on glucotoxicity.

Methods: Murine microvascular endothelial cell line bEnd3 was used in all experiments. Cell viability was examined by MTT or Hoechst 33258 staining. NADPH oxidase activity was measured by the lucigenin chemiluminescence method. ROS production was measured with H2DCF-DA. The expression of NADPH oxidase subunits was examined by RT-PCR and Western blot. Inhibitors for NADPH oxidase, MAP kinases, or PKC; siRNA against Nox1; and dominant-negative Ikβa expressing plasmid were used in the mechanistic study.

Results: We found that NADPH oxidase inhibitor (apocynin) and resveratrol both inhibited HG-induced endothelial cell apoptosis. HG-induced elevation of NADPH oxidase activity and production of ROS in endothelial cells was inhibited by apocynin, suggesting that HG induce endothelial cell apoptosis through NADPH oxidase-mediated ROS production. Mechanistic studies revealed that HG upregulated NADPH oxidase subunits Nox1 but not Nox2 and p22phox expression through ERK/JNK/PKC-NF-kB pathway, which resulted in elevation of NADPH oxidase activity and consequent ROS production. Resveratrol prevented HG-induced endothelial cell apoptosis through inhibiting HG-induced NF-kB activation, NADPH oxidase activity elevation and ROS production.

Conclusions: Our results demonstrate that HG induces endothelial cell apoptosis through ERK/JNK/PKC-NF-kB-NADPH oxidase-ROS pathway, which was inhibited by resveratrol. Our findings provide new therapeutic targets against vascular complications of diabetes.

Key Words: resveratrol, hyperglycemia, vascular endothelial cells, NADPH oxidase, apoptosis.

PO2160

DIETETIC PRACTICES IN THE MANAGEMENT OF CHILHOOD OBESITY IN MALAYSIA

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Background and objectives: Dietitians play an essential role in the management of childhood obesity and consistency in dietetic practices is required to ensure the effectiveness of the treatment. This study aimed to assess dietitians' current practices in the management of childhood obesity, compare the practices with practice guidelines used by dietitians in other countries and identify practice components for the development of nutrition clinical practice for the management of childhood obesity in Malaysia.

Methods: A cross-sectional study was conducted among 40 dietitians in 16 Ministry of Health hospitals and three teaching hospitals. Information on current dietetic practices in the management of childhood obesity was obtained through mailed survey questionnaire. The practices included nutritional assessment, energy requirement determination, dietary prescription and physical activity modification. Emails were sent to 31 dietetic associations in others countries to obtain information on practice guidelines used by dietitians. Practice guidelines from the United States, Canada and New Zealand were used for comparison.

Results: About 45% and 55% of dietitians used CDC growth reference (2000) and WHO growth standard (2007) to determine child obesity, respectively. Frequently used dietary intervention and physical activity modification approaches were high fiber diet (65%), low fat diet (40%), reduction of sedentary pursuits and screen times (67.5%) and increase in duration of current activities (60%). In comparison to other dietetic practice guidelines, the current dietetic practices in Malaysia did not include waist circumference, biochemical data and blood pressure. Similar to other guidelines, the current dietetic practices included a low dietary fat, high fiber diet, decrease sedentary activity and increase physical activity.

Conclusions: The management of childhood obesity in our clinical setting is diverse and a comprehensive nutritional clinical practice guideline that includes nutritional status assessment, energy requirement determination, dietary prescription and physical activity modification is urgently needed.

Key words: childhood, obesity and dietitians

PO2161

DIETARY HABIT AND PREVALENCE OF GUM DISEASE IN OBESE CHILDREN

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Background and objectives: Poor dietary habits and oral hygiene practices are major factors for gum disease in adults and children. Obesity in adults has been associated with increased risk in gum diseases but this association is not yet clear in obese children. To assess the relationship between dietary habits and gum disease among obese and non-obese school children.

Material and methods: 510 (219 obese and 291 non-obese) School children (9-15 yrs) were recruited from 8 selected private schools in Accra, Ghana. Oral examination was done for all the children, breakfast intake, frequency of consumption of various foods, snacking habit and soft drink intake were assessed. Frequency of tooth cleaning, tooth cleaning material, mouth wash and toothpick use, were determined. Oral plaque, calculus, and gingival indices were used to estimate oral hygiene status and Community periodontal index of treatment needs (CPITN) score was used to assess gum disease. Logistic regression was used to assess the influence of the dietary factors on the gum disease.

Results: Mean age was 11.5yrs, Weekly frequency of consumption of fruit juices, evaporated milk, milk drinks and pizzas were significantly higher among the obese but corned beef, and watermelon were higher for non-0bese, ($p < 0.050$), but were not significantly associated gum disease. Breakfast, and soft drink intake did not significantly affect gum disease. Weekly intake of snacks showed a significant association with gum disease (OR 0.782, CI; 0.626-0.976, $p = 0.030$). Overall prevalence of gum disease was 4.7%; (obese 3.7% and non-obese 5.5%, $p = 0.330$).

Conclusions: Only snack consumption was associated with gum disease in the two groups. Most oral health indices between obese and non-obese were similar but lower Plaque index for obese suggest better oral hygiene in the obese than the non-obese. Gum disease did not differ for the two groups.

Key words: dietary habit, gum disease, plaque index, snacks.

PO2162

SYSTEMATIZATION OF NUTRITIONAL ASSISTANCE TO PATIENTS OF THE ONCOLOGY AND HEMATOLOGY UNIT, UNIVERSITY HOSPITAL VIRGEN DE LAS NIEVES IN GRANADA

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Background and objectives: Cancer patients at high risk of malnutrition due, first, to the characteristics of the underlying disease, and secondly, to the treatments. The assessment of nutritional status provides preventive and therapeutic tools where necessary. Establish routine nutritional care of patients admitted to the units of Oncology and Hematology of a hospital.

Methods: The techniques used were: classification of patients based on attendance levels, previously determined by observing these, nutritional interview, anthropometry and dietary record. Attendance levels of the patients were classified as 1-3 Clinical and nutritional profile: Level 1 (N1) well-nourished patients without nutritional risk without specific diet or overweight without comorbidities, Level (N2) Nutritional risk, overweight, obesity and comorbidities good diet acceptance, Level 3 (N3) with low nutritional risk acceptance of diet, nutrition therapy. From the list of patients admitted was performed nutritional assessment (dietary recall and medical history) of new revenue and their relative rankings by level of care, determining the total weekly visits for follow up. During follow-up the patient was carried food delivery record for those who had low dietary acceptance, besides doing anthropometry and nutritional assessment.

Results: We evaluated 35 patients (18 of Hematology and 17 of Oncology). Of which were classified as 34.28% N1, 40% N2 and 25.71% N34. The sickest patients in relation to their nutritional status and that required a larger number of weekly visits were in Hematology (N3 - 66.9%). From observation and nutritional monitoring of patients, was discussed with the medical team the need to supplement or an alternative supply.

Conclusions: The Nutritional assessment must be performed to diagnose the disease and continuously at different stages of evolution of the disease. It should therefore be included in the daily routine management of patients with these characteristics.

Key words: cancer. nutritional assessment.

PO2163

PERCEPTION OF PAIN IN CHILDREN, ITS IMPACT ON LIFESTYLE AND DIETARY HABITS

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Background and objectives: It has been well established Helicobacter pylori as a cause of peptic ulcer (PU) in adults, but in children the evidence is not as strong, although highly suggestive. The most common symptom in PU is epigastric burning pain that typically occurs when the stomach is empty. The aim of the study was to determine the prevalence of HP infection in children, assess the impact of pain on their daily activities. Assess willingness to change eating habits.

Methods: Children with pain and evaluated in the child outpatient Gastroenterology Unit, are referred to the Functional Tests Unit for diagnosis, and the presence of HP is determined by the ¡§urease test¡¨. The survey "EVA" was administered to all patients in addition to the scales "ECR" and "EAF".

Results: A sample of 181 children on ages from 3 to 15 years old (average age 8.9±2.8 years). The 46.4% of the sample were male. In regard to weight, 17.3% had low weight according to the age („T 10 percentile), and the body mass index (BMI) was 18.8±4.3 kg/m2. The perception of pain assessed with the scale ¡§VAS¡¨ reflects that children are suffering severe pain, which leads them to interrupt the hours of play (66.4%), sleep hours (44.2%), and truancy (66.3 %). In 12% of the cases are both parents who are absent from their work, however, the parents' concern about pain is low in 47% of cases. An attitude change referring to these habits is proposed, 64.6% of families willingly accepted a nutrition change, and it was proved in subsequent interviews that 70.2% of those who accepted actually accomplished with the habits change.

Conclusions: It's necessary to develop preventive and therapeutic strategies targeting children at risk and it should be our challenge for the coming years in pediatrics, in order to predict future complications.

Key words: pain, children, helicobacter pylori, peptic ulcer.

PO2164

PREVALENC OF METABOLIC AND BEHAVIOR CARDIOVASCULAR RISK FACTORS IN INDONESIAN POPULATION 2007

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Background and objectives: Cardiovascular disease is becoming more prevalent in Indonesia. Risk factors are a condition that might increase the risk of developing cardiovascular disease. The objective of this study is to determine the prevalence of metabolic and behavior cardiovascular risk factors among Indonesian population.

Methods: Data for this study derived from sub sample of the National Basic Health Survey 2007.The studied population consisted of 5851 adults aged 40 years and older. Hypertension, abnormal blood lipids, hyperglycemia, obesity were identified as metabolic cardiovascular risk factor while current smoking, physical inactivity, stress and consumed less fiber food were identified as behavioral risk factors.

Results: Prevalence of hypercholesterolemia was 53.0 %. Prevalence of low level of HDL (high density lipoprotein) cholesterol was 59.3 %, hypertension 44.2 %,hyperglycemia 25.5 %,obesity abdominal 34.9 % andprevalence of individual clustering metabolic risk factors were 37.2 %. Prevalence of hypercholesterolemia, low level of HDL and obesity abdominal as well as clustering of metabolic risk factors were significant higher among those who lived in urban area compared to rural. Prevalence of smoking was 31.7%,of low intake of fiber was 57.5%, of physical inactivity was 19.8% and of stress was 12.7%. Prevalence of individual clustering of behavioral risk factors was 36.0 %. Prevalence of smoking and low intake of fiber and clustering of behavioral risk factors were significant lower among those who lived in urban compared to rural area.

Conclusions: Difference prevention strategy should be taken into consideration to reduce metabolic cardiovascular risk factors among urban population and to reduce behavior cardiovascular risk factors among those rural population.

Key words: cardiovascular disease, risk factors, urban, rural

PO2165

DIETARY INTAKE OF VITAMIN A, E, C, MAGNESIUM, ZINC AND SELENIUM IN ASTHMATIC PATIENTS

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Background and objectives: The aim of this study was to compare dietary intake of vitamins A, E, C and minerals (magnesium, zinc, and selenium), energy and anthropometric measurements (height, weight, BMI) among people with and without asthma.

Methods: This cross-sectional study included 148 adults aged 20 to 60 years old. Seventy-four were recruited from one of the centers of Tabriz medical clinics as patient group. The control group consisting of 74 subjects was from various places. A general questionnaire and three food questionnaires were filled for each person. The nutrient intake was determined using nutritionist IV software. Consent letter was obtained. Statistical analysis of X2 and student t-test were used.

Results: Difference in the average intake of zinc from supplements was significant (p = 0.009). Intake of zinc from supplement in the patient group was (0.68±0.68) and control group was (6.08±1.91).The Average intake of vitamin E (p = 0.033) from food between two groups was significant. Intake of vitamin E in the case group was (5.4±1.13) and the control group (14.32±3.94). There was a significant difference in the average total intake of vitamin A (p = 0.027) from different sources between two groups. The average total intake of vitamin A in cases was (2444.15±799.43) and controls was (5892.01±1313.9). The difference in total average intake of zinc (p = 0.023) from various sources was significantly different between two groups. There were significant differences in average height between two groups (p = 0.000); average height of the patients was (168.50±1) and control group was (170.31±0.96). Use of supplement in control group was higher (p = 0.017).

Conclusions: Intakes of total vitamin A and total zinc from various sources, vitamin E from food, zinc from supplements, average height and Frequency distribution for qualitative variable minerals used from supplements in the case group were significantly lower than controls.

Key words: asthma, vitamins A, E and C, selenium, magnesium, zinc.

PO2166

INFLAMMATORY RESPONSE AFTER PARENTERAL NUTRITION LIPID EMULSIONS IN CHILDREN WITH BONE MARROW TRANSPLANTATION

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Background and objectives: Parenteral nutrition (PN) side effects are associated with metabolic and inflammatory changes. There is evidence that emulsions enriched with omega-3 fatty acids can modify the inflammatory response. The objective of this study wasto compare changes in levels of plasma cytokines in children undergoing bone marrow transplantation (BMT) after a fish oil or soybean PN.

Methods: 14 children with BMT and requiring PN for at least 10 days were selected. They were randomized in a clinical trial to use a lipid emulsion with fish oil or soybean oil. Blood samples at baseline, at 10 days and at the end of the PN were taken to analyze plasma cytokines: interleukin 1 beta (IL-1β), 2 (IL-2), 6 (IL-6), 8 (IL-8) and 10 (IL-10) and tumor necrosis factor alpha (TNF-α).

Results: After 10 days of PN, there were no significant changes in the levels of interleukins when comparing the two groups or by time. However, in patients requiring PN more than 21 days (4 in each group), those receiving the emulsion enriched with soybean showed higher levels of IL-10 and TNF-α ($p < 0.05$) at the end of PN, than omega-3 emulsion group. Similarly, levels of IL-1β showed a tendency to be higher in soybean group ($p = 0.07$).

Conclusions: PN administered in children for a short period of time up to 10 days, and even with different fat formulas, does not cause significant inflammatory changes. However, when PN is prolonged in time (over 21 days), fish oil formulas appear to modulate the inflammatory response. So, more studies are still required in childhood to provide information on the effects of lipid emulsions.

Key words: parenteral nutrition, cytokines, inflammation, childhood, bone marrow transplant.

PO2167

IMPACT OF NUTRITION EDUCATION ON PATIENTS UNDERGOING CHRONIC HEMODIALYSIS AT GENERAL HOSPITAL OF DOUALA

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Background and objectives: Protein-energy malnutrition is common in chronic hemodialysis. Furthermore there is accumulation of substances normally excreted by the kidneys between dialysis sessions. All significantly increase morbidity and mortality risk. The objective of this study was to evaluate the nutritional status of patients undergoing chronic hemodialysis at general hospital of Douala and find out the impact of nutrition education on their nutritionals features.

Methods: A randomized trial was conducted on 113 chronic dialysis patients at general hospital of Douala between March 2012 and September 2012. The intervention group received in addition to usual treatment 3 sessions of weekly nutrition education base on the nutrition guideline of national kidney foundation from 1st to 21th June 2012 whereas the control group received regular treatment. Both groups where observed for a further 2 months to assess the impact. Information on socioeconomic status, anthropometric and biochemical features, dietary intake assess by the 24 hours recall was collected.

Results: The study population consisted of 67.3% men, mean age 49±14 years. According to the Body Mass Index, only 3.5% of patients were malnourished. 27.7% had interdialytic weight gain > 5.7% of dry weight. 39.8% presented a muscle wasting. Biochemical features were done in only 50.4%. Among this 31.6% had hypoalbuminemia, and 35.10% had hypocholesterolemia. 44.1% of patient consumes less than 3 principal meals per day and only 9.30% had diversified diet. Two months after intervention, interdialytic weight gain and ultrafiltration of the intervention group significantly dropped. In the same way, the percentage of patients having diversified diet increased significantly. No significant change was observed in control group.

Conclusions: This study shows that malnutrition is largely present among hemodialysis patients of general hospital of Douala and that Nutrition education can helps to ameliorate their nutritional status.

Key words: Chronic hemodialysis, nutritional status, food habit, nutritional education.

PO2168

ASSOCIATION BETWEEN ABO BLOOD GROUPS AND BODY MASS INDEX AMONG ADULT PARTICIPANTS IN EAST AZERBAIJAN, IRAN

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Background and objectives: Overweight and obesity are among the most common health problems. Obesity as a potential risk factor for chronic diseases, rapidly increasing in Iran and other developing countries. ABO blood groups are associated with the risk of certain chronic disease. The purpose of this study was to investigate possible association between ABO blood type and overweight and obesity among adult population.

Methods: Total population of 381 men and women based on the inclusion and exclusion criteria were selected. Anthropometric measurements and type of blood were determined. To define the obesity and overweight in population study, body mass index (BMI) were used. To determine the correlation between body mass index and blood type chi-square statistical tests and One-way ANOVA was applied using SPSS ver.16 Software.

Results: 15.2% of participants were male and 84.8% were female. 5.8% of them were underweight, 41.5% normal weight, 27.8% overweight and 24.9% were obese. Blood group O was the most common one in the study population (35.95%). Although the correlation between blood groups and different BMI categories were poor and non-significant($p = 0.42$) but the highest frequency of overweight and obesity were observed in blood group AB (36.4%) and blood group A (29.6%) respectively. The Average BMI and body weight in A blood group was higher compared to other blood types.

Conclusions: Results indicate no possible association between ABO blood group and overweight and obesity in adult population. However further studies to accept or reject this hypothesis seems necessary.

Key words: ABO blood group, body mass index (BMI), obesity, overweight.

PO2169

ZINC, COPPER AND MAGNESIUM CONCENTRATIONS IN IMPAIRED GLUCOSE TOLERANCE: THEIR RELATION

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Background and objectives: Diabetes mellitus is a chronic metabolic disorder which affects carbohydrate, lipid and protein metabolism. There is strong evidences that homeostasis of trace elements can be disrupted by impaired glucose tolerance. On the other hand, disturbance in trace element status in impaired glucose tolerance may contribute to the insulin resistance and development of diabetic complication. The aim of present study was to compare the concentration of essential trace elements, zinc, copper and magnesium in serum of pregnant women with impaired glucose tolerance (n =44) with those of healthy pregnant subjects (n =44).

Methods: The serum concentrations of zinc, copper and magnesium were measured by means of an atomic absorption spectrophotometer (AAS) after acid digestion. To compare the mean serum levels of variables in 2 groups Independent Samples T-Test analysis was applied using SPSS ver.16 Software. $p < 0.05$ was considered as significant.

Results: There were no differences in plasma magnesium levels between groups ($p = 0.998$). Plasma copper ($p = 0.000$) and zinc ($p = 0.028$) was lower in women with impaired glucose tolerance than in control subjects.

Conclusions: The results of this study showed that deficiency of some essential trace elements may play a role in the development of impaired glucose tolerance and gestational diabetes mellitus. However, it is not known whether differences in trace element status are a consequence of impaired glucose tolerance, or alternatively, whether they contribute to the expression of the disease.

Key words: impaired glucose tolerance, zinc, copper, magnesium, trace element

PO2171

REDUCED ACID LOAD OF THE MACROBIOTIC MA-PI DIET IMPROVES GLYCEMIC CONTROL AND CARDIOVASCULAR RISK FACTOR IN TYPE 2 DIABETES.

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Background and objectives: The diet acid load has been associated to inflammation, insulin resistance, and cardiovascular risk. Main purpose of this study was to evaluate the impact of the lower acid load of the macrobiotic vegetarian Ma-Pi diet (70% carbohydrate as whole cereals, 12% vegetable protein, 18% fat) on this association.

Methods: A prospective 21 days dietary intervention was carried out in 24 adults with type 2 diabetes (15 men, 9 women; 60.3±6.4 y of age). Cases were selected from diabetic patients afferent to the Preventive Medicine Centre of IPA, Rome. Subjects were submitted to anthropometric, body composition, biochemical, and blood pressure records. Data at onset and termination were compared.

Results: The lower diet acid load was evidenced by the 7% increase in urinary pH (p = 0.0027) and 10% in blood bicarbonate (p = 0.0014), together with a 27% reduction of the serum anion Gap (p = 0.0006). Significant decreases were present in: leucocytes, 18% (p = 0.0000); glycaemia, 35% (p = 0.0000); insulinemia, 68% (p = 0.0000); HOMA-IR, 69% (p = 0.0000), total cholesterol, 23% (p=0.0000); LDLc, 24% (p = 0.0000); LDLc/HDLc, 17% (p=0.0013); triglycerides, 53% (p = 0.0000); urea, 45% (p=0.0000); homocysteine, 17% (0.0002); microalbuminuria, 81% (p=0.0000); systolic blood pressure, 8.3% (p=0.0000); and diastolic blood pressure, 7.5% (p = 0.0000).

Conclusions: The macrobiotic Ma-Pi diet improved, at short term, insulin resistance and decreased the cardiovascular risk in type 2 diabetic patients. The reduced lower acid load was evidenced.

Key words: macrobiotic diet, diet acid load, insulin resistance, cardiovascular risk, diabetes.

PO2172

EFFECT OF AMARANTH GRAIN CONSUMPTION ON HEALTH AND NUTRITION STATUS OF ADULTS LIVING WITH HIV IN MWEIGA, NYERI -KENYA

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Background and objectives: People living with HIV (PLHIV) are at greater risk of under nutrition, infections and death. Use of nutrient dense foods is one of the interventions to deal with these challenges. Minimal information exists on effect of consumption of amaranth grain on health and nutrition status. The objective of this study was to assess the effect of amaranth grain consumption on health and nutrition status of PLHIV.

Methodology: One group pre-test post-test experimental design was adopted. A comprehensive sample of 66 PLHIV not on antiretroviral therapy was purposively selected. The intervention involved daily consumption of porridge made from 100 grams of amaranth grain flour for six months. Dietary practices, nutrition status and CD4 cell count were monitored during the intervention period. Data were analyzed using SPSS computer software.

Results: mean energy consumption increased by 13.1% from 3139±365 SD to 3549±386 SD for males and by 16.7% from 2479±312 SD to 2892±330 SD for females. There was a significant increase (p = 0.041) in CD4 cell count by 22.0% (105±16.3SD). The proportion of the respondents who met the RDAs for zinc, iron, magnesium, calcium and vitamin E increased from below 40% to over 77% after addition of amaranth grain to the diet. The mean weight gain was 3.35±0.5 kg which led to a reduction on proportion that was underweight from 71.2% at baseline to 7.6% at month six.

Conclusions: Consumption of amaranth grain porridge supplemented the diet of PLHIV and enabled them to meet the RDAs for energy and selected micronutrients. It also led to increased CD4 count. This study recommends adoption of amaranth grain by PLHIV both at community and health facility level for improved health and nutrition status.

Key words: amaranth grain, HIV, CD4 count, weight gain, micronutrient status.

PO2173

URBANIZATION AND RISK FACTORS FOR NON-COMMUNICABLE DISEASES IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA

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.**Background and objectives:** There are correlations between urbanization and prevalence of risk factors for non-communicable diseases (NCDs), but little is known about elements of urban environments contributing to the development of these factors. In developing countries with overburdened health systems, allocating limited resources effectively are essential. The aim was to identify environmental factors contributing to the development of risk factors for NCDs in resource-poor urban contexts.

Methods: Two communities in the Western Cape, South Africa were included. A community-based survey (n = 230 female adults), using the WHO STEPwise approach to Chronic Disease Risk Factor Surveillance, was conducted. Risk factors included overweight (BMI≥25), alcohol use, tobacco smoking, low fruit and vegetable consumption, and physical inactivity. A socioeconomic score was calculated based on education, occupation, and wealth. Urban elements identified were population composition, physical environment, social environment and access to health and social services.

Results: Overweight/obesity was found in 149 participants (64.8%); 43 participants (18.7%) reported daily smoking; 50 participants (21.7%) reported binge drinking, fruit and vegetable consumption was extremely low with 94.8% (n = 218) of respondents consuming less than the recommended 5 servings per day. 50% (n = 115) had insufficient weekly physical activity. In total, 115 (50%) participants were at high risk (3 or more risk factors) for developing NCDs. Being at high risk for NCDs was independently associated with working (OR 0.31; 95%CI:0.12-0.74; p = 0.008), being married (OR 2.22; 95%CI:1.08-4.54; p = 0.030), having a larger house (OR 1.44; 95%CI:1.06-1.95; p = 0.019), and never having visited a health center (OR 0.19; 95%CI:0.04-0.92; p = 0.040).

Conclusions: The study shed light on the relationship between urban living environment and risk factors for NCDs. Future studies should include quantitative and qualitative research to strengthen the knowledge base from which sustainable interventions can be derived.

Key words: non-communicable diseases, urbanization, risk factors, physical environment, lifestyle.

PO2174

FACTORS INFLUENCING NUTRITION EDUCATION OF FARM WORKERS IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA

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Background and objectives: Nutrition education, focusing on the stages of change is the foundation to prevent the increased prevalence of obesity. The aim of this study was to identify factors that influence nutrition education in farming communities.

Methods: The study comprised semi structured in-depth interviews with male and female farm workers (n = 16) and managers (n = 4) from randomly selected wine farms (n = 4) in the Western Cape, South Africa.

Results: Workers were aware of the importance of healthy eating via repeated messages from the media and health workers, but had difficulties defining healthy food, and evaluating their own food habits. They were motivated to change because they value their family's health and fear diseases. Factors influencing nutrition education programs in this farming community included: i) social norm (awareness should be raised amongst all workers, regardless of job description, gender or age, to increase motivation, create a sense of ownership and obtain sustainability); ii) social structure (men should support change and women should obtain social support and empowerment to implement change) iii) limited education and learning experience in general (programs should be basic, especially because participants have limited experience in nutrition education), iv) lack of financial management skills (workers have sufficient financial resources to buy and prepare healthy food, but lack budgeting and planning skills), v) lack of ownership (a sense of ownership regarding health should be created) and vi) familiarity (program should focus on familiar food products and dishes to increase the likelihood of change).

Conclusions: Long term, practical, repetitive, short and small classes rather than theoretical courses were supported. The consultation of farm workers to develop a suitable nutrition education program is valued and can be recommended for development of nutrition education in other communities.

Key words: nutrition education, farm workers, overweight and obesity, behavior change.

PO2175

NUTRITIONAL MANAGEMENT OF CHILDREN WITH CANCER: CASE OF KENYATTA NATIONAL HOSPITAL - KENYA

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Background and objectives: Observations at the Kenyatta National Hospital wards prior to the research period indicated a marked increase in cases of child cancer patients being admitted with various complications. These complications interfered with the children's food consumption patterns as there was increased morbidity and infections since the immunity of these children was compromised. The purpose of this study was to investigate the nutritional management of children with cancer at Kenyatta National Hospital by investigating the food consumption patterns of children with cancer and finding out their nutritional status.

Methods: A descriptive survey design was used. The study sample was made up of 60 children aged 6 months' to 14 years and 15 service providers. Purposive sampling was used. Data collection instruments included a self-administered questionnaire, an interview schedule, anthropometry, 24 hour dietary recall and an observation checklist. Data was analyzed using the Statistical Package for Social Sciences Programme. **Results:** 32% of the children were stunted, 26% were underweight while 12% were wasted. The findings confirmed that all the 18.3% children in the advanced stage of the disease were malnourished. A majority (88.5%) of the children's food intake was affected by the type of treatment received while the disease process affected 71.8% of the patient's food intake. Most of these interferences occurred in the middle (55%) and advanced stages (18.3%) of the disease.

Conclusions: Food consumption patterns of children with cancer at Kenyatta National Hospital were influenced by the following factors: type of cancer a child suffered from, stage of the disease, duration of cancer disease and therapy used to manage their conditions. In view of these findings, the study recommends that nutritionists should emphasize the importance of adherence to the amounts of nutrients recommended for individual child cancer patients.

Key words: nutritional status, food consumption patterns, stunting, wasting, underweight.

PO2176

RESISTANT STARCH AND DIETARY FIBRE CONTENT OF COMMON INDIAN COOKED FOODS AND ITS EFFECT ON GLYCEMIC INDEX

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Background and objectives: The prevalence of Type 2 diabetes and NCDs had risen to 8.3% in 2011 and is expected to be 9.9% by 2020 globally. Attempts are being made to reduce the risk of NCDs by modifying dietary carbohydrates to impact glycemic index (GI) and glycemic load (GL) of the diet. In view of this, the present study was undertaken to determine the resistant starch (RS) and dietary fiber (DF) content of cooked Indian foods and its impact on GI.

Methods: A total of 8 Indian food items prepared by moist heat cooking method and 13 Indian foods prepared by dry heat method were selected. They were prepared using standard recipes in the test kitchen facility. All the samples were freeze dried and analyzed for DF and RS content using Megazyme Enzymatic Kit at the Foods Analytical Lab of our center. The GI of foods were estimated using internationally recognized GI protocol in-house and for some foods GI values have been imputed from the international GI table.

Results: The RS content of traditionally cooked Indian foods ranged from 0.33 g (fermented rice cake) to 2.83 g (legume and rice based pancake). The Indian cooked foods with dry heat method showed significantly higher RS content than the moist heat method based food items ($p < 0.027$). DF and RS content of the foods were inversely correlated with GI ($r = -0.671$ and $r = -0.587$ respectively).

Conclusions: Cooking methods could influence RS content of the foods. Both DF and RS impact the GI of the Indian foods. Future research to study the impact of RS on glycemic response by continuous glucose monitoring test is required. Acknowledgement: This study was sponsored by Department of Science and Technology (DST), New Delhi, India

Key words: Resistant starch, dietary fiber, glycemic index, moist heat, dry heat

PO2177

THE RELATION BETWEEN SOCIOECONOMIC SITUATION, ECONOMIC ENVIRONMENT AND OBESITY IN TURKISH ADULTS

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Background and objectives: This research was done in order to investigate the relation between socioeconomic situation, economic environment and obesity. The number of total participants is 487.

Methods: A survey, which includes general demographics information and nutritional behavior was filled by the researcher. Socio economic status determination scale, developed by Kuppuswamy from India, was used for socio economic classification of the participants. Each participant was assigned a score related to his/her education status, occupation and income status and then classified according to the summation of these scores. 5 socio economic status are determined according to the survey results and they are; upper, upper middle, middle, lower middle and lower classes.

Results: In the research, it was determined that, participants who are classified in lower socio economic status have higher BMI averages. It was extracted from the study that, the upper socio economic status participants have an average BMI of 23±4.6 kg/m2 and the lower socio economic status participants have an average BMI of 28.7±7.7 kg/m2. It was noticed that, there is an important statistical relation between the socio economic status and BMI of the participants ($p < 0.05$). The average waist circumference of male participants in upper socio economic status was found as 98.8±15.5 cm, and the average waist circumference of female participants were found as 72.5±11.8 cm.

Conclusions: In this research, it was determined that there is a relationship between socioeconomic status and obesity. Participants are in lower socioeconomic class have greater BMI and waist circumference values than the other participants.

Key words: BMI, obesity, socioeconomic status.

PO2178

PREVALENCE AND DETERMINANTS OF OBESITY AMONG SCHOOL CHILDREN13-17YEARS OF BHILAI CITY

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Background and objectives: The WHO refers obesity as a global epidemic because of rapid increase in the number of overweight and obese individuals in last 20 years. The onset of obesity may occur at any age and it may be triggered by factors such as early weaning, inadequate food intake, eating disorders and problems related to disturbed family relationships.

Methods: We measured the weight, height, body mass index, Waist Hip ratio of children. The children were classified as normal, underweight, overweight or obese, according to body mass index per age. 500 children were assessed at a school of Bhilai Nagar.

Results: The overall prevalence of overweight among children was 23.8% and obesity was 8.4%. The prevalence of overweight was 23.44% among boys and 24.22% among girls; 8.02 and 8.81% were obese, respectively. WHR provides index of relative accumulation of abdominal fat. According to WHR among 500 subjects 9.1% boys are overweight and nil obese, where as in girls 41.40% are overweight and 21.14% obese. The prevalence rate of central obesity is higher in girls in comparison to boys.

Conclusions: We observed an association between excess weight and obesity and inactivity in children. The time spent in watching TV was a positive factor for maintaining a balance between weight and height. The study also suggested that under nutrition rates remain high in children. Therefore Special attention has to be given for their overall nutrition.

Key words: abdominal obesity, adolescent, physical activity.

PO2179

L-ARGININE SUPPLEMENTATION PREVENTS ALLODYNIA AND HYPERALGESIA IN A RAT MODEL OF DIABETIC NEUROPATHIC PAIN BY NORMALIZING PLASMA NITRIC OXIDE CONCENTRATIONS.

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Background and objectives: Neuropathic pain is a common feature of diabetic patients. It is characterized by symptoms of spontaneous and stimulus-evoked pain including hyperalgesia and allodynia. Arginine-deficiency has been observed in diabetes. Arginine has been implicated in numerous physiologic and pharmacological effects. Its metabolites are considered important neurotransmitters, related to exert regulation on cationic channels responsible for pain processing at the N-methyl-D-aspartate (NMDA) receptor channel complex. Thus, if arginine deficiency and changes in its metabolites might contribute to the development of neuropathic pain we propose to evaluate the effects of arginine supplementation on its metabolites, and on biological and clinical parameters in the development of neuropathic pain in diabetic rats.

Methods: Male Sprague–Dawley rats were rendered diabetic by an intraperitoneal (i.p.) injection of STZ (72mg kg.-1). Controls received an i.p.-injection with distilled water. One week after, animals were assigned to three experimental groups: Control non-diabetic, Non-supplemented STZ-D, and L-Arg-supplemented STZ-D rats receiving L-arginine (2.5 g.l -1 of L-Arginine in drinking water for 3 weeks). Measurement of clinical (body weight, food and water intake); biological (blood glucose, plasma insulin, and urine nitrogen) parameters; arginine and its metabolites (ornithine, glutamate, glutamine, citruline and nitric oxide (NO)); and pain sensitivity (mechanical hyperalgesia, tactile and thermal allodynia) were performed.

Results: STZ-administration induced typical symptoms of type-1 diabetes. Diabetic-rats also displayed mechanical hypersensitivity, tactile and thermal allodynia, and increased NO plasma concentrations. Arginine supplementation increased insulinemia and reduced polydipsia, polyuria and urine nitrogen excretion. Moreover, it abolished thermal and tactile allodynia, mechanical hypersensitivity in 80% of the rats, and normalized NO plasma concentration.

Conclusions: Neuropathic pain symptoms can be attenuated by arginine supplementation, targeting the NO production and probably agmatine-mediated blockade of NMDA receptors, offering new therapeutic opportunities for the management of chronic neuropathic pain.

Key words: arginine, nitric oxide, NMDA receptors, STZ-D rats, pain.

PO2180

EFFICACY OF GLUTAMINE IN THE PREVENTION OF OXIDATIVE STRESS IN CANCER PATIENTS UNDERGOING RADIOTHERAPY IN THE ABDOMINAL OR PELVIC REGION.

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Background and objectives: Among the antineoplastic therapies, radiotherapy plays an important role, either as first choice or adjuvant to surgery. Radiotherapy, can produce acute and chronic toxicity of non-tumor tissues due to its cytotoxic effects, resulting from direct DNA damage and production of free radicals. Reactive oxygen and nitrogen species initiate a series of chain changes that ultimately cause tissue damage. In the case of patients with pelvic tumors radiotherapy leads to gastrointestinal damage. Glutamine, the most abundant amino acid in the bloodstream, plays a protective role in intestinal cells during physiologic stress; however, the protective mechanisms are not fully understood. Objective. The aim of this study is to determine if glutamine prevents oxidative stress during radiotherapy in cancer patients undergoing radiotherapy of the abdomino-pelvic cavity.

Methods: Double-blind, randomized, controlled trial including 69 patients that received glutamine (Gln, 30 g/day) or placebo (Pla). Oxidant/antioxidant blood markers were determined by ELISA.

Results: Most patients (65.2%) were male, 66.6 (9.9) years of age, with urologic (44.9%), rectal (24.6%) and gynecological cancer (23.1%). Markers of inflammation and oxidative and nitrosative stress do not differ between the two groups at endpoint: IL-1beta [Gln 4.56±0.38 pg/ml vs Pla 4.64.89±0.29 pg/ml], MPO [Gln 29.65±2.3 ng/ml vs Pla 28.99±0.7 pg/ml], protein carbonyl [Gln 0.58±0.06 nmol/mg vs Pla 0.55±0.042 pg/ml] and nitric oxide [Gln 3.0±0.1μM vs Pla 2.9±0.1 μM]. Moreover, glutamine administration produced no significant changes in glutathione concentration [Gln 0.382±0.04 μM

vs Pla 0.363±0.03 μM], antioxidant capacity [Gln 14.49±1.3 mM trolox vs Pla 13.89±1.5 mM trolox] and catalase activities [Gln 261.8±29 UL-1min-1mgp-1 vs Pla 227.8±55 UL-1min-1mgp-1].

Conclusions: Glutamine does not prevent the development of oxidative stress during radiotherapy.

Key words: glutamine , oxidative stress, cancer.

PO2181

STUDY ON RELATIONSHIP BETWEEN DIETARY SODIUM INTAKE AND HYPERTENSION IN HEILONGJIANG RESIDENTS

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Background and objectives: To explore the relationship between dietary sodium intake and hypertension and provide scientific evidence on hypertension intervention.

Methods: We used a subpopulation of 1,254 subjects aged 18-65 years old in Heilongjiang province from an ongoing longitudinal study, China Health and Nutrition Survey. We used a stratified multistage cluster sampling scheme to randomly select two cities and four counties in Heilongjiang province. Experienced physicians collected detailed diet data and measured blood pressures.

Results: The prevalence of hypertension increased from 25.0% in 2004 to 28.0% in 2009. Added salt intake decreased slightly from 7.6 g/day to 7.4 g/day; however this was offset by an increased sodium intake from 3.6 d/day to 3.8 g/day. One key change was the significant increase in processed food consumption from 60.5 g/day to 70.4 g/day.

Conclusions: The increased prevalence of hypertension is much more rapid and has attained a much higher level in Heilongjiang than in other areas in China. Excessive intakes of sodium and processed foods, particularly pickled vegetables, may attribute to the high prevalence of hypertension.

Key words: sodium intake, hypertension, processed food.

PO2182

DYNAMICS OF NUTRITION TRANSITION AND RISK OF DIABETES IN HUBEI, 1991-2009

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Background and Objectives: To examine the effects of dynamics of nutrition transition on risk of diabetes in Hubei, China.

Methods: A subsample of adults aged 18-75 years (n = 1,169 at baseline) from the China Health and Nutrition Survey was used. Dietary data were collected by using 3 consecutive 24-hour recalls in combination with weighing methods. Exploratory factor analysis method was used to analyze dietary patterns and scores. Multivariate logistic regression models were used to estimate the association between dietary patterns and risk of diabetes.

Results: During 1991 and 2009, Hubei witnessed a significant increase in intakes of vegetables, fruits, meat, eggs, fish, milk and oil, and a significant decrease in intakes of cereals, legumes and salt (p-trends < 0.01). Accordingly, energy intake decreased but energy from fat increased over time. Seven dietary patterns among male and six patterns among female were observed and determined. Multivariable logistic regression demonstrated that meat-fruit pattern and meat-fast food pattern were positively related with risk of diabetes risk among both male and female. Compared to the 1st quartile of meat-fruit pattern, the risk of the 4th quartile increased by 8 times (OR=8.29, 95% CI: 1.69-40.63) among male. Compared to the 1st quartile of meat-fast food pattern, the risk increased by 7.5 times in the 3rd quartile (OR=7.50, 95% CI: 1.96-58.61) and the 4th quartile (OR=7.55, 95% CI: 1.67-45.23) among female.

Conclusions: Dietary patterns among residents in Hubei province are shifting toward meat-fruit pattern and meat-fast food patter that significantly increase the risk of diabetes among male and female.

Key words: dietary pattern, nutritional status, factor analysis, diabetes, risk factors.

PO2183

SMOKING MAY INCREASE THE RISK OF DIABETES AMONG ADULTS

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Background and objectives: The prevalence of diabetes is increasing in Beijing, China, while the risk factors remain unknown.

Methods: a subsample of 1,085 adults aged 18 years old and older from the China Health and Nutrition Survey was used. Hemoglobin A1c was used to determine diabetes status. Blood pressure and anthropometric data were measured with standard protocols. Binary logistic regression models were used to examine the association between smoking and diabetes.

Results: The prevalence of diabetes was 8.4% in this study population, with higher prevalence among men than among women (9.6% vs. 7.3%), and higher prevalence in elder people than in younger people. Adjusted for age, gender, and body mass index (BMI), smoking significantly increased the risk of diabetes (OR=1.432, 95% CI: 1.00-2.05).

Conclusions: smoking cessation may decrease the risk of diabetes among adults in Beijing.

Key words: diabetes, smoking, BMI.

PO2184

RELATIONSHIP BETWEEN BODY MASS INDEX, WAIST CIRCUMFERENCE AND HYPERTENSION

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Background and Objectives: To explore the relationship between body mass index (BMI), waist circumference (WC) and the prevalence of hypertension among residents in Guangxi, China.

Methods: A multistage random cluster sampling method was used to draw the sample for the China Health and Nutrition Survey in Guangxi. A subsample of 1,131 adults aged 18 years old and older was used in this study. Blood pressure and anthropometric data were measured with standard protocols. Multivariate logistic regression models were used to examine the association between BMI and WC and hypertension.

Results: The overall prevalence of hypertension was 21.4% in Guangxi. It was 17.3% among normal weight group (BMI 18.5 to 23.9), 33.0% among overweight group (BMI 24.0 to 27.9), and 39.0% among obesity group (BMI > 28). The linear trend was significant ($p < 0.01$). The prevalence of hypertension was 15.7% among normal WC group (WC < 85 cm in men or <80 in women and 34.1% among central obesity group (WC > 85 cm in men or > 80 cm in women). Central obesity significantly increased the risk of hypertension (OR = 2.769, $p < 0.01$).

Conclusions: Overweight and obesity significantly increases the risk of hypertension. Central obesity or waist circumference may be a better indicator to predict hypertension than BMI.

Key words: Body mass index, waist circumference, hypertension.

PO2185

STUDIES ON PHYSICOCHEMICAL AND BIOLOGICAL ACTIVITIES OF OPHICEPHALUS STRIATUS BLOCH COLLECTED FROM THE FRESH WATER IN THE BANGLADESH

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Background and objectives: Bangladesh is a land of rivers. She well and woe depends on rivers. There are many big and small rivers. The studies depict the content of moisture, protein, fat, minerals, and antimicrobial activities in the fresh water fish of Bangladesh. Fish selected for the studies is Ophicephalus striatus Bloch.

Methods: Oil was extracted from the Ophicephalus striatus Bloch. Fatty acids analysis of the oil by G.L.C indicated relatively high proportions of oleic acid (33.08%), stearic acid (28.97%), palmitic acid (17.66%), linoleic acid (03.75%), and lauric acid (02.73%). Chloroform and methanol mixture was used for lipid extraction. The physical and chemical properties of the lipid were determined by the standard methods.

Results: The lipid showed saponification value (205.92), saponification equivalent (272.43), iodine value (87.34), peroxide value (40), acid value (01.76), and free fatty acids (0.88%); ester value (204.16), unsaponifiable matter (0.5535), specific gravity (0.9297) at 300C, refractive index (1.4643) at 300C, coefficient of viscosity (418.5836 millipoise) at 300C, energy of activation (6.1017 Kcal/mol), Reichert-Miessel value (0.898), Polenske value (0.5958), acetyl value (13.436), and cholesterol (12%). Ophicephalus striatus Bloch contained highest percentage of moisture (70%), dry matter (30%), ash content (1.97%), carbohydrate (6.93%), calcium (5.297 mg/kg), magnesium (276 mg/kg), iron (4.93 mg/kg), zinc (8.30 mg/kg), lead (0.06 mg/kg), chromium (less than 0.01 mg/kg), and mercury (less than 0.01 mg/kg). The lipid and protein in Ophicephalus striatus Bloch were found to be 2.86% and 18.24%. Only studies on

the antimicrobial activities against organisms Escherichia coli, Staphylococcus aureus, Salmonella spp., and Shigella sonnei.

Conclusions: The indigenously available medicines and technologies can prove an asset in the tropical and developing countries of the world. At the same time developed countries also can be benefited because of safety profile of the extracts and microbial activities.

Key words: Bangladesh, Fatty acids, Ophicephalus striatus Bloch.

PO2186

OVERWEIGHT AND OBESITY: A COMPARATIVE STUDY BETWEEN PREDOMINANTLY STATIONARY MARKET WOMEN AND THEIR MOBILE COUNTERPARTS IN TAMALE METROPOLIS OF GHANA

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Background and objectives: The sedentary lifestyle of most market women in the developing world is likely to increase their risk for becoming overweight and/or obese. The purpose of this study was to compare overweight and obese tendencies between predominantly sedentary market women/traders (PST) and their mobile counterparts (PMT).

Methods: This was a cross sectional survey undertaken in 3 markets within the Tamale Metropolis of Ghana. Sociodemographic characteristics as well as anthropometric measurements of weight, height and waist and hip circumferences were assessed. Physical activity levels were also estimated using MET scores.

Results: In all 180 market women (90 PST and 90 PMT) aged 15 to 65 years were surveyed. Sedentary women were significantly more likely to be older than their mobile counterparts (p = 0.043). Overall, 32.8% and 15.6% were overweight and obese respectively. PST were significantly more likely to be overweight (20.0% cf. 12.8%, p = 0.002) and obese (10.6% cf. 5.0%, p = 0.008), to have higher Waist (94.5cm cf. 76.2, p = 0.012) and Hip (104.6cm cf. 97.5cm, p = 0.034) circumferences and lower PAL (459-MET-min/week cf. 587 MET-min/week, p = 0.051) than PMT.

Conclusions: The increasing tendencies for overweight and obesity in PST has implications for emerging non-communicable diseases of diabetes, hypertension and arteriosclerosis in a rapidly urbanizing population.

Key words: overweight, obesity, prevalence, market women, Ghana.

PO2187

CARDIOMETABOLIC RISK MARKERS IN ADULT ARGENTINE WOMEN WITH INSULIN RESISTANCE

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Introduction: Waist-to-height ratio (WHtR) and triglyceride HDL-cholesterol ratio (TG/HDL-C) are relevant cardiometabolic risk markers (CMR) which as can be linked to insulin resistance (IR). Objective: To evaluate the prevalence of IR and compare to CMR: WHtR and TG/HDL-C in adult women attending the Foundation for Research on Endocrine Metabolic Disease and Applied Clinical Research (FIEEM-ICA).

Methodology: A cross case-control study in non-pregnant women over 30 years old without previously diagnosed diabetes which attended the Nutrition and Endocrinology center of Buenos Aires City, Argentina. Dependent Variable: HOMA-IR homeostasis model > 2.5 (cases) without IR (controls). Independent variables: WHtR (height in cm considering CMR ≥ 0.50), TG/HDL-C (high value considering ≥ 3.0), body mass index (BMI), considering overweight ≥ 25 kg/m2). Analysis: SPSS 19.0, Fisher exact test for categorical variables, OR with confidence intervals of 95% and logistic regression by establishing Spearman test p value <0.05.

Results: n= 213 women (50.9 ± 9.7 years). 87.8% were overweight or obese and 64.8% increased WC. CMR 90.6% by WHtR and 22.1% by TG/HDL-C. 46.9% had IR and 53.1% had a HOMA-IR less than or equal to 2.5 (not considered controls IR). Significant association between IR and overweight or obesity (OR=3.36, 95% CI= 1.29-8.76, p=0.007), WHtR increased (OR= 9.28, 95% CI= 2.09-41.1, p= 0,000) and TG/HDL-C elevated (OR = 2.72, 95% CI = 1.38-5.36, p= 0.003) compared to controls. In the multivariate analysis revealed a direct correlation between HOMA-IR and BMI (r = 0.35, p <0.001), WHtR (r = 0.37, p <0.001) and the ratio TG / HDL-C (r = 0.26, p <0001).

Conclusions: Higher WHtR and TG/HDL-C were associated with the possibility of finding IR diagnosis. Slight direct correlation was found between HOMA-IR and BMI.

Key words: insulin resistance, TG/HDL-C ratio, Waist-to-height ratio, nutritional assessment

PO2188

THE EFFECT OF MILK AND MILK PRODUCTS ON THE CHILD' S OSTEOPOROSIS

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Background and Objectives: The greatest increase in bone mineral content occurs during adolescence. This study aimed to evaluate the effects of usual childhood dairy intake on adolescent bone health.

Methods: Some types of yogurt, dried curds, milk products, bio sorbent were selected for the purpose of investigating the effect of milk and milk product on the children's osteoporosis. The survey covered 194 children aging between 2 to 6 from kindergartens % were57.3 males, 42.7 % were females, and 120 children aging 10-12 from middle schools 40.9% were males, 59.1% were females. The questionnaire method was used to determine the life style, food consumption, and the adequacy of food consumption with direct intention. The mineral content of foods was determined using PFA method. The random selection covered 40 children under age of 2-5 and 20 children under age of 10-12 and the dynamic comparison using osteo densitometry method was made to determine the level of osteoporosis comparing the status before and 30-45 days after the consumption of milk products as supplements. Survey data were developed using Excel andSPSS 16 software based on survey data collected and child nutrition facts.

Results: The study showed that osteoporosis decreases by 6.5%-23%, and density, and bone mineral density improves significantly when the person uses for 30-45 days the milk products including 200-250 ml consumption of milk and yogurt as well as 50 g of curds on daily basis. The result showed that bone mineral density improved up to 23% for children consumed the curd and dried curd as combined.

Conclusions: These prospective data provide evidence for a beneficial effect of childhood dairy consumption on adolescent bone health.

Key words: dairy product, osteoporosis, bone density, child.

PO2189

DOCOSAHEXAENOIC ACID REBALANCES STAT3/ PPARγ EQUILIBRIUM IN ADIPOCYTES OF OBESE PATIENTS AFFECTED BY COLON CANCER EXERTING ANTI-INFLAMMATORY ACTIVITY

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Background and objectives: Obesity is associated with high incidence of colorectal cancer (CC). White adipose tissue (WAT), an active endocrine organ secreting many products, plays a crucial role in obesity-associated inflammation. Obesity, by altering adipocyte homeostasis, leads to a chronic inflammatory status that might play a role in cancer development. The activity of inflammatory mediators can affect the balance between pro/anti-tumorigenic pathways involving a number of transcription factors, e.g. STAT3 and PPARγ. STAT3 promotes inflammatory/carcinogenic processes. PPARγ shows anti-inflammatory properties, inhibits growth, and induces apoptosis. Notably, PPARγ inhibits STAT3 through a transcriptional mechanism. Therefore STAT3 and PPARγ form a signaling loop potentially crucial for CC development. Dietary fatty acids (FAs) are major determinants in inflammation given their precursor status to signaling mediators. The ω-3 and ω -6 polyunsaturated FAs (PUFA) show opposite behaviors in modulating adipocyte functions. In particular, docosahexanoic acid (DHA) has been shown to exert a strong anti-inflammatory activity. We hypothesized that STAT3/PPARγ imbalance occur in WAT of CC patients, creating a pro-inflammatory environment that might influence cancer development. DHA, by rebalancing STAT3 and PPARγ, may elicit anti-inflammatory responses in adipocytes. To test this hypothesis, adipocytes isolated from visceral WAT of normal-weight (BMI 22-24.9 kg/m^2), and overweight/obese subjects (BMI 25-40 kg/m^2), affected or not by CC, were treated with DHA.

Results: Visceral fat isolated from CC patients showed an increase of STAT3 and a concomitant decrease of PPARγ activation, with respect to control subjects. The up-regulation of STAT3 was independent from BMI, whereas was associated with a lower n-3/ n-6 ratio than controls. DHA treatment, likely by increasing the adipocyte n-3-PUFA content, counteracted the over-expression of STAT3 as well as stimulated PPARγ activation, particularly in obese/CC subjects.

Conclusions: These findings suggest that DHA might represent a useful tool for preventive and therapeutic strategies aimed at reducing CC risk.

Key words: obesity, colon cancer, DHA, STAT3.

PO2190

ASSOCIATION BETWEEN OBESITY AND COMMON MENTAL DISORDERS AMONG NUTRITIONISTS, RIO DE JANEIRO, BRASIL

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Background and objectives: Demographic changes, in food consumption patterns, in lifestyles and rapid urbanization are among the main factors for the increase in chronic diseases conditions. Obesity, for it multifactorial characterization, has been shown to be associated with several factors and among them the minor psychiatric morbidity. The main aim of this study was to analyze the association between obesity and common mental disorders among nutritionist working in the municipal public area of Rio de Janeiro.

Methods: Sectional study conducted in 23 hospitals in the municipal health system of Rio de Janeiro, in the form of census, with 289 nutritionists, (15) 4.9% refused to participate. Analyses were performed using the multinomial regression model adjusted for covariates morbidity, age, years of work, other employment link, type of main link, tertile of income per capita and color.

Results: Most nutritionists were women (97.2%), mean age 41 years (Dp = 10.0) and 48,4% were post graduated. The prevalence of overweight, obesity and common mental disorders were 32.3%, 15.3% and 37.5%, respectively. The association between obesity and TMC, although not statistically significant, showed a significant magnitude. We observed a crude OR of 1.26 (IC 95% 0.63 2.51), even after adjusting multiple covariates the OR was 1.14 (IC 95% 0.52 2.49).

Conclusions: The high prevalence of overweight, obesity and common mental disorders in this population are consistent with population surveys conducted in Brazil and worldwide, and emphasize the need for further studies with these professionals (nutritionists) for being placed in the group of health professionals who are dedicate to being caretakers of population health. The magnitude of association may be a starting point to support improved strategies for prevention and promotion of health of these workers.

Key words: obesity, common mental disorders, nutritionist.

PO2191

THE DIETARY POLYPHENOL PROTOCATECHUIC ACID EXERTS INSULIN-LIKE ACTIVITIES BY IRS-1 ACTIVATION IN HUMAN PRIMARY ADIPOCYTES

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Background and objectives: Anthocyanins, naturally occurring in vegetables, fruit, and beverages, appear to exert beneficial effects in preventing atherosclerosis and other chronic-degenerative diseases, such as type 2 diabetes and insulin resistance. In particular, they have been demonstrated to ameliorate hyperglycemia and insulin sensitivity. We have recently shown that the main anthocyanin metabolite, the protocatechuic acid (PCA), enhances glucose uptake and GLUT4 translocation in human visceral adipocytes. Aim of the study was to investigate the molecular events elicited by PCA in human visceral adipocytes responsible for the insulin-like activity.

Methods: Human adipocytes were collected from anesthetized individuals undergoing abdominal surgery for benign conditions. Glucose uptake, and the activation of IRS-1 and the main upstream kinases involved, namely Akt and PI3K, were evaluated in cells after treatment with 25μM PCA. Untreated adipocytes were used as controls.

Results: PCA-treated cells showed higher levels of glucose uptake and IRS-1 tyrosine-phosphorylation than control cells. We also found a strong increase in Akt serine-phosphorylation after PCA treatment. Furthermore, in a set of experiments the cells were pre-treated with specific PI3K kinase inhibitors, LY294002 and wortmannin. The treatment with the inhibitors significantly reduced Akt and IRS1 phosphorylation and glucose uptake. Our data clearly show a direct involvement of PI3K and Akt in PCA-induced IRS1 up-regulation.

Conclusions: These results provide evidence that PCA might exert insulin-like effect by activating insulin signaling pathway. Dietary polyphenols, thus, could be included in the preventive/therapeutic armory against pathological conditions associated with obesity and insulin resistance.

Key words: dietary polyphenols, anthocyanins, insulin resistance, obesity.

PO2192

CONSUMPTION FREQUENCY OF SELECTED GROUPS OF FOOD PRODUCTS AND THE PREVALENCE OF COLORECTAL POLYPS

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Background and objectives: The results of many studies suggest that regular consumption of foods rich in dietary fiber and calcium-rich dairy products can be associated with reduced risk of colorectal cancer. Moreover, individuals who frequently consume red meat and alcohol have increased risk of this malignancy. The aim of study was to analyze a relationship between the consumption frequency of certain groups of foods and the prevalence of colorectal polyps.

Methods: The study included 460 individuals subjected to lower gastrointestinal endoscopy. On the basis of histopathological findings, they were classified to the group with colorectal polyps (n = 237) and the polyp-free control group (n = 223). Consumption frequencies of cereals, vegetables, fruits, meat, fish, dairy products, eggs, and alcohol amongst participants of both groups were determined with a questionnaire survey. The results were subjected to statistical analysis.

Results: The fraction of the controls who declared the everyday consumption of cheese (both cottage and ripening cheese) and fruits were significantly higher than in the polyp group (36.5% vs. 28.3%, p = 0.019; and 69% vs. 60.3%, p = 0.050, respectively). No significant intergroup differences were documented with regards to the consumption frequency of the remaining food products and alcohol.

Conclusions: Higher consumption of cheese and fruits may represent a protective factor against colorectal polyps.

Key words: consumption frequency, food, colorectal polyps.

PO2193

DXA MEASURES OF BONE MASS IN MORBIDLY OBESE YOUNG ADULT WOMEN

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Background and objectives: Studies suggest that fat mass does not exert a protective effect on bone mass, being even sometimes harmful. It is possible that morbidly obese patients constitute a group particularly susceptible to loss of bone mass as a result of hormonal and metabolic changes. The aim of the present study was to assess bone health and vitamin D status of morbidly obese young adult women.

Methods: Twenty women (18-49 y) bariatric surgery candidates with BMI higher than 40 kg/m2 participated in the study. Body composition and bone mass of the whole body and specific sites (lumbar spine-LS, total proximal femur and forearm) were assessed by dual energy X-ray absorptiometry (LUNAR - IDXA). Concentrations of parathyroid hormone (PTH), 25-hydroxyvitamin D (25OHD), C-telopeptide (CTX) and osteocalcin were determined in serum samples.

Results: Total body mass (TBM) ranged from 93 to 180 Kg and total fat was on average 53±3%. Mean Z-scores at total femur and forearm were 0.57±0.96 and 0.68±0.79, respectively, and all women studied were within the expected values for their age at these sites. Mean LS Z-score was -0.76±1.36. LS Z-score was lower than the expected for age in four women (Z-score < -2.0) and between -1.0 and -1.9 in six women. TBM, BMI and fat mass were not significantly associated with Z-scores at any site. Serum concentrations of 25OHD (28.4±10.7 ng/mL), PTH (47.4±28.3 pg/mL), osteocalcin (15.8±8.8 ng/mL) and CTX (0.32±0.20 ng/mL) were on average adequate.

Conclusions: Although it is necessary to consider possible misreading of DXA measures due to the excess of fat mass in abdominal region, our results of lumbar spine Z-scores suggest some impairment of bone mass at this specific site in the morbidly obese women studied.

Key words: morbid obesity, DXA, bone health, vitamin D. Financial support: FAPERJ and CNPq (Brazil).

PO2194

VITAMIN D AND DIABETIC RETINOPATHY

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Background and objectives: Diabetic retinopathy (DR) is one of the serious microvascular complications in diabetes. Micronutrients may potentially alter the risk of DR by interfering with pathologic mechanism. Recent studies have been focused on Vitamin D and its effect on pathogenesis of DR. vitamin D may protect diabetic retina through its effects on normal insulin secretion, glycemic control and hypertension. It may also play a role in the pathogenesis of diabetic retinopathy through its anti-inflammatory, anti-proliferative, and anti-angiogenic mechanisms. Objective: The aim of this review is to explore the current data on how vitamin D may contribute to diabetic retinopathy.

Results: Plasma concentration of vitamin D has been inversely correlated with the severity of DR. diabetic patients especially those with proliferative diabetic retinopathy have lower Vitamin D levels than those without diabetes or PDR.

Key words: Diabetes; diabetes complication; diabetic retinopathy; vitamin D .

PO2195

ASSESSMENT OF RISK FACTORS OF LIPID IN CARDIOVASCULAR COMPLICATIONS FOR 121 DIABETIC WOMEN TYPE II

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Background and objectives: Diabetes is the kind of chronic disease that severely exacerbates health budgets, Algeria, food culture is still lacking even in the healthy population. To facilitate the patient's ability to achieve and especially long-term plan of cardiovascular prevention, the prevention of lipid score or SLP was developed. Our goal is to evaluate the risk factors of lipid cardiovascular complications in a population of non-insulin dependent diabetic women to better understand issues related to their diet.

Methods: A dietary survey was carried out for a population of 121 non-insulin dependent diabetic women (NIDD) aged 34-78 years at two diabetes centers in Constantine compared to a population consisting of 121 non-diabetic women (healthy) aged from 39 to 45 years. (Reminder food 24 hours). Entry and data processing is done by the software Microsoft Excel 2007, comparisons between means were performed by the student and the test-score thresholds 1%, 5% and 99%.

Results: Our results show that there is an increase in triglycerides, a decrease in HDL-C, and a decrease of daily lipid score and the daily intake of lipid and a decrease in SLP (compared to recommended).

Conclusions: The power followed by our diabetic women is low in saturated fatty acids (SFA) and MUFA but rich in PUFA which could exclude the occurrence of cardiovascular complications as a result of the diet.

Key words: women NIDD- SLP, lipids, cardiovascular complications, anthropometric parameters.

PO2196

EVOLUTION OF NUTRITIONAL STATUS IN CHILDREN WITH CYSTIC FIBROSIS IN EASTERN ROMANIA

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Background and objectives: The importance of nutritional intervention for children with cystic fibrosis (CF) is well recognized. Improved nutritional status early in life is associated with better long term evolution in patients with CF. The authors evaluated the nutritional status of children with CF in a Regional Center in Eastern Romania.

Methods: We performed a retrospective study included 37 children with CF followed between January 2010 - January 2012. Mean age was 87.27 months ±59.3SD(min.: 4 months; max.: 216 months). Nutritional status was assessed based on weight, height, weight and height Z score. Pulmonary function was evaluated by determining FEV1 in children older than 6 years and frequency of respiratory infections. We followed the nutritional status correlate with age at diagnosis, age at disease onset, impaired lung function, frequency of lung infections and number of hospitalizations.

Results: The mean Z score for weight and age were: -0.91±2.07SD (min: -3.7, max: 3.8) and mean Z score for height and age were: -0.802±1.74SD (min:-3.6; max: 3.5). Lower age at onset was significantly correlated with disease severity (r=-0.696). The result of multiple logistic regression analysis on nutritional status assessed Z score was significantly influenced by late age of diagnosis (R = 0.453862, p = 0.007539, 95% CI) and repeated respiratory infections (R = 0.279127, p = 0.042693, 95% CI).

Conclusions: The worse nutrition is associated with late aged of diagnosis and early respiratory infections of children with CF. In order to improve nutritional status and a better clinical evolution is necessary to introduce newborn screening program for CF in Romania.

Key words: cystic fibrosis, nutritional status, Z score, children.

PO2197

RELATIONSHIP AMONG TG/HDL-C RATIO, NUTRITIONAL STATUS AND INTAKE OF OMEGA-6 AND OMEGA-3 FATTY ACIDS IN PRE AND POSTMENOPAUSAL WOMEN

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Background and objectives: The triglyceride/HDL cholesterol (TG/HDL-C) ratio has been significantly associated with insulin resistance and cardiometabolic disease. Fatty acids diet intake may influence this ratio. The main objective was to investigate the relationship among TG/HDL-C ratio, nutritional status and essential fatty acids intake in pre and postmenopausal women.

Methods: Observational Analytic Transversal study. Convenience sample of women over 40 years-old, from the city of Buenos Aires. Dependent variable: TG/HDL-C ratio (expected: <3 and high: >3). Independent variables: nutritional status by BMI and waist circumference (WC); omega-6 (W6) and omega-3 (W3) essential fatty acids intake by amount, type and adequate ratio between them (Adequate < 10:1 and inadequate: > 10:1). Control variables: biological stage (pre and post-menopause) and lifestyle (smoking, alcohol intake and physical activity). Anthropometric assessment was carried out by direct measurement and fatty acids intake was estimated by 24-hour recall. We used Table Chemical Composition of German origin Fachmann-Kraut-Souci and data provided by the food industry. Statistical analysis with SPSS 15.0 calculating Odds ratio with 95% confidence intervals, chi-square or Fisher test, considering $p < 0.05$.

Results: 96 women were included, 45.8% of them premenopausal and 54.2% of them postmenopausal. 34.4% had a BMI > 25 kg/m2 and 16.7% WC > 88 cm. 21.9% had a TG/HDL-C ratio > 3 and 61.5% W6/W3 ratio > 10:1. 61.5% consumed below the W6 DRI and 87.5% below the W3 DRI. A significant association between TG/HDL-C and overweight by BMI > 25 kg/m2 ($p = 0.000$) and with increased CC ($p = 0.000$) but not with the intake of W6 and W3. Regarding biological stage and lifestyle only significant association was found with smoking ($p = 0.002$)

Conclusions: TG/HDL-C ratio was significantly associated with nutritional status and smoking but not with consumption of W6 and W3.

Key words: TG/HDL-C ratio, nutritional status, W6 – W3, menopause.

PO2198

EFFECT OF THE TEMPORAL PATTERNS OF FOOD INTAKE ON GLYCEMIC CONTROL IN JAPANESE MALE TYPE 2 DIABETIC PATIENTS

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Background and objectives: Type 2 diabetes mellitus is strongly influenced by life style, especially dietary habits. Food intake entrains physiological and genetic circadian rhythms, which regulate the glucose metabolism. However, the correlation between meal timing and glycemic control has not yet been fully elucidated. Therefore, we investigated the role of temporal patterns of caloric intake in daily blood sugar control.

Methods: This was a cross-sectional study with 71 Japanese men under treatment for type 2 diabetic mellitus in an outpatient department. Meal times and dietary intake were assessed using a one-day 24-hour dietary recall. Blood biochemical data and medication status were obtained from the medical records. We hypothesized that any hypoglycemic episode might influence the dietary habit, and divided the patients into two groups according to the medication prescribed, a group treated with insulin and/or sulfonylurea hypoglycemic agent (INS•SU) (n = 46), and another group with other or no medication (Non-INS•SU) (n = 25). Then, we conducted multivariate regression analyses with controls for age, BMI, and medication status in order to determine the independent association of meal times and the blood biochemical data.

Results: The average age, BMI and HbA1c of the subjects were 66.3±8.9, 24.0±3.6 kg/m2 and 7.0±0.8%, respectively. The INS•SU group showed a significantly higher caloric intake after 9 p.m. (163.8±354.6 kcal) than the non-INS•SU group (32.9±138.6 kcal). The evening/ (morning + lunch) caloric intake ratio was significantly correlated with HbA1c in the non-INS•SU group ($r=0.393$, $p = 0.040$), but not in the INS•SU group.

Conclusions: When considering dietary intervention for type 2 diabetes, it is necessary to take into account not only total caloric intake, but also the temporal patterns of food intake, in particular, the evening ratio of daily calorie intake.

Key words: type 2 diabetes mellitus, meal times, glycemic control.

PO2199

A GENE VARIANT IN THE TRANSCRIPTION FACTOR 7-LIKE 2 (TCF7L2) IS ASSOCIATED WITH AN INCREASED RISK OF GESTATIONAL DIABETES MELLITUS

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Background and Objectives: Adipokines play an important role in the pathogenesis of insulin resistance during pregnancy. Variations in transcription factor 7-like 2 (TCF7L2) and fat mass and obesity associated (FTO) genes have been associated with type 2 diabetes and FTO also with obesity. We aimed to study the association of genetic variants previously linked with type 2 diabetes in subjects with gestational diabetes mellitus (GDM) and its influence on maternal adipokines during pregnancy.

Methods: We recruited 25 healthy pregnant women (Controls) and 45 women with GDM between weeks 24 and 28 of gestation. Maternal blood samples were collected at recruitment and at delivery. Adipokines were determined at both sampling times using LINCOplex kits of human monoclonal antibodies. Genomic DNA was extracted from blood recruitment samples and FTO rs9939609, TCF7L2 rs4506565, rs7901695, rs12243326, rs12255372 and rs7903146, INSIG2 rs7566605, SREBF1 P197L, P576P and IVS20+151T>C and FATP4 IVS12+147G>A were genotyped.

Results: Plasma adiponectin was significantly lower in GDM than Controls at the time of recruitment and a trend was observed at the time of delivery (GDM 7.43±0.53 mg/L vs. Controls 9.2±0.8 mg/L, p = 0.060). In contrast, serum resistin showed a trend to higher levels in the GDM group only at the time of recruitment. TCF7L2 rs4506565 (OR=2.31, 95% CI: 1.97-5.01; p = 0.031) and FTO rs9939609 (OR=2.17, 95% CI: 1.07-4.41; p = 0.039) were associated with the risk of GDM. TCF7L2 rs4506565 was associated with resistin at delivery; women carrying the T allele had increases in plasma resistin of 9.38 μg/L (95% CI 1.39-17.37; p = 0.022) per allele; this association remained significant after adjusting for pre-gestational body weight.

Conclusions: TCF7L2 rs4506565 variant (T/T) is associated with an increased risk of GDM and it is associated with plasma resistin concentrations in woman with GDM at delivery.

Key words: Gestational diabetes mellitus, adipokines, TCF7L2.

PO2200

VITAMIN D STATUS AND MORTALITY IN PATIENTS WITH STABLE ANGINA

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Background and objectives: Vitamin D is a candidate nutrient which status may be relevant to survival and cardiovascular risk. The vitamin is associated with cardiovascular risk factors, including body mass, inflammation and hypertension, which may confound this relationship. We assessed the association between vitamin D status and all-cause and cardiovascular mortality in patients with stable angina.

Methods: From the Western Norway Coronary Angiography Cohort (WECAC, 2000–2004) we measured serum 25-hydroxyvitamin D (25OHD) by LC-MS/MS at baseline in 4118 participants with stable angina pectoris. 68% were males and the mean age was 60.1 (SD 11.1) years. Cox proportional hazards models were used to compare survival across quartiles of 25OHD concentrations adjusted for month of blood draw.

Results: A total of 302 deaths occurred during a mean follow-up of 4.7 years, upon which 163 were due to cardiovascular causes. In Cox models adjusted for age and gender, the risk of death (Hazard ratio [95% confidence interval]) differed across 25OHD quartiles for all-cause mortality (p for trend < 0.001) when comparing the 1st quartile to the 2nd 0.60 [0.45-0.82], 3rd 0.54 [0.40-0.74] and 4th 0.46 [0.33-0.63] quartiles and for cardiovascular mortality (p for trend = 0.001) when comparing the 1st quartile to the 2nd 0.79 [0.53-1.18], 3rd 0.61 [0.40-0.94] and 4th 0.49 [0.32-0.78] quartiles. The associations remained similar after adjustment for smoking, diabetes, low-density lipoprotein, ejection fraction and above mentioned cardiovascular risk factors.

Conclusions: Normal and high vitamin D status were associated with reduced all-cause and cardiovascular mortality in patients with stable angina.

Key words: Vitamin D, 25OHD, mortality, cardiovascular mortality.

PO2201

PREVALENCE OF OBESITY IN THE "INMA: ENVIRONMENT AND CHILDHOOD" SPANISH COHORT, ACCORDING TO DIFFERENT CRITERIA

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Background and objectives: The INMA -Environment and Childhood- Project is a network of Spanish birth cohorts that aims to study the role of environmental pollutants in air, water and diet during pregnancy and early childhood in relation to child growth and development. The most appropriate parameters and reference populations for assessing childhood obesity are still controversial. We estimated the prevalence of child obesity in the INMA cohort according to different international and national criteria.

Methods: The height and weight of 1552 children from the INMA cohort were directly measured at the age of 4 and 10 years (4.4±0.2 and 10.6±1.2 yrs). We calculated the prevalence of overweight and obesity according to: the International Obesity Task Force (IOTF), enKid study, Obergozo Foundation (Hernandez 1988 and Sobradillo, 2004), and Carrascosa tables (2008).

Results: We observed a wide variability in the prevalence of obesity according to the criteria used. At 4 years, the highest prevalence of excess weight was obtained by applying Carrascosa tables (23.6%) and the lowest with the enKind study (8.3%). Considering children by gender, the same results were only obtained among boys. The prevalence of obesity was comparable using different national or international standards, but there were major discrepancies in overweight prevalence. The prevalence of excess weight in INMA children increased throughout the follow up. At 10 years, the highest frequency of excess weight was obtained with the IOTF criteria (33.5%) and the lowest with the enKind (23.8%) and Carrascosa (23.7%) criteria. Analyzing by gender, IOTF obtained the highest prevalence for excess weight in both genders. The prevalence of overweight and obesity was also dependent on the criteria used, but the differences among criteria decreased.

Conclusions: The variability in results demonstrates the importance of the criteria selected to assess overweight and obesity for the comparison and follow-up of childhood obesity.

Key words: Obesity, childhood, overweight

PO2202

EFFECTS OF FRUCTOOLIGOSACCHARIDES IN THE CD4+CD62L+ T CELL TRANSFER MODEL OF COLITIS

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Background and objectives: Fructooligosaccharides (FOS) are used as functional foods due to their prebiotic effects. Previous studies demonstrated that FOS may improve intestinal inflammation. Our aim is to study the antiinflamatory effect of FOS in the CD4+CD62L+ T cell transfer model of colitis.

Methods: CD4+CD62L+ T cell transfer model of colitis. CD4+CD62L+ T cells were purified from spleen mononuclear cells of C57 healthy mice by CD4+CD62L+ T Cell Isolation Kit with immunomagnetic microbeads (Miltenyi Biotech). CD4+CD62L+ T cells ($1x10^6$) were resuspended in 100 µl of sterile phosphate-buffered saline (PBS) and injected intraperitoneally in recipient RAG1 deficient mice. Colitic activity was monitored by weight changes. After 8 weeks mice were used for experiments. T-cell free PBS injected RAG1 mice were used as control. Experimental design. Three groups were established: control, CD4+CD62L+ and FOS. Saline or FOS (75 mg/mouse/day) were administered by gavage daily. Mice were sacrificed after 12 days. Assessment of colonic damage and inflammation. Large intestine status was evaluated by macroscopic scoring, myeloperoxidase (MPO) and alkaline phosphatase (AP) colonic activity.

Results: Treatment of mice with 75 mg of FOS daily partially improved colitis, as evidenced by a significantly increased body weight gain (+3.0±1.6%) compared with colitic mice (-6.5±1.5%). Macroscopic score of the large intestine was lower in FOS-treated mice (1.6) vs. colitic mice (2.5). Neutrophil recruitment to the inflammatory site was significantly lower ($p < 0.05$) in treated animals than in colitic controls, as measured by MPO activity (23.1±6.9 vs. 51.6±8.6 mU•mg protein-1). AP was also diminished by FOS (131.7±7.3 vs. 200.9±24.5 mU•mg protein-1), and its sensitivity to levamisole was lower.

Conclusions:FOS exerts intestinal antiinflammatory activity in T lymphocyte dependent colitis.

Key words: fructooligosaccharides, colitis, CD4+CD62L+ T cell, inflammatory bowel disease

PO2203

EFFECT OF PRE/POST RICE CONSUMPTION OF MILK AND FERMENTED SOYBEAN ON POSTMEAL GLYCEMIA AND INSULIN RESPONSES IN HEALTHY STUDENTS

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Background and objectives: The objective was to describe the effect of milk or fermented soybean when consumed before/after a rice on postprandial blood glucose and insulin in healthy students.

Methods: 1) Thirty five students were divided into two groups. One group (milk group; female 21) has consumed 200ml milk, the other group (soybean group; male 3, female 11) fermented soybean (90g). 2) Two studies were conducted. In experiment 1 (reference meal), white rice (carbohydrate 50g) only was provided. In experiment 2 (test meal), 200 ml milk / 90g fermented soybean with white rice (total carbohydrate 50g) were provided. At 15min before/after a white rice consumption, the subjects were provided milk or soybeans. 3) Blood glucose and insulin were measured at baseline and at intervals both experiments. The area under the curves for glucose (GAUC) and insulin (IAUC) were calculated. Comparisons between meals were analyzed based on paired t-test.

Results: 1) The milk before a rice had significantly lowered blood glucose at 30, 45 and 60 min after a rice eating ($p < 0.05$), and significantly lowered the GAUC values ($p < 0.05$), compared with the white rice only. The milk after a rice had no effects on reducing postprandial blood glucose. 2) The fermented soybeans before/after a rice had significantly lowered the GAUC values ($p < 0.05$), compared with the white rice only. There is no difference between rice IAUC and corresponding fermented soybean IAUC.

Conclusions: Milk consumption before a rice, not after a rice, reduced postprandial blood glucose and insulin. Fermented soybean before/after a rice reduces postprandial blood glucose, but had no effects on insulin secretion.

Key words: postprandial blood glucose, insulin, rice, milk, soybean products.

PO2204

FOOD PATTERN, BMI, BODY COMPOSITION AND CD4 CELL COUNT OF ADULT LIVING WITH HIV/AIDS IN EAST JAVA (INDONESIA)

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Background and objectives: Cumulative HIV and AIDS cases from 1 April 1987 through 30 September 2012 are 92251 for 39434 for AIDS. This epidemic has caused a real challenge to overcome. Massive efforts required to minimize the impact of the epidemic, which of course must be integrated with the support and care in nutritional aspects. The purpose of this study was to analyze the relationship between food pattern, BMI and body composition with the CD4 cell count in HIV infected adult.

Methods: This study was an analytical observational research with cross sectional design. The samples were 69 people living with HIV/AIDS from outpatient clinic at Dr. Soetomo Hospital (East Java Province, Indonesia) that was taken by purposive sampling. Food pattern (semi quantitative food frequency), Body Mass Index, Body Composition (bioelectrical impedance), and CD4 cell count were assessed. Data collection was done from August–December 2012. The data were analyzed by Pearson Correlation Test.

Results: There was 40.6% responden with CD4 cell count under 200 cells/mm3. Average BMI, fat mass and fat free mass were 20.6; 10.9 kg and 41.1 kg. Significant correlations were found for BMI and CD4 cell count ($p = 0.00$), fat mass and CD4 cell count ($p = 0.01$), fat free mass and CD4 cell count ($p = 0.028$). The study group had a poor energy intake with average intake 1833 Calories per day.

Conclusions: Significant relationships existed between BMI and the CD4 cell count, and also between body composition and the CD4 cell count. Strategies for increasing food pattern, BMI, body composition and CD4 cell count ought to be identified and implemented in communities.

Key words: BMI, body composition, food pattern, CD4.

PO2205

RETINOL, TOCOPHEROL AND β-CAROTENE STATUS AND OXIDATIVE STRESS IN CHINESE PATIENTS WITH PULMONARY TUBERCULOSIS

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Background and Objectives: In pulmonary tuberculosis (PTB), oxidative stress is a result of tissue inflammation, poor dietary intake of micronutrients due to illness. The objective was to investigate retinol (VA), tocopherol (VE) and β-carotene (α-C) status and oxidative stress among PTB patients.

Methods: Totally 70 tuberculosis patients were randomly selected as the case group, and 70 health persons matched on age, gender, etc. as the control group. The information of the body mass index (BMI), and serum lipid levels such as triglyceride (TG), total cholesterol (TCHO) and high-density lipoprotein (HDLC) was collected. The activities of superoxide dismutase (SOD) and catalase (CAT), and VA, VE and α-C were detected.

Results: BMI values was 19.13 kg/m2 in the case group, lower than 21.95 kg/m2 in the control group (both $p < 0.05$). The values of serum TG, TCHO, HDLC were 1.54 mmol/L, 4.47 mmol/L and 1.21 mmol/L, respectively, in the case group, significantly lower than those of the control group (all p values <0.05); The activities of serum SOD and CAT were 78.20 U/ml and 5.24 U/ml respectively, in the case group, also lower than the control group (83.27 U/ml and 9.99 U/ml respectively) ($p < 0.05$). Compared with the control group, the levels of VA and VE were 25.6 μg/100ml and 38.5μg/100ml, respectively, lower than the control group ($p < 0.05$). However, levels of serum β-carotene were 4.8 μg/100ml and 5.1 μg/100ml, respectively, in the case group and control group, which did not showed significant differences ($p>0.05$).

Conclusions: The status of retinol, tocopherol and β-carotene is poor, and activities of SOD and CAT were lower in PTB patients. The implication of the study was that oxidative stress increased and the supplementation with micronutrients, such as VA, VE and β-carotene should be considered.

Key words: retinol; tocopherol; β-carotene; oxidative stress; pulmonary tuberculosis. Granted by The National Natural Science Fund (81172662).

PO2206

EFFECT OF RETINOL AND VITAMIN D TREATMENT ON THE GROWTH OF MYCOBACTERIUM TUBERCULOSIS FROM TUBERCULOSIS PATIENTS

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Background and Objectives: The objective was to assess the effect of retinol (VA) and vitamin D (VD) on the growth of Mycobacterium tuberculosis (MTB).

Methods: Totally 118 tuberculosis patients with positive sputum culture were selected. Strains isolated from sputum were cultured and used for drug sensitivity test by the absolute concentration method. In addition, strains was treated with three dosages of retinol, i.e. VA1 with 500 IU/mL, VA2 1000 IU/mL and VA3 2000 IU/mL; and vitamin D treatments included VD1 (25 IU/mL), VD2 (50 IU/mL), VD3 (75 IU/ mL) and VD4 (100IU/mL), added to the Lowenstein-Jensen medium, and no treatment of VA and VD as control medium. All strains were inoculated simultaneously in the medium, cultured for 3 to 4 weeks and observed colony growth conditions.

Results: The study showed that the positive percentages of MTB colony growth were 92.37%, 81.36% and 86.44% in the groups VA1, VA2 and VA3, respectively, which were all less than the control group (100%) (all p values <0.05); while the positive percentages of VD1, VD2, VD3 and VD4 groups were 94.1%, 93.2%, 94.9% and 91.5% respectively, less than those in the control group (all p values<0.05). Moreover, administration of higher dosage of retinol in A2 group was better than the low dose in inhibiting MTB growth ($p < 0.017$). The inhibitory effect of 4 groups VD had no statistically significant differences ($p>0.05$); Comparing the inhibitory effect of VA and VD, the effect of VA2 and VA3 group was better than the VD group ($P < 0.05$).

Conclusions: The appropriate dosages of VA (1000 IU/ml) and VD (25 IU/ml) could inhibit the growth of MTB, and the further study of retinol and/or vitamin D supplementation in the population of TB patients in China will be expected.

Key words: retinol; vitamin D; mycobacterium tuberculosis; strain.

PO2207

EFFECT OF AMMONIA AND GLUTAMINE ON BRANCHED-CHAIN AMINO ACID OXIDATION AND PROTEIN METABOLISM IN HEALTHY AND ENDOTOXEMIC RATS

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Background and objectives: Enhanced oxidation of branched-chain amino acids (BCAA; valine, leucine and isoleucine) in skeletal muscle, that is a typical metabolic alteration in sepsis, is coupled with activated synthesis of glutamine and development of muscle wasting. It can be hypothesized that modulation of glutamine synthesis by reactant availability may affect BCAA oxidation and protein metabolism in skeletal muscle.

Methods: Two separate experiments were performed using male Wistar rats in which the effects of inhibition and stimulation of glutamine synthesis on BCAA and protein metabolism was evaluated. In the first study, glutamine synthesis was inhibited by alanyl-glutamine infusion in healthy and endotoxin treated rats. In the second study, glutamine synthesis was stimulated by infusion of ammonium acetate/bicarbonate mixture. The parameters of protein metabolism and leucine oxidation were measured under steady state conditions using L-[1-14C] leucine infusion. Statistical comparisons were performed using ANOVA and Bonferroni test.

Results: Infusion of alanyl-glutamine induced a decrease in plasma BCAA levels, a decrease in leucine oxidation, and an improvement of protein balance due to the decrease in proteolysis both in intact and endotoxemic rats. Ammonium infusion induced an increase in ammonia and glutamine, an increase in BCAA oxidation, a decrease in BCAA and alanine levels in blood plasma, and a decrease in whole-body protein turnover and protein synthesis in skeletal muscle.

Conclusions: It is concluded that changes in glutamine synthesis induced by alanyl-glutamine and by ammonia infusion are associated with significant alterations in BCAA and protein metabolism. The results also demonstrate that the cause of decreased plasma BCAA levels observed frequently in liver cirrhosis is hyperammonemia.

Key words: glutamine, ammonia, branched-chain amino acids, leucine oxidation. Supported by PRVOUK P37/02.

PO2208

CLEAR KEFIR PROBIOTICS REDUCED POTENTIALLY ON GLYCEMIC STATUS, LIPID PEROXIDATION OF THE DIABETES MELLITUS PATIENTS IN WEST JAVA, INDONESIA

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Background and objectives: Hyperglycemia causes excessive free radicals, may increase reactive oxygen species, lipid peroxidation, as well as dysfunction of the pancreatic β cells. Kefir consists of bioactives, exopolysaccharides, antioxidants, immunomodulator. This study was validating the effect of clear kefir probiotic on glycemic status, lipid peroxidation of the Diabetes Mellitus Patients in West Java, Indonesia.

Methods: The randomized pretest-posttest control group study design was conducted in 108 diabetes mellitus (DMT2) patients in public hospitals. Sample were randomized into three groups: (1) DMT2 with HbA1c < 7, received diet and 200 ml clear kefir as intervention group 1, (2) DMT2 with HbA1c > 7, received diet and 200 ml clear kefir as intervention group 2. (3) DMT2 received diet as control group. Blood exopolysaccharide glucose was measured by enzymatic. Peroxidation was measured by MDA-TBARs. Probiotics characterization was done by microbiology. Data were analyzed by One Way Anova, Duncan test with significance level $p < 0.05$. Research was approved by Ethical Clearance Medicine Faculty of Diponegoro University.

Results: Clear kefir supplementation 200 ml/day for 30 days administration, affected on reduction of the blood glucose and MDA level. Statistical analysis showed there were respectively decreased of glucose ($p < 0.001$), MDA ($p < 0.001$) except in control. Probiotics were found as many as 106-109 cfu/mL and declined to 105 cfu/mlduring storage. It was five species of probiotics; Lactobacillus Sp, Sp Lactococcus and Acetobacter and Saccharomyces Sp.

Conclusions: Kefir was significantly decreased of the blood glucose, level of MDA. Exploring potentially in a pathogenesis of the pancreatic β cells repairs and antioxidants is challenge for future research.

Key word: Probiotic, kefir, diabetes mellitus, hyperglycemia, lipid peroxidation.

PO2209

MICRONUTRIENTS DIETS MODIFICATION REDUCED ON BLOOD GLUCOSE OF THE TYPE 2 DIABETES MELLITUS (T2DM) IN WEST JAVA, INDONESIA (STUDY ON ENRICHEMENT DIET OF ZINC, SELENIUM AND ZINC AND SELENIUM SELENIUM COMBINED)

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Background and objectives: Micronutrients Zinc (Zn) plays glucose tolerance, immune and hilling wounds of diabetes mellitus in patients. Selenium is an essential part of the enzyme glutathione peroxidase related to the body's immune system and works synergistically with the vitamin E. Supplementation vitamins and trace elements are still controversial used and no strong evidence approved for diabetes therapy. This study aimed to validate the effect of enrichment modification intake of zinc, selenium and combination in the diet on blood sugar levels.

Methods: Quasi-experimental design was using 28 T2DM patients selected by the purposive sampling. Samples were divided into three intervention groups; (1) sample received a diet enriched by Zinc, (2) sample Selenium enriched diet, (3) diet enriched in Zinc and Selenium, and (4) received diet as the control group. Socioeconomic was measured by questionnaire. Body composition measured by anthropometry. Blood glucose were measured by enzymatic. Nutritional intake was measured by FFQ. Data were analyzed by statistical program with significance level $p < 0.05$. Ethical was approved this research.

Results: Micronutrient dietary modification reduced delta fasting glucose 14.50 mg/dL in the group Zinc+Selenium diet enrichment, the selenium enrichment diet obtained about 7.88 mg/dL, and Zinc diet groups achieved at 6.38 mg/dL and the control group at 5, 25 mg/dL ($p = 0.027$). Delta postprandial glucose levels achieved at 12.50 mg/dL in the group Zinc + Selenium diet group, the enrichment of Zinc at 12.25 mg/dL, and Selenium diet group about 6.75 mg/dL, and a control group of 2.50 mg/dL ($p = 0.007$).

Conclusions: Modification of diet enrichment of Zinc+Selenium reduced significantly of blood glucose. Further research is challenge with a larger sample.

Key words: Diet modification, Zinc, Zinc, blood glucose, antioxidant.

PO2210

RELATIONSHIP BETWEEN SLEEP, HUNGER, CRAVINGS FOR FOOD, SEDENTARY LIFESTYLE AND WEIGHT IN ADOLESCENTS

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Background and objectives: The recent epidemic of obesity in adolescents has been accompanied by a parallel decrease in hours of sleep. Physiological studies suggest that a reduction in sleeping time can have an effect on weight through the effects on appetite, physical activity and/or thermo-regulation. The purpose of this study was to determine the relationship between quality of sleep (QS), hunger, sense of satiety, cravings for food, sedentary lifestyle and weight in adolescents.

Methods: 323 adolescents, 12 to 18 years old who were registered in public schools participated in the study. The Pittsburgh Index of Sleep Quality was used. The data obtained included demographic, hunger level and satiety, cravings for food, sedentary lifestyle, and height and weight data. Descriptive and non-parametric procedures were used for the analysis of the data ($\alpha = 0.05$).

Results: The adolescents' age mean was 14.6±1.7 years, and BMI mean was 22.55±4.72 kg/m2. The night sleeping time mean during the week was 6.15±1.7 hours, and 8.55±2.0 hours on weekends. 72.8% reported a global score of bad QS during the week. A relationship between sleeping time and BMI ($rs = -0.131$ $p < .05$), hunger level ($rs = -0.178$ $p < 0.05$) and cravings for food ($rs = -0.168$ $p < 0.05$) was identified. The greater the sleeping disorders, the higher the level of cravings ($rs = 0.186$ $p < 0.001$). The greater the daily dysfunction, the greater the sedentary lifestyle ($rs = 0.164$ $p < 0.001$), the greater the level of hunger ($rs = 0.149$ $p < 0.05$) and cravings for food ($rs = 0.230$ $p < 0.001$).

Conclusions: These results point to a relationship between QS and behaviors during the day that can lead to obesity. Longitudinal studies using objective measurements of sleep, appetite regulation, and caloric intake are needed.

Key words: Sleep, obesity, food cravings.

PO2211

RELATIONSHIP BETWEEN SLEEP AND OBESITY IN ADOLESCENTS IN NORTHEASTERN MEXICO

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Background and objectives: Adequate sleep has been considered important for the health and wellbeing of adolescents. Several studies have indicated that a decrease in night sleeping time in adults and children would be a risk factor for weight gain and the development of obesity (OB); the relationship is not clear for adolescents. The objective of this study was to evaluate the prevalence of short sleeping time and its relationship to OB in Mexican adolescents.

Methods: A transversal study was carried out; the sample consisted of 250 participants, 10 to 18 years old, both male and female, who were registered in three public education institutions. The participants were randomly selected using stratified sampling. Self-reporting questionnaires were used to assess sleeping time. Weight, size, waist circumference, and body mass index were determined.

Results: The sleeping time mean (SD) was 7.3 (1.5) hours/day during the week and 8.5 (2.0) hours on weekends. Around 30% sleep less than 7 hours per day and 20% more than 9 hours per day. It was identified that adolescents with long sleeping times (more than 9 hours per night) have a higher BMI score χ^2= 7.14 p = 0.02, waist circumference χ^2= 4.70 p = 0.02 and percentage of body fat χ^2= 5.16 p = 0.05.

Conclusions: The results obtained in this study show high prevalence of short sleeping times among Mexican adolescents and that longer sleeping times are significantly associated with a higher risk for overweight and obesity. Longitudinal studies are essential to address the magnitude of causality and, concurrently, to identify the biological mechanisms involved in the development of obesity.

Key words: Adolescents, obesity, sleeping time, waist circumference.

PO2212

OATS AS HIGH-VALUE CEREAL ADDITIVE FOR COELIAC SUBJECTS: DEVELOPMENT OF NEW VARIETIES NON-TOXIC FOR THE COELIAC POPULATION

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Background and objectives: Contrary to the case of other diseases, the treatment of coeliac patients is based not on drugs but on the maintenance of a gluten-free diet, which means the exclusion of wheat, barley, rye, and oats from the daily diet. The introduction of oats into the gluten-free diet has been a topic of debate in recent years. Earlier works of Comino et al. (2011. Gut 60:915-922), with monoclonal antibodies (G12 and A1) and T lymphocytes of coeliac patients, demonstrated that the immunogenicity of oats depended on the cultivar used. The results established a basis for the selection and development of new varieties safe for the coeliac population. With this background, the main aim of this work is the development of new oat varieties non-toxic for coeliac patients, offering the grower a greater diversification of traditional crops.

Methods: The oat varieties previously reported as non-toxic for coeliac subjects have been used as parentals and crossed with new varieties that present good adaptation and yields under Mediterranean crop conditions.

Results: Analysis of the toxicity, using the G12 and A1 antibodies, of a collection of 100 cultivated oat varieties from Mediterranean countries and subsequent crossing of the selected lines with the oat varieties previously reported as non-toxic.

Conclusions: The demonstration that the new oat lines generated are non-toxic, and should be suitable for consumption by the coeliac population, could allow their incorporation, via various types of prepared foods, into the daily diet of these patients, which would be of great importance for the patients both nutritionally and therapeutically.

Key words: oat varieties, coeliac disease, monoclonal antibodies.

PO2213

ROLE OF NUTRITIONAL INTERVENTION, AS ONE OF THE PACKAGE OF SERVICES PROVIDED TO HIV INFECTED PATIENTS

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Background and objectives: The Centre of Ambulatory Treatment (CAT) at Libreville, the capital of Gabon, provides a package of services to HIV infected patients composed of medical examination and providing antiviral treatment. Nutritional assessment with management of malnutrition and related symptoms, was added to the provided services, to improve the immunity level of the patients, their general condition, and the prognosis of the disease.

Methods: The study was conducted at the CTA, during one year, with follow-up of cases through a monthly visit. The sample of the study was formed of 117 patients. Nutritional education, nutritional assessment (medical, anthropometry and hemoglobin and CD4& CD8 levels) were achieved. Nutritional demonstration for healthy food and sanitary precautions during food preparation and supplement supplies were distributed when needed.

Results: Males formed 40.3% of cases, while women (59.7%). The mean age of men and women were: 40.5and 34.3 years respectively. After the fifth visits the following figures were changed: The mean hemoglobin is increasing from 9.9 to 11.9 g/lit. The mean number of CD4 from 279.2 to 489.The mean weight for men from 55 to 67 kg.

Conclusions: Nutrition intervention is an important pivot in the package of services provided to HIV patients, to improve their immunity, their general health, and for the management of the complications of the disease and the retroviral treatment.

Key words: Nutrition, HIV, Gabon

PO2214

CLINICAL-NUTRITIONAL STATUS OF OBESE POST-MENOPAUSAL WOMEN ON A WEIGHT LOSS PROGRAM BASED ON PREPARED DISHES

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Background and objectives: Few studies have evaluated the efficacy and reliability of weight loss-focused prepared food dishes in obese post-menopausal women. To compare the efficacy of a weight loss program based on a balanced hypocaloric diet using prepared dishes* with that of a similar program based on standard commercially available foods and with a non-intervened control group. A further aim was to evaluate the subjectivity of participants in the preparation of the diet-adjusted dishes based on usually consumed products.

Methodology: Controlled longitudinal interventional study with obese post-menopausal women aged between 55 and 65 years. 75 female volunteers divided in three groups of 25 women: control, who consume their usual non-dietary adjusted meals (CG); treated with a diet adjusted to their individual requirements based on standard commercially available food (SG); and similar but based on prepared dishes (PG). Data were gathered on anthropometric variables, consumption habits and physical activity levels, and clinical-nutritional levels were conducted at the start and every two weeks to the end of the 8-week study in order to evaluate biochemical changes.

Results: The weight loss was significantly higher in SG y PG than CG (losses of 7.60 kg in PG and 7.01 kg in SG versus 2.10 kg in CG ($p < 0.01$). PG showed a significantly higher ($p < 0.01$) loss of fatty mass and abdominal circumference versus the SG women.

Conclusions: Two groups treated lost more weight than those untreated. The diet based on prepared dishes obtained more reliable and higher quality outcomes, achieving a positive change at fatty compartment level and in the abdominal circumference.

Key words: Obesity. Prepared dishes, weight loss, hypocaloric diet, post-menopausal women.

PO2215

DOCOSAHEXAENOIC ACID SUPPLEMENTATION AND INSULIN RESISTANCE IN OBESE CHILDREN IN A DOUBLE-BLIND RANDOMISED CONTROLLED CLINICAL TRIAL: A PILOT STUDY

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Background and objectives: Insulin resistance is highly prevalent among children with severe obesity. Long chain polyunsaturated fatty acids (LCPUFAs) are major components of cell membranes. Low levels of LCPUFAs, especially docosahexaenoic acid (C22:6 n-3, [DHA]) and a high n-6/n-3 LCPUFA ratio in skeletal muscle membrane phospholipids have been associated with insulin resistance in adults. The aim of the present study was to investigate whether dietary supplementation with DHA would be more effective than nutritional-behavior intervention alone in reducing insulin resistance in obese children.

Methods: We performed a randomized controlled trial of DHA supplementation (500 mg/day) versus placebo in 30 children (8-13 years) obese children. Both the intervention product and placebo were prepared as gelatin-soft gel pills (AFR Advanced Food Researchμ, Limbiate, Milan, Italy). The main outcome was the change in insulin resistance as detected by homeostatic model assessment method (HOMA-IR) after 6 months of treatment. Secondary outcomes were the changes in body mass index z-score, alanine transaminase, triglycerides after 6 months of treatment.

Results: All children completed the study. At recruitment (baseline), the two groups were comparable ¡ with respect to nutritional, anthropometric and metabolic variables (minimum p = 0.372). At the end of the study reduction of plasma insulin and HOMA index was higher (p = 0.046 and p = 0.045, respectively) in DHA (mean 34.6%; 33.4%) than placebo (20.7%; 20.3%) group. Triglycerides decreased in DHA group as compared to placebo but there was no effect on alanine transaminase and body mass index. At the end of the intervention children showed a reduction in BMI z-score from 2.25 (0.49) a 1.90 (0.95) in DHA group and from 2.27 (0.47) to 1.95 (0.96) in placebo group.

Conclusions: Daily dietary supplementation of DHA at adequate dose may contribute to improve the insulin sensitivity of obese children undergoing a nutritional-behavior intervention.

Key words: DHA, obesity, insulin resistance, nutritional intervention, LCPUFA.

PO2216

POLYMORPHISM RS17782313 IN MC4R GENE IS NOT ASSOCIATED WITH BINGE EATING BEHAVIOR IN A BRAZILIAN COHORT OF OVERWEIGHT CHILDREN

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Background and objectives: Melanocortin-4 receptor (MC4R) mutations are the most common known cause of monogenic obesity. The rs17782313 is a common allelic variant, located near MC4R, and associated with an increased risk for obesity. MC4R is involved in the melanocortinergic system, and is deeply involved in energy homeostasis and body weight regulation. Thus, variations in this receptor might disturb the control over eating behavior. Binge eating (BE) may be originated in neural and hormonal defects in appetite and satiety control. Although the prevalence of BE disorder as defined in DSM-IV in the normal adult population ranges from 2% to 5%, rates in cohorts of obese adults seeking treatment for obesity rise up to 30%. The association of rs17782313 with BE behavior has been controversial. The main goal of this study was to investigate the association between rs17782313 with adiposity, BE and metabolic profile in overweight children.

Methods: 333 obese children (53.2% girl; 12.4±2.7 years-old, ZBMI 3.23±0.65) were genotyped for rs17782313 by TaqMan assay. Different genotypes were analyzed according to of BE behavior (as measured by the BE Scale), percentage of fat mass (%FM) and cardiometabolic risk factors. The statistical analysis was performed with qui-square and one-way ANOVA tests by SPSS software, with level of significance set at $p < 0.05$.

Results: The population was in Hardy-Weinberg equilibrium (CC: 4.66%, CT: 33.8%, TT: 61.5%, p = 0.74). We found 142 (42.6%) binge eaters without association with rs17782313 (p = 0.40). The presence of variant allele rs17782313 (T>C) was not associated with %FM (p = 0.33), triglyceride levels (p = 0.50), fasting glucose levels (p = 0.97), insulin resistance–HOMA (p = 0.79), HDL-cholesterol levels (p = 0.67).

Conclusions: The prevalence of binge eaters in our cohort of Brazilian overweight children seeking treatment for obesity is extremely high, but the polymorphism rs17782313 in MC4R is not involved in BE behavior, increased adiposity and metabolic parameters in our sample.

Key words: MC4R, variant rs17782313, binge eating.

PO2217

RS12970134 IN MC4R GENE IS NOT RELATED TO WORST METABOLIC PROFILE IN OVERWEIGHT CHILDREN

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Background and objectives: Genome-wide association studies have shown that variants near the melanocortin-4 receptor gene (MC4R) are associated with higher risk of obesity. The variant rs12970134, located 154 kb downstream from the MC4R was associated with increased adiposity, insulin resistance (estimated by HOMA-IR) and prevalence of type 2 diabetes. However, the results are still controversial. The main goal was to verify the influence of the rs12970134 in MC4R on adiposity and cardiometabolic risk factors in a cohort of overweight children and adolescents.

Methods: 333 obese subjects aged 7 to 18 years-old (53.2% girl; 12.4±2.7 years-old, ZBMI 3.23±0.65) were genotyped for rs12970134 by TaqMan assay. The variables analyzed were ZBMI, percentage of fat mass (%FM), fasting glucose, HDL-cholesterol (HDL-c), triglyceride (TG) levels, HOMA-IR and blood pressure percentiles (BPP). Statistics were performed using Qui-square test, ANOVA and Kruskal-Wallis Test and the level of significance was set at $p < 0.05$.

Results: The population was in Hardy-Weinberg equilibrium (AA: 4.39%, AG: 33.1%, GG 62.5%, p = 0.16). The presence of the variant allele rs12910134 (G>A) was not associated with any parameters: ZBMI (p = 0.15), %FM (p = 0.57), TG levels (p = 0.23), glucose levels (p = 0.20), HOMA-IR (0.42), HDL-c levels (p = 0.94), systolic BPP (p = 0.94) and diastolic BPP (p = 0.68).

Conclusions: We conclude that the variant allele rs12970134 in MC4R is not associated with increased adiposity and cardiometabolic risk factors in our sample of Brazilian overweight children and adolescents.

Key words: MC4R, variant rs12970134, childhood obesity.

PO2218

ASTHMA E EXCESS BODY WEIGHT

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Background and objectives: Central obesity was more associated with the presence of asthma in children compared with body mass index (BMI). The main goal wasto assess the association between measures of adiposity and asthma in adolescents.

Methodology: This cross-sectional study. The study consisted of adolescents aged 10-18 and enrolled in public schools in the city of Santa Maria/RS/Brazil. The characteristics of asthma questionnaire were evaluated by the ISAAC, 1998. Anthropometric measurements using standardized techniques. High BMI indicates children with 85th percentile (WHO, 1997). The waist circumference (WC) cutoff point was defined as the 80th percentile (Taylor et al., 2000). The significance level adopted was 5%, and the analyses were carried out with the SPSS 11.5. The research was approved by the ethics in research committee.

Results: 867 adolescents with a mean age of 15.53±1.27 years, and 365 (42.1%) were male. Considering the 233 (26.8%) adolescents who are overweight observed that 48 (32%) had asthma sometime in their lives and 184 (26.3%) had no (p = 0.157), 49 (27.7%) had wheezing ever in life and 71 (32.4%) did not (p = 0.308) in the last 12 months 66 (32%) had wheezing and 165 (25.7%) did not (p = 0.075), 72 (32%) had no crisis, 41 (25.2%) of 1-3, 6 (46.2) of 4.12 and 5 (71.4%) > 12 crisis (p = 0.002). Among the 140 (16.1%) adolescents with WC > 80th observed that 28 (18.7%) had asthma sometime in their lives and 111 (15.9%) had no (p = 0.399), 27 (15.3%) had wheezing ever in life and 45 (20.5%) did not (p = 0.810) in the last 12 months 38 (18.4%) had wheezing and 99 (15.4%) had no (p = 0.300), 44 (19.8%) had no crisis, 26 (16%) of 1-3, the second (15.4%) of 4-12 and 1 (14.3%) > 12 crisis (p = 0.780).

Conclusions: a higher percentage of adolescents with BMI > 85th have asthma and wheezing ever in life and in the last 12 months and had more than 12 crises.

Key words: asthma, adolescents, obesity.

PO2219

ASSOCIATION BETWEEN INTAKE OF FRUITS AND BETA-CAROTENE AND AMYOTROPHIC LATERAL SCLEROSIS RISK IN KOREANS: A CASE-CONTROL STUDY

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Background and objectives: Amyotrophic Lateral Sclerosis (ALS), a rare progressive neurodegenerative disease, has been suggested to be associated with oxidative stress, and thus antioxidant dietary factors or dietary habits may influence pathophysiological mechanisms or the risk of ALS. The purpose of the present study was to investigate the hypothesis that intakes of fruits, rich in antioxidant nutrients are negatively associated with the risk of ALS.

Methods: Seventy seven Koreans diagnosed ALS by the EI Escorial criteria-revised and same numbers of age- and sex-matched healthy controls were participated in this study. Dietary intake was estimated by the standardized food frequency questionnaire.

Results: Multivariate logistic regression analysis showed that fruits consumption was negatively associated with the risk of ALS, but intake of beef, fish, and fast food were positively associated with the risk of ALS. Consumption of ¡Ã20 servings of fruits per week reduced the risk of ALS by 66% as compared with consumption of ¡Â9 servings of fruits per week. In addition, the risk of ALS was negatively associated with an intake of plant calcium and beta-carotene, while positively associated with an intake of total calcium and animal calcium. Intake of vegetables and other antioxidant nutrients had no effect on the risk of ALS in the present study.

Conclusions: In conclusion, this present study suggests that intake of fruits and beta-carotene may be related with decreased risk of ALS in the aspect of diet habits. However, large prospective and intervention studies are needed to support the effect of fruits and beta-carotene intake on reducing the risk of ALS.

Key words: Amyotrophic lateral sclerosis, Beta-carotene, Case-control study, Fruit, Korean. (This study was supported by the Korea Research Foundation Grant 2012R1A1A2040553, funded by the Korean Government)

PO2220

ROLE OF TYPE OF DIETARY FAT IN THE ETIOPATHOGENESIS OF CARCINOGEN-INDUCED BREAST NEOPLASM IN FEMALE FISCHER RATS

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Background and objectives: Cancers most frequently seen in India are being associated with lifestyle changes and the type of diet consumed is also emerging as one of the important risk factors in carcinogenesis. Among the various dietary components, the role of fat as a risk factor has been extensively studied. High fat diets are known to promote cancer cell proliferation. The aspect of fat quality (saturated/unsaturated/trans-fat) in cancer causation is complex and not clearly elucidated. Evidence is accumulating that consumption of specific types of fat may be an important determinant of breast cancer risk. The present study looked into the role of saturated vs unsaturated vs PHVO (partially hydrogenated vegetable oil) in experimental DMBA [DiMethylBenzAnthracene]-induced mammary carcinogenesis in female Fisher 344 rats.

Methods: Forty weanling female rats were divided into five groups and maintained on synthetic diets with fat content at 10% level comprising saturated fat [palmolein oil], PHVO [vanaspati], n-6 PUFA [sunflower oil], ALA [soybean oil] alone and ALA + long chain (LC) n3 PUFA [soybean+fish oil] respectively for 4 months, after which DMBA was administered orally once a week (for 4 weeks) and continued on same diets for 8 more months, till termination of the experiment.

Results:: Tumors (malignant, benign & metastatic) developed least in PHVO group followed by (LC) n3 PUFA and ALA-fed animals as compared to other groups and this could be attributed to low level of PUFA in the PHVO group, and ALA in the n3-PUFA containing groups.

Conclusions: Regardless of the dietary fat consumed, the predominant tumor type was adenocarcinoma followed by squamous carcinomas.

Key words: Diet, saturated, unsaturated, PHVO, cancer.

PO2222

ADEQUACY OF SHROB RATS AS A MODEL FOR THE METABOLIC SYNDROME IN NUTRITIONAL STUDIES

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Background and objectives: SHROB (spontaneously hypertensive obese) rats have been proposed as a model for Metabolic Syndrome (MS), an increasing public health problem. They have a mutation in DNA loci coding for the extracellular domain of the leptin receptor, which has been properly described, as well as some derived phenotypic aspects, i.e., hyperinsulinemia or hyperlipidemia always in comparison with the already mutated SHR rats. Other parameters related with cardiovascular disease (CVD) and oxidative stress have not been explored in this rat. This work aimed to provide an adequate phenotypic characterization of SHROB rats, as compared with Wistar rats, in order to evaluate its validity as a model for MS in nutritional interventions.

Methods: Female SHROB rats (n = 7) were followed up from an age of 7 up to 28 weeks together with a control group of female Wistar rats (n = 7). Body weight was recorded weekly. At the end of the study, parameters related with CVD, glycaemia and oxidative stress were evaluated in plasma, urine and in different organs by validated methodologies.

Results: SHROB rats presented statistically significant differences with Wistar rats in CVD risk factors, e.g., LDL-cholesterol (nine-fold increase), abdominal fat as percentage of body weight (+50%) or C-reactive protein (+66%). Lipid oxidation (as urinary F2-isprostanes) was significantly higher in SHROB rats than in Wistar rats, while the inverse tendency was observed for protein oxidation (carbonyl groups in plasma and liver). SHROB rats also exhibited hepatic steatosis and renal atrophy.

Conclusions: SHROB rats present, in comparison with Wistar rats, extreme phenotypic alterations in parameters related with CVD, not previously measured in this animal model, and in oxidative status. These alterations are too severe to be reversed merely by nutritional interventions; therefore, this model may not be adequate for nutritional studies on MS.

Key words: SHROB rats, metabolic syndrome, animal models, oxidative stress.

PO2223

THE FLAVONOID RUTIN ATTENUATES RAT ILEITIS INDUCED BY TRINITROBENZENE SULFONIC ACID

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Background and objectives: The pathogenesis of inflammatory bowel disease (IBD) remains undefined to date, and there is a need for new treatments for this condition. The flavonoid rutin has colonic anti-inflammatory effects which have been ascribed to the intracolonic release of the aglycone quercetin as active moiety. Our objective is to assess whether rutin may exert similar protective effects in ileal inflammation.

Methods: rat ileitis was induced by the intraluminal injection of a TNBS solution dissolved in 50% ethanol (30 mg/kg) at a site 10 cm proximal to the ileocecal valve, under isoflurane anesthesia. Control rats were injected with saline. Treatment with rutin 20 mg/Kg (or 1% methylcellulose) administered by gavage was started 2 days before ileitis induction. Six days after the TNBS injection the animals were sacrificed and the ileum examined for macroscopic and microscopic, damage score, weight/length ratio, myeloperoxidase (MPO) and phosphatase alkaline (AP) activity. Experimental groups: control, TNBS, TNBS+rutin.

Results: TNBS ileitis was characterized by diarrhea and anorexia. In the TNBS group, the body weight gain was significantly decreased and the damage score visibly elevated above the levels observed in control group. The administration of the flavonoid rutin resulted in an increased body weight gain, a lowered ileal weight/length ratio (23.3% relative to TNBS) and a decreased macroscopic damage score (37.5% relative to TNBS) and indicating protection against TNBS induced inflammation. Rutin treatment also significantly decreased tissue MPO (35% relative to TNBS) and AP activity (27% relative to TNBS).

Conclusions: oral administration of rutin is effective for attenuating rat TNBS-induced ileitis, even though it is not considered to release quercetin at this level.

Key words: rutin, ileitis, flavonoid, quercetin.

PO2224

APIGENIN K HAS INTESTINAL ANTI-INFLAMMATORY EFFECT IN TWO EXPERIMENTAL MODELS COLITIS IN THE RAT.

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Background and objectives: Flavonoids are polyphenolic compounds which are widespread in nature and are consumed as part of the human diet in significant amounts. Many flavonoids have been studied for their intestinal anti-inflammatory activity. The aim of this study was to test the intestinal anti-inflammatory activity of apigenin K, a soluble form of apigenin, in two models of rat colitis, the trinitrobenzene sulfonic acid (TNBS) model and the dextran sulfate (DSS) model.

Methods: Apigenin K (3 mg/kg, p.o.) was administered as a pretreatment to rats with TNBS and DSS colitis and colonic status was checked 7 and 9 days after colitis induction, respectively, by macroscopic and biochemical examination.

Results: Apigenin K pretreatment resulted in amelioration of the morphological signs and biochemical markers in the TNBS model. The results demonstrate a reduction in inflamed area of 2.4 cm compared with TNBS group, lower values of macroscopic damage (5.8±1.1 vs 8.6±1.4, $p < 0.05$) and a slight decrease in the colonic weight/length ratio. Myeloperoxidase and alkaline phosphatase colonic activities were reduced by 34% ($p < 0.05$) and 18%, respectively. Moreover, apigenin K also ameliorated morphological signs and biochemical markers in the DSS model, the comparable results. Thus macroscopic damage was significantly reduced (0.5±0.5 vs 2.1±0.6, $p < 0.05$) and the colonic weight/length ratio was lowered by approximately 10%. Colonic myeloperoxidase and alkaline phosphatase activities decreased 30% and 20%, respectively ($p < 0.05$). Apigenin K treatment additionally reduced the colonic expression of IL1β, IL6, Foxp3, TLR2 and TGF-β compared with the TNBS group ($p > 0.05$ for the latter two).

Conclusions: Apigenin K has anti-inflammatory effects in two preclinical models of inflammatory bowel disease.

Key words: apigenin K, trinitrobenzene sulfonic acid, dextran sulfate, colitis, rat.

PO2225

EFFECTS OF REDUCED FAT FRANKFURTERS AND PÂTÉS ON METABOLIC SYNDROME COMPONENTS OF VOLUNTEERS AT INCREASED CARDIOVASCULAR RISK. A PLACEBO-CONTROLLED STUDY

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Background and objectives: Meat and meat products consumption is very high in Spain and developed countries. Meat appears as suitable matrix for incorporating functional ingredients. The aim wasto analyze the effect of consuming 200 g and 250 g per week of reduced-fat frankfurters and paté (RF), respectively on metabolic syndrome components (waist perimeter, glycaemia, triglyceridemia, blood pressure and high density lipoproteinemia) of volunteers at high CVD risk classified according to low-normal and increased blood pressure.

Methods: Twenty-two volunteers consumed RF (frankfurters, 15.3% fat; pâté, 15.2% fat) during 4-wk in the frame of each own diet. Cutoff points selected for high systolic and diastolic blood pressures were 130/85 mmHg.

Results: The intervention did not globally modify any component of metabolic syndrome. However, significant different diet response was observed for normo vs hypertense volunteers with respect to glycaemia ($p < 0.001$) and blood pressure ($p < 0.02$) changes. Thus, in normotenses the intervention increased the glycaemia ($P < 0.05$) but in hypertenses decreased the glycaemia ($p < 0.02$) and the systolic pressure ($p < 0.05$).

Conclusions: Hypertense volunteers appear as the target population for consuming RF meat products as improved two components of metabolic syndrome

Key words: Reduced-fat, frankfurters, pâtés, glucose, waist perimeter, HDL-cholesterol, triglycerides. . Granted by Consolider-Ingenio-2010, CARNISENUSA-CSD2007-00016. Ministerio de Ciencia y Tecnología (Spain).

PO2226

POSITIVE INTERACTION BETWEEN PREBIOTIC NUTRIENTS AND THIAZOLIDINEDIONE IN THE CONTROL OF ADIPOSITY

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Background and objectives: In a model of diet-induced obesity, fat mass accumulation was associated with activation of the peroxisome proliferator-activated receptor gamma (PPARgamma), a master regulator of adipocyte differentiation. Inulin-type fructans (ITF) are non-digestible, fermentable carbohydrates that counteract the high-fat (HF) diet-induced metabolic disorders such as increased adiposity. Thiazolidinediones are PPARgamma agonists currently used as anti-diabetic agents in humans but they induce one important side effect, namely an increased adiposity. The aim of this study was to investigate the impact of ITF prebiotics on adiposity in a model of pharmacological activation of PPARgamma in HF diet fed mice.

Methods: Male C57bl6/j mice were fed a HF diet alone or a HF diet supplemented with ITF (0.2 g/day*mouse) or pioglitazone (30 mg/kg body weight*day) or both during 4 weeks.

Results: As expected, pioglitazone improved glucose response to insulin but also importantly increased plasma adiponectin levels and brown adipose tissue (BAT) weight. Furthermore, it induced an over-expression of several PPARgamma target genes in white adipose tissues. ITF prebiotics modulated the pioglitazone-induced PPARgamma activation in a tissue-dependent manner. The co-treatment with ITF prebiotics and pioglitazone maintained the beneficial impact of the PPARgamma agonist on glucose homeostasis and adiponectinemia. Moreover, the combination of both treatments induced a reduction in fat mass accumulation, in circulating lipids and hepatic triglycerides content, thus suggesting an overall improvement of metabolism linked to ITF co-treatment.

Conclusions: ITF prebiotics improve the metabolic response in HF fed mice treated with an anti-diabetic agent and could be considered as an interesting nutritional approach in the management of diabetes in obese patients.

Key words: thiazolidinedione, inulin-type fructan prebiotics, adipose tissue.

PO2227

NUTRITIONAL KNOWLEDGE AND ASSOCIATION WITH DIETARY PRACTICES AMONG CANCER PATIENTS: A CASE STUDY OF KENYATTA NATIONAL HOSPITAL CANCER TREATMENT CENTER.

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Background and Objectives: It has been indicated that Malnutrition can affect up to 85% of patients with cancer depending on the type (Argilés, 2005). The hypothesis of this study was that there was no association between the nutritional knowledge of cancer patients and their dietary practices. The objectives of this study were the social demographic status, the nutritional knowledge and the dietary practice of patients attending the cancer treatment center at the hospital.

Methods: This study intends to use the cross-sectional design to establish the level of nutritional knowledge and their usual food habits (dietary practice). The tools mainly used will be a nutrition knowledge questionnaire to determine the level of knowledge and food frequency and dietary diversity to determine the dietary practice.

Results: From the analysis of this study using the Pearson's correlation showed that there was a significant positive correlation between the nutrition knowledge cancer patients and their dietary diversity score which was $p = 0.000$ at $p < 0.01$ and $r = 0.392$. Further a logistic regression was done $r2 = 0.147$ indicating that 15% of the Dietary Diversity Score (DDS) could be explained by the nutrition knowledge. The linear equation was DDS = 4.084±0.030(Knowledge score). Using logistic regression the frequency in which patients was eating fruits is predicted to increase 10 times by increasing their nutrition knowledge, this relationship was statistically significant $p = 0.018$ at $P < 0.05$.

Conclusions: There is an association between nutrition knowledge and dietary practice among cancer patients attending the CTC (Cancer Treatment Center).

Key words: nutritional knowledge, dietary practice and cancer.

PO2228

HEALTH IMPLICATIONS OF RICE CULTIVAR DIVERSITY AND CARBOHYDRATE DIGESTIBILTY IN CAMBODIA

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Background and objectives: The association of rice consumption with risk of type 2 diabetes was recently reported. The current prevalence of diabetes in Cambodia is 3.1% and projected to increase to 6.5% by 2030. Rice is a staple food for Cambodians. Foods containing slowly digestible starch and resistant starch can both mitigate, and prolong the onset of, obesity and diabetes. The objectives of this study are: to investigate rice choice and consumption behavior, to understand the digestibility of cooked Cambodian rice, and to suggest suitable rice varieties with less adverse impact on human health.

Methods: A quantitative survey of a representative sample of 250 rural and urban households in five different agro-climatic zones of Cambodia was done to investigate the rice consumption patterns. An in-vitro method was used to study the starch digestibility of cooked rice.

Results: The survey results showed that rice varieties commonly grown and consumed by Cambodian people differ across agro-climatic zones. Rural people, men, and rice growers consumed a significantly larger proportion of rice than urban people, women, and non-rice growers, respectively. The most important attributes in purchasing rice for consumption were price, taste, and texture. The in-vitro study suggested that the digestibility of cooked rice was significantly different among the ten most popularly consumed varieties. There were at least 39% of respondents consumed very high and high digestibility rice varieties, which may cause significant future health implications. Low digestibility rice varieties, IR66 and Bei Katam, are hypothesized to lower risk of diabetes and other related metabolic diseases.

Conclusions: Cambodian people tend to grow and consume different rice varieties across agro-climatic zones. Individual households may have a restricted selection of rice that they routinely consume, which might have a pronounced effect on their health due to their particular digestibility properties.

Key words: rice, starch digestibility, diabetes.

PO2229

FISH OIL INTAKE ENHANCES ENERGY UTILIZATION BY INDUCTION OF UCP1 EXPRESSION IN ADIPOSE TISSUE

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Background and objectives: Mammals have two types of adipose tissue. White adipose tissue (WAT) accumulates excess dietary fat. On the other hand, brown adipose tissue (BAT) dissipates excess energy through adaptive thermogenesis. The key of this process is uncoupling protein 1 (UCP1), a specific mitochondrial protein. Several studies indicate that treatment of obese animals with b3-adrenergic agonist induce UCP1 expression in BAT and WAT, resulted in increasing of lipid mobilization and finally reduce body fat. Our previous study showed that intake of fish oil reduced the body fat accumulation and induced UCP1 expression in BAT (J. Agric. Food Chem. 1998). In this study we investigated the anti-obesity effect of fish oil intake was linked to UCP1-mediated thermogenic activity in adipose tissue.

Methods: Male C57BL/6J mice were fed a high fat diet (on a calorie basis, contained 14% protein, 41% carbohydrate, 45% fat) or supplemented with two types of fish oil (contained 5% or 10% in 45% fat) for 10 weeks. Results and

Conclusions: Fish oil intake reduced body weight gain and lipid accumulation, while increasing of oxygen consumption and rectal temperature compared with high-fat diet-fed mice. Fish oil intake induced UCP1 mRNA and protein expression in both of BAT and WAT, and also induced b3-adrenergic receptor mRNA expression. In addition, fish oil intake increased the amount of catecholamines in the urine. Elevation of urinary catecholamine levels suggested that fish oil intake stimulates the sympathetic nervous system. Thus, the fish oil intake enhanced energy utilization by induction of UCP1 in response to up-regulation of b3-adrenergic receptor in both adipose tissues.

Conclusions: Our study indicated that fish oil intake could be useful to prevent obesity and related metabolic disorders.

Key words: Fish oil, brown adipose tissue, uncoupling protein 1, sympathetic nervous system

PO2230

TOBACCO SMOKE AND SIDE-STREAM CIGARETTE SMOKE INDUCE THE RISK OF CARDIOVASCULAR DISEASE

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Background and objectives: Disease risk due to smoking is not limited to smokers only. Passive smoking exposure to environmental tobacco smoke is associated with adverse health effect. Side-stream cigarette smoke, a major component of secondhand smoke induces reactive oxygen species with promote oxidative stress. This paper summarizes the cardiovascular effects of tobacco smoke.

Methods: Studies were carried out on 150 smokers (50 industrial cigarette smokers, 50 passive smokers and 50 local tobacco smokers compared with 50 nonsmoking controls. Blood samples were collected and determined for level of biochemistry substances, Cholesterol (C), HDL- Cholesterol (HDL-C), LDL-Cholesterol (LDL-C), Triglyceride (TG), Malondialdehyde (MDA), Conjugate diene (CD) and Homocysteine (Hcy).

Results: Levels of C, LDL-C, TG and MDA were significantly lower in smokers than in controls. Whereas Hyc levels were significantly higher among smokers than controls. No significant differences of HDL- C and CD were found between both groups. For dietary intake assessment, smokers consumed significantly less energy from carbohydrate, fat compared to controls, while energy derived from protein did not differ between groups. Moreover, smokers consumed less dietary fiber and vitamins compared with controls.

Conclusions: Increasing whole blood toxic trace elements in healthy smokers may be explained by low antioxidant trace elements and vitamins that lead to develop oxidative stress and cardiovascular disease. Therefore public health should not only aim for smoking cessation, but also concern about diet in terms of vitamin and mineral content to protect the risk of cardiovascular disease.

Key words: tobacco smoke; side-stream smoke; cardiovascular disease.

PO2231

CEREAL FOODS AND COMPONENTS IN OUR DAILY DIETS AND THEIR IMPORTANCE FOR HEALTH

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Background and objectives: Cereal foods are the most important component of the human diet; they are major contributors of dietary carbohydrates and, therefore, play an important role in energy and substrate metabolism. The relevant literature has been reviewed to better understand the relationship between cereal food intake and major chronic non communicable diseases (NCD), trying to elucidate potential mechanisms linked to food constituents.

Methods: A PubMed search has been undertaken utilizing as key-words cereals (refined and wholegrain) plus other terms identifying NCD and associated relevant body functions; both epidemiological and human intervention studies have been included.

Results: Relationships between cereal food consumption and health outcomes have heterogeneous patterns, depending on the type of cereal, on whether cereals are consumed as wholegrain or in refined form, on the amount of fiber, food structure, glycemic index, polyphenol content, micronutrients, etc. Recent research indicates as relevant for health not only the rate of starch accessibility and digestion in the small intestine, but also carbohydrate fermentation in the gut. Prebiotic compounds present in cereal products may influence the composition of intestinal microbiota and promote production of short chain fatty acids in the colon; this may represent one of the relevant mechanisms of the beneficial impact of many cereal foods on energy, glucose and lipid metabolism and intestinal cell proliferation (linked to the risk of cancer).

Conclusions: Epidemiological surveys consistently show an association between cereal consumption (mostly wholegrain) and prevention of several NCD; however, there is a gap between the health benefits shown in observational studies and the elucidation of the mechanisms involved. More research (particularly human intervention studies) is needed to fill this gap and provide solid grounds for more specific guidelines for cereal food consumption at the population level.

Key words: cereal foods, health benefits, blood glucose regulation, energy metabolism, plasma lipids.

PO2232

ACTIVATION MECHANISM OF DRUG-METABOLIZING PHASE II ENZYMES BY 3-O-[2-O-(α-D-XYLOPYRANOSYL)-β-D-GALACTOPYRANOSYL]-KAEMPFEROL

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Background and objectives: The consumption of 3-O-[2-O-(α-D-xylopyranosyl)-β-D-galactopyranosyl]-kaempferol (kaempferol-GX), one of the major polyphenols in horseradish leaves, for 1 week activated drug-metabolizing phase II enzymes, glutathione S-transferase (GST) and quinone reductase (QR), in the liver of mice. However, there is no information on the activation mechanism. The present study investigated the metabolites of kaempferol-GX in the plasma of mice and the involvement of intestinal flora in the activation.

Methods: To investigate the metabolites, ICR mice were given ad libitum access to a diet or water including kaempferol-GX (KFR-GX group), kaempferol (KFR group), or sucrose (control group) for 1 week. The metabolites of kaempferol-GX or kaempferol in the plasma were determined by HPLC-colorimetric ECD and LC/MS/MS analysis. To investigate the involvement of intestinal flora, germ-free IQI/Jic mice were given ad libitum access to plain water or kaempferol-GX-supplemented water for 1 week. The hepatic GST and QR activity and the metabolites of kaempferol-GX in the plasma were then examined.

Results: In ICR mice, kaempferol conjugates in the plasma of the KFR-GX group were significantly lower than those of the KFR-GX group, although the hepatic enzyme activities of the KFR-GX group were higher than those of the KFR group. On the other hand, p-cresol conjugates, which were considered as one of the metabolites, in the plasma of the KFR-GX group were higher than those of the KFR group. Furthermore, 4-hydroxyphenylacetic acid (4-HPAA) in both non-conjugated and conjugated forms significantly increased in the plasma of the KFR-GX group compared with control group. In germ-free mice, the administration of kaempferol-GX did not increase the plasma concentrations of 4-HPAA and p-cresol conjugations or hepatic QST and QR activities.

Conclusions: These results suggest that kaempferol-GX was catabolized by the intestinal flora, and that its catabolites might activate hepatic GST and QR activity.

Key words: 3-O-[2-O-(α-D-xylopyranosyl)-β-D-galactopyranosyl]-kaempferol, 4-hydroxyphenylacetic acid, drug-metabolizing phase II enzymes, germ-free IQI/Jic mice.

PO2233

6-METHYSULFINYL HEXYLISOTHIOCYANATE INHIBITS CELL CYCLE PROGRESSION ACCOMPANIED BY INTERACTION WITH GLYCERALDEHYDE-3-PHOSPHATE DEHYDROGENASE

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Background and objectives: 6-Methylsulfinyl hexylisothiocyanate (6-MSITC), one of the major isothiocyanates in wasabi (Wasabia japonica), exhibits anti-carcinogenic activity. We have previously reported the inhibitory effects of 6-MSITC on cell cycle progression from the G0/G1 to S phase in quiescent JB6 cells after treatment with growth stimulators. The present study investigated the structure-activity relationship and target proteins for 6-MSITC to cause cell cycle arrest.

Methods: To examine the structure-activity relationship, quiescent JB6 cells, which were serum-starved for 36 h, were treated with 6-MSITC or its analogues, followed by stimulation with epidermal growth factor. The cell cycle was analyzed by flow cytometry. To identify the target proteins, ethynyl 6-MSITC and ethynyl 6-metylthiohexyl isothiocyanate (6-MTITC) were synthesized, and the cellular proteins interacting with isothiocyanates were isolated using magnetic beads, in which the linker terminal was modified with the azide group to bind to ethynyl isothiocyanates. These proteins were separated by SDS-PAGE, and identified by nano-LC/MS/MS analysis and a Mascot search using the Swiss-Prot database.

Results: The 6-MSITC significantly inhibited cell cycle progression, as shown in our previous report, but 6-MTITC hardly inhibited it. The results suggest that the sulfinyl group of 6-MSITC plays an important role in cell cycle arrest. The magnetic beads isolated several proteins bound to isothiocyanates, and the nano-LC/MS/MS analysis and Mascot search indicated that one protein bound to 6-MSITC but not to 6-MTITC was glyceraldehyde-3-phosphate dehydrogenase (GAPDH).

Conclusions: Immunoprecipitation analysis demonstrated that GAPDH interacted with retinoblastoma protein and the transcription factor E2F in quiescent JB6 cells. Our previous study demonstrated that 6-MSITC inhibited gene expression of cyclin A2, which is known to be expressed by E2F, and to be one of the S phase-regulating proteins. These suggested that 6-MSITC might inhibit the transcriptional activity of E2F through interaction with GAPDH, and then cause cell cycle arrest.

Key words: 6-methylsulfinyl hexylisothioccyanate, glyceraldehyde-3-phosphate dehydrogenase, cell cycle, JB6 cells.

PO2234

OSTEOPOROSIS RISK FACTORS CONNECTED WITH NUTRITION AMONG ADULTS WITH CARDIOVASCULAR DISEASES

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Background and objectives: Proper nutrition constitute an important factor improving pharmacological treatment of cardiovascular diseases, simultaneously can prevent or inhibit development of other illnesses, including osteoporosis. The aim was assessment of nutrition patterns among adults above 39 years old with recognized cardiovascular disease in aspect of dietetic recommendations in osteoporosis prophylaxis.

Methods: 173 individuals were examined (81 women, 92 men) divided into two age groups: I- 39-59, II- >60. All participants were under control of I Clinic of Cardiology and Hypertension in Krakow. Nutrition was assessed on basis of 24-hour recall, three per each participant. The recall focused on home nutrition. The correctness of results was assessed using updated norms prepared by National Food and Nutrition Institute.

Results: Energetic value of recalls was lower than recommendations: group I - 50% of norm (N) for both sexes; group II - 66%N for women, 60%N for men. Fat intake in group I was 74%N for women, 78%N for men; in group II 80%N for both sexes. Low intake was observed for: calcium (group I 26.2%N for women, 7.6%N for men; group II: 26.2%N for women, 25.8%N for men) and magnesium (group I 72%N for women, 60%N for men; group II 71%N for women, 58%N for men) but uptake of phosphorus exceeded norms (group I 149%N for women, 166%N for men; group II 147%N for women, 162%N for men). Ratio of calcium to phosphorus in group I was 1:2.5 for women, 1:1.27 for men; in group II was 1:1.25 for women, 1:1:3 for men.

Conclusions: Observed nutritional mistakes can influence on development and enhancement of already present osteoporotic changes and can constitute diagnostic premises for dietetic interventions like practical dietetic advices that could modify current eating habits, adjusted to individual needs.

Key words: adults, nutrition, osteoporosis prophylaxis.

PO2235

DAIRY PRODUCTS IN A DIET OF OBESE MEN WITH CARDIAC DISORDERS AND HYPERCHOLESTEROLEMIA

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Background and objectives: Calcium, in particular calcium from dairy products, is considered as a factor inhibiting lipogenesis and stimulating lipolysis. The aim of this study was to examine the impact of calcium from food on anthropometric and biochemical markers of nutritional status. 42 hospitalized and obese men (39-65 years old) with cardiac and vascular disorders were qualified to dietary intervention focused on diet rich in calcium from dairy products. By January 2013 six month lasting dietary intervention was completed for 12 of them.

Methods: The full examination included 5 sessions with dietitian (in every 6th week) and three laboratory examination of physiological fluids: blood cholesterol, thyroid-stimulating hormone (TSH), parathormone (PTH), calcium in the urine. Body composition and body mass were being monitored. Bioimpedance method was used for monitoring changes in fat mass, fat free mass, body water. Individual dietary recommendations focused on low-fat dairy products (3-4 servings/day) and 500 kcal energy deficit were prepared for the participants. To control the way of nutrition 24-hour dietary recall and Food Frequency Questionnaire (FFQ) were applied.

Results: Anthropometric parameters before and after dietary intervention: BMI (39.7±4.66; 31.9±2.32), %Fat Mass (44.7±3.5; 29.9±4.6), %Fat Free Mass (53.3±4.4; 70,1.9±2.5), % of body water (43.9±1.5; 49.2±1.9). Before dietary intervention total cholesterol, LDL, HDL, TG exceeded norms and after 6 month cholesterol was in normal range: 4.56±0.7mmol/L total cholesterol, 2.53mmol/L LDL, 1.11±0,5 HDL, 1.7±0.16 TG. Average PTH, TSH in blood and calcium in the urine were within the range before and after dietary intervention. Daily average calcium intake from food of all was 423±96mg/day.

Conclusions: Calcium from dairy products affects weight loss that is especially important for people with hypercholesterolemia. All patients should be encouraged to consume 3 to 4 servings of low-fat dairy products every day.

Key words: hypercholesterolemia, dairy products, dietary intervention, obesity

PO2236

EVOLUTION OF LYMPHOCYTE SUBSETS IN FIRST-EPISODE ANOREXIA NERVOSA PATIENTS DURING THE FIRST YEAR OF TREATMENT

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Background and objectives: The undernourished state of Anorexia nervosa patients (AN) is associated with relative lymphocytosis and decreased numbers of T lymphocytes. However, little is known about its reversibility with treatment. The aim of this study was to evaluate lymphocyte subsets' changes in AN patients during the first year of multidisciplinary treatment.

Methods: Sixty-six adolescents diagnosed with AN or an Eating Disorder Not Otherwise Specified (EDNOS) were recruited at an Eating Disorders Unit on their first episode (40 AN-restricting type, 9 AN-binge/purging type, 17 EDNOS. Age: 12-17 y). All patients received multidisciplinary treatment including nutritional rehabilitation and psychotherapy. The lymphocyte subset profile was studied upon admission (T0) and after one moth (T1), six months (T6) and one year of treatment (T12). The following lymphocyte subsets were assessed by flow cytometry: CD3+ (T cells), CD4+ (helper T cells), CD8+ (cytotoxic T cells), naive [CD45Ra+] and memory [CD45RO+] T cells, CD3-CD16+CD56+ (NK) and CD19+ (B lymphocytes). Differences between time points were assessed through paired T tests.

Results: BMI increased significantly from 16.0±1.8 in T0 to 19.2±2.2 in T12. T and B cells (cel/μL) showed a significant decrease in T1, T6 and T12 compared to T0. B cell percentage showed significantly lower values in T1, T6 and T12 compared to T0 ($p < 0.01$), and %CD4+ significantly higher values. Memory T cells decreased with nutritional recovery (T1, T6 and T12 compared to T0, $p < 0.001$ all) to a higher extent than naive T cells (T1, T6 and T12 compared to T0, $p < 0.05$ all). The percentage of CD4+CD45Ra+ did not change during weight recovery while the percentage of CD3+CD4+CD45RO+ decreased. The CD4+/CD8+ ratio did not change.

Conclusions: Nutritional recovery is associated with a decrease in T and B lymphocyte numbers; however, adaptation mechanisms are probably triggered in order to increase T lymphocyte production.

Key words: anorexia nervosa, lymphocyte subsets, follow-up.

PO2237

EFFECT OF WHOLE GRAIN WHEAT VERSUS REFINED WHEAT DIET ON METABOLIC HEALTH IN ZUCKER FA/FA RATS

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Background and objectives: Greater intake of whole grain (WG) cereals has been consistently associated with a lower risk of many diet related diseases. However, results from in vivo studies on metabolic health are mixed. The objective of the work was to compare the effect of a whole grain wheat versus refined wheat diet in a model mimicking the development of obesity by overeating.

Methods: Male Zucker (fa/fa) rats (n = 11/group) were fed diets based on AIN-93G, with part of the carbohydrate component based on either WG or refined flour wheat (RF), for 8 weeks. A control group of normal weight Zucker (fa/-) rats were fed RF diet. Classical clinical chemistry parameters, lipid levels from 18 lipid classes in plasma and liver samples and caecal microbiota concentrations were analyzed.

Results:WG wheat significantly decreased glycated hemoglobin, and altered the metabolism of several lipid classes in both plasma and liver (ceramides, sphingomyelins and phosphatidylcholines). Rats fed WG diet had concentrations of these lipids closer to that of the lean control group than the Zucker (fa/fa) littermates fed on RF. WG wheat also increased populations of bifidobacteria and lactobacilli compared to the RF fed rats.

Conclusions: The WG diet led to some changes in metabolism and gut microbiota in Zucker fa/fa) rats, including hitherto unobserved changes to hepatic lipid metabolism, suggesting new avenues for research into how whole grains may impact on health.

Key words: Whole grain, Zucker fa/fa, lipidomics, microbiota.

PO2238

DAILY INCLUSION OF ALMONDS (1.5 OUNCES) IN A CHOLESTEROL-LOWERING DIET MAINTAINS HDL-CHOLESTEROL AND HDL SUBCLASSES IN MILDLY HYPERCHOLESTEROLEMIC ADULTS

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Background and objectives: Reducing dietary saturated fat and cholesterol is recommended to decrease total and LDL-cholesterol levels; however, this strategy also decreases HDL-cholesterol (HDL-C). Almonds previously have been shown to improve HDL-C in hypercholesterolemic individuals. Therefore, we hypothesized that incorporating almonds into a cholesterol-lowering diet would maintain HDL-C and HDL subclasses in mildly hypercholesterolemic adults.

Methods: A randomized, 2-period (6 wk/period), crossover, controlled-feeding study was designed to examine the effects of 1.5 oz. almonds vs an isocaloric muffin substitution on cardiovascular disease risk factors. Differences in nutrient profiles of the control (CON: 59% CHO, 15% PRO, 26% FAT, no almonds/d) and almond (ALD: 51% CHO, 16% PRO, 33% FAT, 1.5 oz. of almonds/d) diets were due to nutrients inherent to each snack and did not differ in saturated fat or cholesterol. Participants were healthy adults (n = 53) with elevated LDL-cholesterol (148.0±2.6 mg/dl) and normal HDL-C (54.4±2.1 mg/dl).

Results: HDL-C and α-1 HDL decreased on both diets vs. baseline (ALD: -3.7±±0.8 and -1.6±0.7, CON: -5.6±0.8 and -4.2±0.7 mg/dl, respectively; P < 0.02); however, ALD maintained HDL-C and α-1 HDL compared to CON (P < 0.01). CON decreased α-2 HDL vs. baseline (-2.6±±0.8 mg/dl; P <0.01). The diets had different effects on α-3 HDL (ALD: -0.9±0.5 vs. CON: 0.2±0.5 mg/dl; P = 0.05). Both diets decreased α-4 HDL vs. baseline (ALD: -1.0±0.3 and CON: -1.2±0.4 mg/dl; P <0.01). CON decreased the α-1: preα-1 HDL ratio vs. baseline (-0.5±0.2; P = 0.01) and ALD (-0.4±0.2; P = 0.04).

Conclusions: Almonds (1.5 oz./d) have beneficial effects on HDL-C and HDL subclasses, thus demonstrating an approach to maintain HDL-C in a cholesterol-lowering diet.

Key words: HDL-cholesterol, HDL subclasses, cardiovascular disease, almonds.

PO2239

DIETARY PATTERNS AND NUTRITIONAL STATUS IN METABOLIC SYNDROME PATIENTS

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Background and objectives: The aim of this study was to assess the differences in the nutritional status of patients with Metabolic Syndrome (MetS) and a group of healthy volunteers.

Methods: A cross-sectional comparative study was carried out, with a representative sample of population with and without MetS. The study included 74 subjects (34 men and 40 women) 32 healthy subjects and 42 patients who fulfilled the Adult Treatment Panel III criteria for the MetS Dietary data, anthropometric measurements and Biochemical parameters were determined in both groups.

Results: Mean of weight, waist circumference and Body Mass Index, were higher in MetS patients than in Control Group (CG). No significant differences were observed in protein intake between the two study groups, although the average of protein intake in the MetS group was higher (1.3 g/kg/day) than in CG (1 g/kg/day). The lipid profile of fat intake in the CG was slightly better than the MetS group. The CG covers the recommendations on the consumption of monounsaturated fatty acids, saturated fat intake was at the limit of recommendations (< 10%) and polyunsaturated fatty acid intake was low, although satisfying the recommendations of < 10%. Although we found no significant differences in the nutrient intake between the two groups of study, the lipid profile of the diet and fiber was poor in MetS patients if compared to the control group. Respect biochemical parameters we founded significant differences between the CG and patients with MetS in glucose levels and TG values (p <0.05).

Conclusions: In summary, dietary intake in MetS patients was inadequate and of less nutritive quality than in the control group

Key words: Metabolic syndrome, diet, nutrient intake, macronutrient, lipidic profile.

PO2240

FLAXSEED LIGNAN METABOLITES ELICIT ANTI-HYPERTENSIVE EFFECTS IN PAD PATIENTS IN THE FLAX-PAD TRIAL

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Background and objectives: Flaxseed is highly prevalent in cardioprotective lignans, alpha-linolenic acid (ALA) and fiber. Secoisolariciresinol diglucoside is the major lignan found in flaxseed whose metabolites demonstrate antioxidant action. Peripheral arterial disease (PAD) is highly associated with hypertension. The aim of this study was two-fold: (i) to determine the effects of milled flaxseed on plasma bioavailability of enterolignans (enterodiol and enterolactone) and ALA and (ii) to examine their correlation with systolic (SBP) and diastolic (DBP) blood pressure. It was hypothesized that PAD patients would exhibit elevated plasma enterolignan and ALA concentrations upon consuming flaxseed with an associated attenuation of blood pressure.

Methods: A clinical population with PAD consumed food varieties containing either 30 g of ground flaxseed or 30 g of whole wheat placebo daily for one-year. This study, known as the Flax-PAD Trial, was a single center, prospective, double-blinded, randomized controlled clinical trial (NCT00781950 at clinicaltrials.gov) involving 110 patients > 40 years of age with PAD [ankle-brachial index (ABI)<0.9]. Plasma enterolignans and fatty acids were measured at baseline, 1-, 6- and 12-months using gas chromatographic techniques. BP was measured using a sphygmomanometer.

Results: Within the flaxseed group, plasma enterolignan and ALA levels increased significantly compared to baseline and placebo ($p < 0.003$). SBP was reduced by ~10 mmHg ($p < 0.04$) and DBP by ~7 mmHg ($p < 0.004$) in the flaxseed group relative to control following 6 months of intervention. Inverse correlations with DBP were observed with both plasma enterolactone ($r=-0.35$; $p = 0.02$) and total enterolignans ($r=-0.4$; $p = 0.01$). ALA levels did not correlate with changes in BP.

Conclusions: Consuming milled flaxseed offers potential advantages in lowering BP levels in hypertensive populations where drug interventions may not be possible or more naturopathic routes are desired. Plasma enterolactone derived from dietary lignans found in flaxseed can decrease DBP selectively.

Key words: Flaxseed, lignans, hypertension . Supported by CIHR, Flax2015, St. Boniface Hospital Foundation, MMSF and ARDI.

PO2241

NUTRITIONAL MANAGEMENT OF BLOOD GLUCOSE LEVELS

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Background and Objectives: Nutritional management of blood glucose levels is a strategic target in the prevention and management of type 2 diabetes mellitus (T2DM), applicable across the population. To implement a successful strategy it is essential to understand the impact of dietary modulation on the postprandial rise in blood glucose concentrations.

Methods: Using the highest quality data, a systematic and comprehensive literature review was undertaken. Included in this review were the major macronutrients (carbohydrate, protein, fat), micronutrient vitamins and minerals, non-nutrient phytochemicals and additional foods such as low-calorie sweeteners, vinegar and alcohol.

Results: The strongest corroboration of efficacy for improving glucose homeostasis was for insoluble and moderately fermentable cereal-based fiber and mono-unsaturated fatty acids as replacement of saturated fat. Postprandial glycaemia was decreased by intake of viscous soluble fiber and the predo-

minant mechanism of action was considered to be by delaying absorption of co-ingested carbohydrates. There was weaker but substantial evidence that certain phytochemical-rich foods were likely to be effective. This may be associated with the suggestion that the gut microbiota plays an important role in metabolic regulation, which includes provision of phytochemical and other metabolites.

Conclusions: Based on the evidence, it is clear that dietary components have significant and clinically relevant effects on blood glucose modulation. This suggests that employing a dietary regimen to attenuate the postprandial rise in blood glucose levels along with previously identified targets (reducing excess body weight and an increase in physical activity) will benefit the health of the population and limit the increasing worldwide incidence of T2DM.

Key words: diabetes, postprandial glycaemia, blood glucose.

PO2242

DIETARY AND URINARY PHYTOESTROGENS AND PLASMA LIPIDS IN MEXICAN WOMEN

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Background and objectives: Phytoestrogens are plant-derived phenolic compounds, structurally and functionally similar to 17 β-estradiol; they also have weak estrogenic and antiestrogenic effects. Phytoestrogens may prevent some chronic diseases, such as cardiovascular disease, by improving the levels of triglycerides, total cholesterol, HDL and LDL in humans. The objective of this cross-sectional study was to evaluate the association of dietary and urinary phytoestrogens with the lipid profile of 135 healthy women older than 25 years, from Northwest México.

Methods: A sociodemographic and health questionnaire was administered to the participants, and anthropometric measures were taken. A 24-h Recall (24-H R) and a Food Frequency Questionnaire (FFQ) were applied to evaluate the phytoestrogen consumption. The lipid profile was analyzed by enzymatic methods using commercial kits. Urinary phytoestrogens were analyzed using HPLC-MS in a subsample of 84 women.

Results: The mean age of the participants was 44.6 years and 65% of them were of low socioeconomic level. According to BMI, 85% of women were classified as overweight (40.3%) or obese (44.7%). By using the FFQ, naringenin (flavonoid) was associated to total cholesterol (R=-24.1, p = 0.00) and LDL (R=-19.4, p = 0.00). Associations were found between lariciresinol and LDL cholesterol (R=-20.8, p = 0.00), glicitein and VLDL cholesterol (R=-9.9, p = 0.00), and glicitein and triglycerides (R=-49.9, p = 0.00) when the 24-H R was used. Coumestans (found in beans, a highly consumed food in Northwest México), were associated to VLDL cholesterol (R=-9.3, p = 0.02) and triglycerides (R=-46.6, p = 0.02). Urinary lignans were associated to VLDL cholesterol (R=-8.7, p = 0.04) and triglycerides (R=-43.5, p = 0.04), while resveratrol was related to total (R=-24.5, p = 0.01) and LDL cholesterol (R=-17.3, p = 0.04).

Conclusions: A high intake of total phytoestrogens as well as dietary coumestrol, naringenin and lignans, may contribute to the prevention of a high risk lipid profile in women from Northwest México.

Key words: phytoestrogens, plasma lipids, diet, associations.

PO2243

ANTHROPOMETRIC INDICATORS IN A REPRESENTATIVE SAMPLE OF SPANISH ADULTS: DIFFERENCES BY HYDRATION STATUS

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Background and objectives: Studies suggest that energy expenditure, energy, macronutrient and food intakes may be conditioned by hydration status, so it would be expected that also might influence the anthropometric parameters. The aim of the study was to analyze several anthropometric indicators according to the hydration status in a representative sample of Spanish adults.

Methods: A representative sample of 418 individuals of 18-60 years (196 men and 222 women) was studied. Weight, height, waist (WC) and hip circumferences (HC) were measured, and Body mass index (BMI), waist-to-height ratio (WHtR) and waist-to-hip ratio (WHR) were calculated. Urine specific gravity (USG) was used as indicator of hydration status, considering as hydrated subjects (USG <1.020) and subjects in risk of dehydration (USG >1.020). All calculations were made using SPSS (v19.0). Statistical significance was set at $p < 0.05$.

Results: 45.5% of the participants were in risk of dehydration (54.6% men and 37.4% women, p = 0.04). After adjusting for age, it was observed a positive and significant association between the USG and weight (r=0.135, p = 0.040), WC

(r=0.184, p = 0.002), HC (r=0.158, p = 0.015), BMI (r=0.172, p = 0.006) and WHtR (r=0.195, p < 0.001) in women, while in men with WC (r=0.129, p = 0.046) and WHR (r=0.141, p = 0.022). In addition, after adjusting for age, it was observed that women with risk of dehydration had a higher risk of having values of WC ≥P50 (78 cm) (OR=2.275 (1.243-4.164, p = 0.008), in comparison with the hydrated women.

Conclusions: The results of the study highlight the existence of differences in the anthropometric parameters according the hydration status. This might suggest that an adequate intake of water or high water content foods may help control body weight.

Key words: hydration status, anthropometric indicators, Spanish adults Acknowledgements: The study was supported by the AESAN (Spanish Agency for Food and Nutritional Safety, Spanish Ministry of Health and Consumer Affairs, Spain) (Project:337/2008).

PO2244

ASSOCIATION OF SUBCLINICAL ATHEROSCLEROSIS WITH DIFFERENT STANDARDS OF THE METABOLIC SYNDROME AND INSULIN RESISTANCE

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Background and objectives: we have previously selected two metabolic syndrome (MS) components blood pressure (BP) and high density lipoprotein cholesterol (HDLC) as associated with carotid intima media thickness (CIMT) a surrogate marker of subclinical atherosclerosis in children (Rev Med Chile 2012; 140: 1268-75). We aimed to ascertain with a higher sample size the influence of the above mentioned variables and three standards defining the MS plus three standards defining insulin resistance (IR).

Methods: A cross-sectional study of 447 children 10-14 years old of low socio-economic strata from an urban area of Chile was performed during years 2009-2011. This sample was selected considering the presence of one or more MS component and IR. Anthropometry and BP were assessed. A blood sample for determination of glycaemia, insulinemia (quimioluminiscence) and blood lipids were taken; HOMA was calculated and three standards were applied to select HOMA-IR cases. Three standards to define MS were also used. Medium CIMT was assessed using ultrasonography with automated software. Chi-squared test and stepwise regression were used.

Results: Mean age was 11.5 ±1.0 years old; 59% girls; 92.6% pubertal; 72% excess weight. Three standards for MS had prevalence of 24.4% (Cook, 2004), 14.1% (IDF, 2007), 42.9% (De Ferranti, 2004). Three standards for HOMA-IR had the following prevalence: 15.2% (Barja, 2011), 37.4% (Burrows, 2006), 23.0% (De Onis, 2012). Elevated blood pressure and reduced CHDL had significant associations with CIMT ≥ percentile 75. The logistic regression for CIMT ≥ percentile 75 only selected BP ≥ percentile 90 (OR = 2.963) and CHDL < 40 mg/dL (OR = 1.789)

Conclusions: None of the various classifications for the MS and the HOMA-IR were selected in the multivariate analysis confirming the previously found influence of increased BP and reduced CHDL on medium CIMT.

Key words: metabolic syndrome, insulin resistance, carotid intima-media thickness, child.

PO2245

EFFECT OF HASS AVOCADO INTAKE ON POST-INGESTIVE SATIETY AND SUBSEQUENT ENERGY INTAKE IN HEALTHY OVERWEIGHT ADULTS

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Background and Objectives: Avocados are nutrient dense whole foods with properties that have the potential to favorably impact energy balance. Since 72% of their weight is water, they increase the volume when added to a meal, which may enhance satiety. Further, avocados are also a source of fiber, which is an additional factor linked to enhanced satiety. This study sought to evaluate if incorporating ~½ of a fresh Hass avocado by inclusion or addition into a meal will influence post-ingestive satiety and subsequent energy intake in overweight adults.

Methods: We performed a randomized 3x3 single blind cross-over study (three 1-day study periods scheduled 1 week apart) in 26 healthy overweight adults (16 women,10 men; mean±SD age 40.8±11.0 years; BMI 28.1±2.4 kg/m^2). Subjects consumed a standardized breakfast meal on each of the 3 days, followed by 1 of 3 lunch test meals [Control (C), avocado-free; Avocado Inclusive (AI); and, Avocado Added (AA)]. Visual analog scales (VAS) were administered prior to the lunch meal and at specific intervals over 5 hours following the start of the test meal to assess 5 measures of appetite sensation. Mixed model analysis was used to compare differences among the 3 lunch test meals. The area under the curve (AUC0-xh) was computed for the VAS using the linear trapezoidal rule.

Results: The AA meal increased satisfaction (p = 0.02) and decreased the desire to eat (p = 0.01) as compared to the C meal for the AUC (0-3h). Energy intake at the subsequent ad libitum dinner meal and evening snack and dietary compensation did not differ between the 3 lunch test meals.

Conclusions: The inclusion or addition of avocado to a meal is an effective approach to reduce hunger and the desire to eat in overweight adults.

Key words: avocado; satiety; VAS; overweight adults.

PO2246

EFFECT OF HASS AVOCADO INTAKE ON POST-INGESTIVE GLUCOSE AND INSULIN LEVELS IN HEALTHY OVERWEIGHT ADULTS

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Background and Objectives: Avocados are rich in antioxidants (e.g. polyphenolic compounds) which may be effective in improving insulin sensitivity in an overweight cohort. This study sought to evaluate if incorporating ~½ of a fresh Hass avocado by inclusion or addition into a meal will influence measures of post-ingestive glucose homeostasis in overweight individuals.

Methods: A randomized 3 x 3 single blind cross-over study (three 1-day study periods scheduled 1 week apart) was performed in a controlled setting in 26 healthy overweight adults (16 women,10 men; mean±SD age 40.8±11.0 years; BMI 28.1±2.4 kg/m2). Subjects consumed a standardized breakfast meal on each of the 3 days, followed by 1 of 3 lunch test meals [Control (C), avocado-free; Avocado Inclusive (AI); and, Avocado Added (AA)]. Blood glucose and insulin levels were measured before lunch and at specific intervals over 3 hours following the start of the test meal. Mixed model analysis was used to compare differences among the 3 lunch test meals adjusting for study periods as fixed effects and treating subjects as random effects. The area under the curve (AUC0-xh) was computed for glucose and insulin using the linear trapezoidal rule.

Results: Compared to the AI meal, the AUC (0-3h) for blood insulin was higher in the C and AA meals ($p = 0.04$ and $p = 0.05$, respectively). Both the AI and AA meals attenuated the rise in postprandial blood insulin levels 30 minutes after the start of the lunch meal as compared to the C meal.

Conclusions: The inclusion or addition of avocado to a meal is an effective approach to favorably influence measures of glucose homeostasis in overweight adults. The attenuation in the rise of insulin in the AI intervention is worthy of future exploration in persons with insulin resistance and type 2 diabetes mellitus.

Key words: avocado; glucose; insulin; overweight adults.

PO2247

METHIONINE ADENOSYLTRANSFERASE EXPRESSION DEPENDS ON METHIONINE CONCENTRATIONS IN THE CULTURE MEDIA

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Background and objectives: Methionine and ATP are joined by methionine adenosyltransferases (MATs) to produce S-adenosylmethionine in the first step of the methionine/homocysteine cycle. MAT1A and MAT2A are the genes encoding mammalian MAT catalytic subunits (á1 and á2, respectively), whereas MAT2B codifies for the regulatory subunit (â). High methionine levels increase the flux through this pathway, leading to enhanced homocysteine levels that may be secreted to the plasma. Such mechanism could contribute to explain the potential atherogenic properties of dietary methionine excess and the epidemiological relationship between elevated homocysteine levels and cardiovascular disease. In order to analyze this possibility, the effect of a range of methionine concentrations was assessed using several cell lines.

Methods: H35 and Cos7 cell lines were grown in DMEM culture medium supplemented with 10% FBS and including 0.01, 0.05, 0.2 (control), 2 or 15 mM methionine for 4 days. Total mRNA was obtained and the expression levels of MAT genes analyzed by real-time RT-PCR (7300 RT PCR System, Applied Biosystems).

Results: Methionine concentrations below control levels induced expression of the three MAT genes in H35 cells, whereas only MAT2A and MAT2B were induced in Cos7 cells. In contrast, methionine concentrations above control levels induced no significant expression changes in Cos-7 cells and only MAT2B was modified in H35 cells. ($p < 0.05$ Unpaired t test).

Conclusions: Our results show that methionine deficient medium affects expression of MAT genes in several cell lines, the specific effect depending on the cell origin. High methionine, however, seems no effect regardless of the concentration.

Key words: Methionine metabolism, methionine adenosyltransferase, homocysteine, cardiovascular disease, cell line.

PO2248

HYPERTENSION AND LIPID TRIAD ARE THE MOST IMPORTANT ATTRIBUTABLE RISKS FOR MYOCARDIAL INFARCTION IN A MIDDLE CLASS URBAN MEXICAN POPULATION

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Background and objectives: Although myocardial infarction (MI) is the main cause of death in Latin-America there are few studies describing the populations prevalence of classic cardiovascular risk factors (CCVRF) in this region. Determination of potential modifiable risk factors is necessary to focus prevention strategies. The study objectives were to establish both the distribution of CCVRF and the population attributable risk (PAR %) for MI in a middle class urban Mexican population.

Methods: A case-control observational study was conducted, 11 CCVRF were examined among 210 patients, with a first acute non-fatal MI, and 607 matched controls from a middle class urban population (MCUP). Continue variables were analyzed by Mann-Whitney U and Student t tests, Odds Ratios (OR) were established by logistic regression and PAR % for MI were calculated.

Results: Eight of the 11 CCVRF analyzed were significantly different ($P < 0.05$) between MI patients and controls. By logistic regression analysis hypertension (OR 3.0 95% CI 1.7-5.3, OR 5.5 95% CI 3.5-8.8) hypertriglyceridemia (OR 2.3 95% CI 1.2-4.5, OR 3.5 95% CI 2.3-5.5) and lipid triad (OR 2.2 95% CI 1.1-4.3, OR 3.2 95% CI 2.0-5.1) were a risk for MI in both female and male groups respectively, in the latter group hypoalphalipoproteinemia (OR 2.8 95% CI 1.4-5.6), hypercholesterolemia low density lipoprotein (OR 2.0 95% CI 1.1-3.9) and atherogenic index (OR 2.5 95% CI 1.6-3.8) were also a risk for MI. The main PAR % for both genders (female, male) were hypertension (51, 45), lipid triad (36, 40) and atherogenic index (37, 28), respectively and also for the male group hypertriglyceridemia (41) and smoking (26). CCVRF prevalence and PAR% were higher among men than women in this population.

Conclusions: Strategies as healthy diet, exercising and quitting smoking will prevent MI in this MCUP.

Key words: myocardial infarction, population attributable risk.

PO2249

INSULIN RESISTANCE AND METABOLIC SYNDROME ASSOCIATED TO BANKING EMPLOYEES IN SOUTHEASTERN BRAZIL.

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Background and objectives: Metabolic syndrome (MS) has been the subject of growing concern worldwide, since it is related to increased risk of cardiovascular disease. Insulin resistance (IR) seems to be the link between alterations present in the SM, which may be linked to increase the visceral fat deposition. Thus, we evaluated determine the prevalence of IR, MS and associated factors among banking workers in southeastern Brazil.

Methods: Out of 501 males and females banking employees, 20 years old were evaluated by cross-sectional study including demographic, biochemical, anthropometric and hemodynamic. The SM was determinate by NCEP and IDF. The IR was determined by HOMA-IR, with the cut off > 2.71.

Results: 86 (17.2% 95% CI 13.8 to 20.6) and 113 (22.6% 95% CI 18.8 to 26.3) of banking employees with MS according to the NCEP and IDF, respectively and 52 (10.4%) workers with RI. The likelihood of developing the syndrome is greater in individuals with high level of education (OR 2.16 (95% CI 1,11-6-13) and among those with overweight and obesity, the possibility of having MS is 12 , 6 (95% CI 4.80 to 33.26, P = 0.000) and 43.6 (95% CI 16.05 to 118.88, P = 0.000) times over, respectively, compared with normal weight. Persons who are overweight are at risk of 4.97 (95% CI 1.31 to 18.83) times more likely to have elevated HOMA, and among those who are obese, the risk rises to 17.87 (95% CI 4 0.36 to 73, 21).

Conclusions: High number of employees that have similar characteristics to a large portion of the working population, which despite high education have MS and IR, and the consequent risk of developing cardiovascular disease.

Key words: Insulin resistance, metabolic syndrome, banking employees, obesity.

PO2250

ASSOCIATION OF AREA, INCOME, OCCUPATION AND EDUCATION LEVELS WITH OBESITY IN JILIN PROVINCE IN CHINA

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Background and objectives: Nowadays the economy has been obviously improved in both rural area and urban area in China. To explore the association to obesity is necessary among area, monthly income occupation type and education level in Jilin province.

Methods: A cross-sectional study (n = 7556) has been conducted in Jilin Province of China. Each participant underwent a standard questionnaire and physical examinations. The associations of demographic and clinical factors with body mass index (BMI) were tested using binary logistic regression.

Results: The prevalence of obesity is 16.2% and 11.2%, respectively, among general population in city area and rural ($p < 0.001$). High monthly income, high education level and brain work had a high prevalence compared to low monthly income, low education level and physical work, respectively ($p < 0.001$). Binary logistic analysis shows that, gender (male vs. female) and education levels (low level vs. high level) is positive with obesity, and the Odd Ratio (OR) of male is 1.181 ($p = 0.018$), the OR of low education level is 1.215 ($p = 0.033$). However, rural area (OR: 0.718, $p < 0.001$), adolescent (OR: 0.556, $p < 0.001$) and low monthly income (OR: 0.588, $p < 0.001$) is negative with obesity, no related with type of occupations.

Conclusions: Occupations were not associated with obesity in this survey. The prevalence of obesity in urban is higher than rural area. The association between areas and obesity may be explained by gender, monthly income, education levels and areas, but no occupations.

Key words: Obesity, Prevalence, areas, monthly income.

PO2251

INFLUENCE OF BODY COMPOSITION IN BONE MASS

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Background and objectives: Body composition has proved related to bone through mechanisms such as mechanical overload, osteogenesis and increased interaction of body weight. But the studies are controversial on which component has the most influence on bone mineral content.

Objective: To evaluate the influence of body composition on bone mineral content in adults.

Design: Cross-sectional study with 630 adults of both sexes over 45 years, 392 women and 238 men that attended at the Family Doctor Program in the metropolitan area of Rio de Janeiro, Brazil. The total bone mineral content (BMC), lean mass (LMA) and fat mass (FMA) were measured by dual energy x-ray absorptiometry (DEXA). The Body Mass Index (BMI) was calculated using the formula: weight/height^2.

Results: The Pearson correlation showed that the BMC was significantly associated with LMA, FMA and BMI ($p < 0.000$, $p < 0.015$, $p < 0.000$, respectively) in both genders analyzed together. However, the association was much greater with the LAM ($r = 0.793$) than with FMA ($r = 0.119$). When analyzed separately, for men and women, all body components were positively correlated (statistically significant, $p < 0.000$), being the largest association with LMA.

Conclusions: The results showed that BMI, LMA and FMA are positively associated with BMC and suggest that the body lean mass component rather than fat mass is more beneficial to bone mass in the population.

Key words: body composition, bone mass, BMI.

PO2252

NUTRITIONAL CARE OF A HEMODIALYTIC PATIENT WITH LIVER CIRRHOSIS: A CASE REPORT

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Background and objectives: Sepsis is a common clinical syndrome with high mortality rates. Acute lung injury is the

most frequent complication of sepsis. Previous study reported that γδ T cells play a major role in linking innate and adaptive immune systems and are instrumental in reducing lung damage associated with inflammation. Glutamine (GLN) has been considered as an essential amino acid during catabolic conditions due to its immunomodulating properties. This study investigated the effects of GLN administration on regulating lung γδ T cells in polymicrobial sepsis.

Methods: Mice were randomly assigned to normal group (NC), septic saline group (SS), and septic GLN group (SG). All mice were fed with chow diet. Sepsis was induced by cecal ligation and puncture (CLP). The SS and SG groups were respectively injected with saline and 0.75 g GLN/kg body weight once via tail vein 1 h after CLP. Mice were sacrificed 6, 12, and 24 h after CLP. Their lungs were collected for further analysis.

Results: Compared to normal mice, sepsis resulted in higher lung γδ T cell and neutrophil percentages and higher cytokine expressed by γδ T cells. The SG group had higher lung γδ T cell percentage and lower neutrophil numbers. Apoptotic rates of lung γδ T cells were lower, whereas neutrophils were higher than those of the SS group. Moreover, interleukin (IL)-17A, interferon-γ, and IL-10 expressed by γδ T cells, and CXCR2 expressed by neutrophils decreased in the SG group. Also, GLN reduced IL-17A, IL-1β, and IL-23 concentrations and myeloperoxidase activity in lung tissues.

Conclusions: Our results suggest that GLN administration after initiation of sepsis affects lung γδ T cell percentage and cytokine secretion, and prevented apoptosis of γδ T cells and neutrophil infiltration to the lungs.

Key words: sepsis; acute lung injury; γδ T cell; glutamine; Interleukin 17

PO2253

THE BRIGHT AND HEALTHY THAI KID PROJECT, A THREE-YEAR STUDY TO COMBAT CHILDHOOD OBESITY

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Background and objectives: Obesity has reached epidemic proportions globally, and is a major contributor to the global burden of chronic disease and disability. The project aimed to improve nutrition and activity among primary school children in Bangkok via targeted activities.

Methods: This was a longitudinal study. A preliminary nutritional survey was carried out involving 5,126 children in 4 public schools in Bangkok. Participatory action research involving students, teachers, and parents was conducted. After a 2-day training course, teachers integrated project concepts into their course curriculum. Seminars on weight management were given separately to parents and students. Multimedia materials prepared included a DVD for children (songs, cartoon animation for healthy eating and exercise) and computer assisted instruction for self-learning. The ongoing and post program evaluation at 2 and 3 years of obese and normal groups were carried out.

Results: The prevalence of obesity in boys (25.4%) was about two times higher than in girls (12.2%) and was more prevalent in the 11-12 years group than the 6-10 years group for both sexes. It was reported that high caloric dietary intake significantly decreased for the obese group ($p < 0.001$), aerobic exercise activity increased in both groups ($p < 0.001$), and overall prevalence of obesity declined from 19.3% to 16.8 and 18.0% respectively . The high blood cholesterol reduced from 78% to 34%. Parents provided their children with healthier foods and intake of unhealthy foods significantly decreased ($p < 0.001$). However, fruits and vegetables remained the least desirable foods.

Conclusions: A long-term, participatory effort to promote healthy diets and physical exercise could be effective with primary school students, and public policy for a healthy school lunch and environment with public relations, positive mass media and parental role models can be effective in combating childhood obesity and future cardiovascular diseases.

Key words: childhood obesity, primary school, hypercholesterolemia, Bangkok.

PO2255

DIETARY EGG YOLK PROTEINS SUPPRESS INFLAMMATION OF DEXTRAN SULFATE SODIUM-INDUCED COLITIS IN MICE

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Background and objectives: Ulcerative colitis (UC) is a chronic inflammatory disease of the colonic mucosa that can dramatically increase the risk of colon cancers. Dietary egg yolk proteins have been reported to suppress expression of colon tumors and improve experimentally induced constipation in rats. The aim of this study was to determine whether egg yolk proteins alleviate the inflammatory responses of dextran sulfate sodium (DSS)-induced colitis in mice.

Methods: Female C57BL/6J mice were fed a purified AIN-93G diet containing either 20% casein or 20% egg yolk proteins for 14 days. Seven days after starting diets, animals were exposed to 3% DSS in drinking water developed chronic colitis for 7

days, which was evaluated by disease activity index (DAI) and histology. We investigated clinical and biochemical markers at the end of the experimental period. The contents of the cecum were analyzed for the presence of short-chain fatty acids.

Results: Dietary egg yolk proteins significantly attenuated DSS-induced DAI scores and colonic myeloperoxidase activity, which implied that it suppressed weight loss, diarrhea, gross bleeding, and the infiltrations of immune cells. Histological examinations indicated that egg yolk proteins suppressed edema, mucosal damage, and the loss of crypts induced by DSS. Egg yolk proteins diet inhibited the mRNA expressions of inflammatory mediators such as tumor necrosis factor-alpha, interleukin-6, and inducible nitric oxide synthase in colonic tissues. Furthermore, a significant increase in cecal n-butyrate concentration was observed in the mice that were fed egg yolk proteins.

Conclusions: These results suggest that egg yolk proteins have an anti-inflammatory effect at colorectal sites that is due to the down-regulations of the expressions of inflammatory mediators and the production of n-butyrate in colon. We concluded that egg yolk proteins-enriched diet could be a beneficial functional food on UC.

Key words: egg yolk proteins, ulcerative colitis, anti-inflammation.

PO2256

DIETARY PECTIC-OLIGOSACCHARIDES FROM BEET PULP MODULATE THE GUT MICROBIOTA AND CONTROL CANCER ASSOCIATED CACHEXIA IN MICE.

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Background and objectives: The gut microbiota has recently been proposed as a novel component in the regulation of energy homeostasis. Our latest studies suggest that changing gut microbiota can reduce leukemia progression and associated metabolic disorders (cachexia, characterized by a loss of fat mass and muscle atrophy). In this study, we tested the hypothesis that pectic oligosaccharides (POS) prepared from beet pulp are original colonic nutrients able to influence the progression of cancer cachexia.

Methods: Mice were transplanted with Bcr-Abl-transfected proB lymphocytes (BaF3) cells mimicking leukemia and received either inulin-type fructans (ITF) as prebiotic control or POS in their diet (5%) for 2 weeks.

Results: POS administration increased total bacteria, bifidobacteria, roseburia and bacteroides numbers in the caecal content, in more extent than ITF. DGGE 16S rDNA analysis revealed qualitative changes in bacteroides for the POS group. ITF and POS reduced BaF3 cell infiltration in liver and adipose tissue, respectively. Only ITF lessened the induction of MCP1 (inflammatory marker) in the liver tissue. Interestingly, POS (and to a lesser extent ITF) delayed the fall of the caloric intake (anorexia) linked to cancer progression. In contrast to ITF, POS treatment reduced the loss of fat mass and the induction of atrophy markers in muscle.

Conclusions: Selected prebiotic approaches appear as innovative tools to modulate cancer progression and associated muscle atrophy and fat mass loss. POS derived from beet may constitute a new nutritional strategy to modulate gut microbiota with positive consequences during cachectic episode. This study confirms the importance of research focusing on gut microbes-host interactions for managing systemic and severe diseases, such as cancer.

Key words: cancer, cachexia, pectic oligosaccharides, muscle atrophy, prebiotics.

PO2257

HIGHER DIETARY QUALITY IS ASSOCIATED WITH LOWER RISK FOR TYPE 2 DIABETES IN A MIDDLE-AGED AND OLDER CHINESE POPULATION

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Background and objectives: Prevalence of type 2 diabetes (T2DM) increased dramatically in China during the past two decades. Diet plays a key role in the prevention of this disease. However, data about dietary quality and risk for T2DM were scarce in China.

Methods: A population-based study with participants aged 50 to 70 years in 2005 was conducted in local communities from both urban and rural areas in Beijing and Shanghai, China. Dietary intake was assessed with a validated food frequency questionnaire. Dietary quality was measured with Healthy Eating Index score 2005. The follow-up survey was performed in 2011. T2DM was defined as meeting at least one of following criteria: fasting plasma glucose ≥7.0 mmol/L, HbA1c ≥ 6.5%, or self-reported use of diabetic medications.

Results: A total of 1912 participants without T2DM at baseline were successfully followed after 6 years. Approximately 48.3% met one or more criteria for T2DM during follow-up. Compared with those with lowest quartile of dietary quality score, those with highest quartile had 15% lower risk for T2DM (relative risk: 0.85, 95% confidence interval: 0.74-0.97, P value = 0.016). This association was independent of age, sex, body mass index, smoking, alcohol drinking, physical activity and total energy intake.

Conclusions: High dietary quality is associated with lower risk for T2DM. Adherence to healthy eating may protect people from T2DM in China.

Key words: type 2 diabetes, dietary quality, Chinese.

PO2258

MODERATE MISO SOUP CONSUMPTION MAY REDUCE THE RISK OF CARDIOVASCULAR RISK FACTORS IN JAPANESE PROSPECTIVE COHORT STUDY: THE SUITA STUDY

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Background and Objectives: Miso soup has gradually come into the limelight due to its association with reduced risk of lifestyle-related disease. However, there have been few prospective studies on the association between miso soup and lifestyle-related disease. We assessed the hypothesis that miso soup would be inversely related with hypertension and dyslipidemia in a general urban population in Japan.

Methods: A total of 2,215 participants (40-64 years old) in the Suita Study underwent a medical examination as a baseline survey between 1994 and 1996. Each subject completed a food frequency questionnaire. The frequencies of miso soup were 'rarely', '1-2 days/week', '3-4 days/week', and 'almost daily' (and the average number of times per day). Hypertension was defined blood pressures >=140/90 mmHg or antihypertensive medication. Diabetes was defined as fasting/occasional blood glucose >=126/200 mg/dL, respectively, or anti-diabetic medication. Dyslipidemia was defined as non-HDL cholesterol >=170 mg/dL or antihyperlipidemic medication. Of the baseline participants, 720, 1,206, and 291 subjects were excluded due to hypertension, dyslipidemia, and diabetes at the baseline survey, respectively. All study participants were invited every 2 years to undergo a medical examination for 10.5 years on average. The risks of incident hypertension, diabetes and dyslipidemia were analyzed by the adjusted Cox proportional hazards model according to the miso soup categories, adjusting for age, sex, body mass index, smoking, drinking, exercise, and medications of (hypertension, diabetes, and dyslipidemia).

Results: The adjusted hazard ratios (95% confidence intervals) of hypertension and dyslipidemia were 0.72 (0.55-0.95) and 0.69 (0.51-0.94) in subjects with 1 cup/day of miso soup, respectively, compared with rarely consumed miso soup. However, for the higher frequencies of miso soup, the associations were attenuated.

Conclusions: Moderate miso soup consumption may prevent hypertension and dyslipidemia in the general urban population.

Key words: miso soup, hypertension, dyslipidemia, prospective cohort study.

PO2259

EFFECTS OF PERILLA OIL ON BONE LOSS IN OVARIECTOMIZED RATS

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Background and objectives: Estrogen deficiency contributes bone loss in postmenopausal women. Several studies have shown that increasing diet content of n-3 fatty acids will inhibit osteoclast production and reduce bone loss. Perilla oil, rich in n-3 polyunsaturated fatty acids, is able to be a good plant oil source for vegetarian. Ovariecromized (OVX) rat was used to be an estrogen-deficiency osteoporotic model. Thus, this study was aimed at studying the effects of perilla oil on bone mass density in OVX rats.

Methods: Forty female Sprague Dawley rats were divided in to four groups: normal control (NC), OVX control (OC), OVX -perilla oil with n-3/n-6 ratio 1/2(OP2) and OVX perilla oil with n-3/n-6 ratio 1/4(OP4) groups. C and OC groups fed with a semi-purified diet with 10% corn oil; perilla oil groups adjusted diet n-3/n-6 ratio to 1/2 or 1/4. After 16 weeks of treatment, the animals were scarified. The blood and femur were collected for analysis.

Results: Compare with the NC group, OVX rats had a lower estradiol level in plasma as well as percent of bone volume, trabecular number and higher trabecular separation. The plasma osteocalcin (OCN) concentration was higher in the OVX rats than NC group for bone formation. It has been observed that higher plasma OCN levels are relatively well correlated with increases in bone mineral density. However, perilla oil groups had a lower OCN level than those in the OC group, maybe can regulate the bone remodeling.

Conclusions: These results indicated that compare with OVX fed with corn oil, dietary perilla oil administration may

regulate bone formation. But the bone loss is not obviously affected by the perilla oil supplementation in this study.

Key words: perilla oil, bone loss, ovariecromized rats, n-3 fatty acids.

PO2260

FACILITATORS AND BARRIERS TO ADOPTING RECOMMENDATIONS OF THE HEBAT! PROGRAMME (A FAMILY-BASED CHILDHOOD OBESITY INTERVENTION): FINDINGS FROM FOCUS GROUP DISCUSSION

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Background and Objectives: The HEBAT! Programme is a comprehensive intervention for treating childhood obesity by reducing weight, increasing physical activity and improving eating habits of overweight children. The programme involves overweight and obese children and their parents. This presentation aims to identify the facilitators and barriers faced by the parents in adopting recommendations of the intervention program.

Methods: A total of three focus groups were conducted among 24 sets of parents. The main discussion focused on recommendations of HEBAT! Programme, such as increasing healthy snacking, more fruits and vegetables, balanced diet, low fat food preparation, shopping behavior, reducing fast foods and screen time, and increasing physical activity. Parents were asked to discuss factors that made each recommendation easy (facilitator) or difficult (barriers) to follow.

Results: Far less facilitators than barriers were identified. The facilitators were changes in parental shopping behavior in relation to reading food labels, reducing frequency of eating fast foods, preferences of children on eating balanced meals and ability of children to reduce screen time. The barriers identified were difficulty to overcome child preferences when practicing balanced diet, eating low fat meals, and healthy snacking. Parents identified time-cost barriers in preparing healthy foods, buying fresh fruits, and participation in physical activities with their children. Economic barriers includes higher price of healthy foods and fruits. Neighborhood safety was another factor that limits physical activity and walking to school.

Conclusions: Parents identified more barriers particularly in relation to child preferences, time and economic costs and neighborhood safety when adopting recommendations to reduce childhood obesity. Hence, development of intervention programs should consider both facilitators and barriers when obesity related recommendations are offered to enhance parental compliance.

Key words: Childhood obesity, obesity treatment, childhood obesity intervention.

PO2261

DO VEGETARIANS HAVE A LOWER RISK OF OBESITY THAN NON-VEGETARIANS IN HIGH AND LOW OBESITY ENVIRONMENTS?

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Background and objectives: Obesity has become an epidemic in the U.S. and other countries with detrimental effects to the quality of life and health perspectives. Lifestyle factors such as dietary patterns may contribute in the prevention of obesity. The purpose of the study was to investigate associations between dietary patterns based on the inclusion or absence of meat and obesity in high and low obesity environments.

Methods: Cross-sectional study of 55676 U.S. subjects (age range 30 to 110 years) from the Adventist Health Study-2 with a complete set of data. Dietary pattern was classified as vegetarian and non-vegetarian based on meat intake derived from a validated food frequency questionnaire. County-level estimates of obesity provided by the CDC were stratified in quintile levels and cohort based individual level BMI values were calculated. Logistic regression analysis was employed to assess the association between dietary pattern and obesity stratified by quintiles of county-level obesity prevalence. Adjustments were made for cohort based information on race, sex, age, physical activity, caloric intake and sedentary behavior.

Results: After multiple adjustments the odds ratios of being obese were substantially lower for vegetarians than non-vegetarians in all quintiles of county level obesity with odds ratios (OR) between 0.460 and 0.522. The odds ratios for vegetarians were lowest in counties with the two highest obesity quintiles (4th quintile OR=0.460, CI=0.406-0.521 and 5th quintile OR=0.469, CI=0.400-0.549).

Conclusions: A vegetarian diet is associated with a lower

risk of being obese in high and low obesity environments and may show the greatest benefit in higher obesity environments.

Key Words: Obesity, Dietary Pattern, Environment, Prevention

PO2262

DIETARY PATTERNS AND THEIR ASSOCIATION WITH THE METABOLIC SYNDROME AND ITS COMPONENT RISK FACTORS

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Background and Objectives: In the US 27% of the population have the Metabolic Syndrome (MetS). The identification of amendable dietary factors that may help in the prevention of the MetS thus becomes an important goal. The purpose of the study was to investigate associations between dietary patterns specified by degree of meat and dairy intake with the MetS and its component factors.

Methods: Cross-sectional analysis of 1278 subjects (mean age 63 years) with a complete set of clinical and dietary data from the Adventist Health Study II. Subjects were classified as non-vegetarian, semi vegetarian, pesco vegetarian, lacto-ovo vegetarian and strict vegetarian. ANCOVA was used to determine associations between dietary pattern and metabolic risk factors while controlling for possible confounding factors such as sex, age, ethnicity, physical activity and other relevant factors. Odds ratios for being over the risk threshold as defined by the Adult Treatment Panel III for each metabolic risk factor and the MetS were calculated with non-vegetarians being set as the group of reference.

Results: After multiple adjustments the odds ratio of having a waist circumference that was over the risk threshold was halved for pesco vegetarians (OR=0.49, CI=0.32-0.73) and semi vegetarians (OR=0.49, CI=0.36-0.67) and reduced by two thirds for strict vegetarians (OR=0.32, CI=0.19-0.55). The OR for high blood pressure was reduced by half for lacto-ovo vegetarians (OR=0.53, CI=0.39-0.72) and the OR of high glucose levels was significantly reduced in lacto-ovo vegetarians (OR=0.64, CI=0.45-0.92) and strict vegetarians (OR=0.42, CI=0.22-0.78). Strict vegetarian had the lowest risk for MetS (OR=0.33, CI=0.17-0.61) followed by lacto-ovo vegetarians (adjusted OR=0.65, CI=0.47-0.90).

Conclusions: Dietary patterns characterized by lower intakes of animal products are associated with a lower metabolic risk profile and may thus contribute in the prevention of metabolic disease.

Key Words: Obesity, Dietary Pattern, Environment, Epidemiology, Prevention.

PO2263

ANTIHYPOGLYCEMIC ACTIVITY OF MYRTUS COMMUNIS IN ALLOXAN-INDUCED DIABETIC RATS

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Background and objectives: the actual treatment of diabetes is efficacious to decrease glycaemia; however, the good control of the glycaemia is, sometimes, difficult to reach and leads to the emergence of serious complications. Phytotherapy offers an opportunity to use natural substances with beneficial effect on glucose homeostasis and without side effects observed with drug therapy. The aim of this study was to evaluate the use of Myrtus communis, a hypoglycemic plant, for treating diabetes mellitus in alloxan-induced diabetic rats.

Methods: two extracts (powder and infusion) were administrated orally and daily, during 12 days to experimental alloxenic Wistar rats at the respective doses of 250 and 500 mg/kg b.w. and 25 and 50 g/l. Body weight, liver index, blood glucose, serum level of creatinine, transaminase, phosphatase alkaline activity (PAL), cholesterol and hepatic glutathione were evaluated.

Results: the effect of the extracts was advantageous in reducing blood glycaemia (121,80g±22.50) ($p \leq 0.001$) comparing to the control one (357.00g ± 145.40), and regulating biochemical parameters except the cholesterol one. Indeed, the powder extract (250 mg/kg) showed better results than the infusion one. The two extracts have not a hepatocytotoxicity and did not showed any sign of toxicity in rats.

Conclusions: the presented data suggest that the two extracts of Myrtus communis have beneficial effect on the hyperglycemia in diabetic Wistar rats; however, the powder extract results are better than the infusion one. Further studies are needed to study the active constituents responsible for this propertie.

Key words: alloxane, diabetes, myrtus communis, wistar rats.

PO2264

FORMULATION AND OPTIMIZATION BY EXPERIMENTAL DESIGN OF LOW-FAT MAYONNAISE BASED ON SOY LECITHIN AND WHEY

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Background and objectives: Traditional mayonnaise is a relatively microbiologically stable product containing high oil content and among its ingredients, egg yolk is most critical for the stability of the product (Hasenhuettl, 2008; Narsimhan and Wang, 2008). Nevertheless, one main problem with egg yolk is its high cholesterol content. In this way, extensive investigations are being carried out actually to develop low cholesterol sauces with similar characteristic to real mayonnaise.

Methods: For this purpose, we focused on the following investigated steps: Characterization of commercial mayonnaise on low-fat (10%), as reference product, Experimental formulation tests, finally a design study that consists to make tests using the method of design of experiments and to determine the optimal formula which has characteristics approximating those of the reference product.

Results: Emulsifying power is provided by the use of soy lecithin and the total fat content in our formulations was limited to 16%. Droplet size measurement of employed mayonnaise samples at different times, show that the largest diameter of fat made of 16 tests does not exceed 18.5 μm. Results of stability to centrifugation reveals that the absence of the supernatant oily layer ensures the stability of the emulsion. However, the rheological of used of mayonnaises gives a yield stress of 56.1 Pa. Using the experimental design method, the number of trials can be limited to a number of design experiments of 16, and best formulation of the mayonnaise (without cholesterol) was obtained.

Conclusions: Therefore, we can conclude that we have formulated a product without cholesterol, reduced fat and can provide the body full of essential nutrient, namely whey protein (essential amino acids), fatty acids essential minerals (calcium, phosphorus, sodium, potassium) and polysaccharides.

Key words: low-fat mayonnaise, soy lecithin, whey, guar gum, design of experiments.

PO2265

PREVALENCE AND PREDICTING CLINICAL OUTCOME OF CARDIAC PATIENTS BY NUTRITION RISK SCREENING (NRS).

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Background and objectives: Malnutrition is highly prevalent among hospital admissions and is associated with, poor response to medical treatment as well as increased mortality, increased length of hospital stay and increased cost to the state. Cardiac patients are especially prone for nutritional risk due to apparent factors. The aim of this study is to assess the nutritional status and the ability of the Nutrition Risk Screening (NRS) to predict the clinical outcome when applied to cardiac patients.

Methods: Five hundred twenty six patients underwent nutritional screening NRS on admission and each subject was followed up until discharge and after one month to identify the clinical course and outcome.

Results: Three hundred twenty three males (61.22%) and 204 females (38.78%) were participated in the study. NRS divided patients in to malnutrition categories of normal (230; 43.7%), mild (33; 6.3%), moderate (132; 25.1%) and severe (131; 24.9%) respectively. The mean hospital stay is increasing with the NRS, patients with 'normal' nutrition category discharged mean days of 4.5, whereas patients with severe malnutrition stayed average 5.9 days. Compared to patients with severe malnutrition, other patients had two folds higher mortality and three folds higher morbidity during hospital stay. During one month follow up severe malnourish patients had increased risk for death (two times) and hospital readmission compared to the rest of the patients.

Conclusions: Among cardiac patients nearly a quarter suffers from severe malnutrition according to NRS. Prolonged hospital stay, higher mortality and morbidity were predicted by NRS among this patient population. Therefore, the nutritional screening should be applied to all cardiac patients to predict the unfavorable clinical outcome.

Key words: cardiac patients, NRS, nutrition risk screening, malnutrition.

PO2266

DIFFERENCES BETWEEN FEMALE AND MALE DIABETIC PATIENTS IN FACTORS ASSOCIATED WITH HYPERTRIGLYCERIDEMIA

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Background and objectives: Diabetic patients with hypertriglyceridemia frequently develop atherosclerosis. The aim of this study was to analyze factors associated with hypertriglyceridemia in male and female diabetic patients.

Methods: Subjects were 196 female and 61 male diabetic patients living in Krasung District, Burirum Province, Thailand. Fasting blood samples were taken for the determination of triglyceride (TG) levels. Body mass index (BMI) was calculated, and waist circumference (WC) measured. Data were collected during the period January to April, 2011. Multiple logistic regression was used to identify factors associated with hypertriglyceridemia in female and male diabetic patients.

Results: The mean (SD) age of the diabetes subjects was 59.8 (10.5) years in females, and 57.4 (12.7) in males. The average (SD) duration since the diagnosis of diabetes mellitus was 6.1 (4.0) and 5.7 (4.6) years for female and male subjects, respectively. The prevalence of abnormal TG levels (> 150mg/dl) was 31% in females and 23% in males. The female and male subjects categorized as obese (BMI > 25.0 kg/m2) were 33% and 39%, respectively. Abdominal obesity was found in 64% of females (WC > 80 cm) and only 23% of males (WC > 90 cm). The results of the multiple logistic regression showed that abdominal obesity was the only factor associated with hypertriglyceridemia in the female subjects (OR adj = 2.50, 95% CI: 1.21 – 5.19), whereas diabetic duration more than five years was the only factor associated in the male subjects (OR adj = 0.17, 95% CI: 0.03 – 0.87).

Conclusions: Greater emphasis needs to be placed on decreasing abdominal obesity to reduce triglyceride levels in female diabetic patients. The issue in male patients should be further investigated due to the small sample size in the present study.

Key words: diabetes, hypertriglyceridemia, obesity.

PO2267

BIRTH WEIGHT AND BREASTFEEDING: PROTECTIVE FACTORS AGAINST OBESITY

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Background and Objectives: Overweight at birth is correlated with the occurrence of childhood obesity. Many epidemiological studies are in favor of a protective effect of breastfeeding against the development of childhood obesity. The objective was to study the prevalence of overweight and obesity in the child population of Constantine (Algeria) in terms of birth weight, type and duration of breastfeeding and the impact of socio-economic status.

Methodology: A study was conducted on a sample of 340 children (153 girls and 187 boys) aged 6 to 12 years old, enrolled in the commune of Constantine in 2011. The questionnaire includes questions on the practice of breastfeeding, birth weight, socio-economic and anthropometric measurements (weight and height) of children. The IOTF criteria were used to assess overweight and obesity.

Results: The overall prevalence of overweight is 21.76%. That of obesity is 5%. A significant association was observed between obesity and female gender (p = 0.007). The percentage of overweight children seems to be higher for the group with birth weight greater than or equal to 4 kg (26.47%, p = 0.6). A proportion of 85% of mothers reported having breastfed their children. The percentage of overweight appears to be the highest among children who were not breastfed (31.37%) against 20.17% among children exclusively breastfed. the percentage of non-breastfed children is higher when the level of education of mothers is higher compared to the low level (27.63% vs 13.25%, p = 0.005). The prevalence of overweight appears to decrease with increasing of the total duration of breastfeeding.

Conclusions: The prevalence of breastfeeding is quite high in our population. The determining factors are the socio-economic status and maternal education. A protective effect of breastfeeding against overweight seems to be highlighted.

Key words: Birthweight, breastfeeding, children, overweight, prevention.

PO2268

STRAIN-DEPENDENT ANTIBODY AND ANAPHYLACTIC RESPONSES TO WHEAT GLIADIN IN A/J MICE: AN ANIMAL MODEL FOR WHEAT-INDUCED FOOD ALLERGY

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Background and objectives: Wheat gliadins are major causative allergens of wheat-induced food allergy, including anaphylaxis, despite of their insolubility to water/salt-solutions. Detailed mechanisms on allergic sensitization and elicitation with gliadins remain unclear, though individual genetic predisposition must in part be involved. In this study, we establish an animal model to better understand the allergenicity of gliadins and the immunological and pathophysiological mechanisms of wheat allergy.

Methods: Four strains of mice with different H-2 haplotype (A/J, AKR/N, BALB/c, C3H/HeJ) were injected intraperitoneally with fractionated gliadin. Specific antibodies to gliadin in mouse serum were evaluated using the ELISA and immunoblotting. The mice were orally administered with gliadin and systemic allergic and anaphylactic responses were studied.

Results: Among four mouse strains, A/J mice showed the highest IgE response to i.p.-injected gliadins as analyzed by ELISA and immunoblotting, and provoked severe anaphylactic reactions as estimated by measuring rectal temperature decrease and capillary permeability increase after administration of gliadin. Despite that serum IgE anti-gliadins levels as measured by ELISA were not significantly different between the two strains, A/J mice experienced maximum drop after the gliadin challenge and severely decreased temperature in contrast with BALB/c mice. Causative allergenic components reactive with the IgE of A/J mice were estimated to be several components in α-gliadins and in α-gliadins as well as minor components in α-gliadins using ELISA and immunoblotting in combination with aluminum lactate-PAGE and SDS-PAGE.

Conclusions: We report here a high-responder mouse strain, A/J, to gliadins on not only specific IgE response but also anaphylactic reaction to oral gliadins. It was suggested that component- and/or epitope-specific IgE rather than the IgE to total gliadins affected provocation of severe anaphylactic responses to oral challenge with gliadins in A/J mice.

Key words: wheat gliadin, allergy, anaphylaxy, mouse model.

PO2269

EVALUATION OF THE HYPOCHOLESTEROLEMIC EFFECT OF ANTIOXIDANT EXTRACTS FROM SOME ALGERIAN DATE VARIETIES (PHOENIX DACTYLIFERA) IN RATS

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Background and objectives: Because of the many virtues attributed to natural antioxidants, the aim of this study is to evaluate cholesterol lowering effect of dates phenols extracts.

Methods: The first step of this work is the extraction and purification of the phenolic fraction from three Algerian date varieties (Mech Degla, Deglet Nour and Ghars) using two solvents (methanol and ethanol) to assess their anti-radical potential and hypocholesterolemic activity in vivo.

Results: The results show that the three ethanolic extracts are the most biologically active after purification. Also, it exists a correlation between the rate of total polyphenols that the ethanolic purified extracts contain, their anti-radical potential and their hypocholesterolemic activity, through the proportionality of the found results, because more the extract is rich in total polyphenols more its antioxidant activity is raised and its hypolipemiant effect is effective. Mech Degla illustrates very well this relativity with a content total polyphenols of 311.65 mg EAG / 100g, an antioxidant activity of 74,07% and a reduction of more than half rate of LDL in the blood at the second week of the treatment.

Key words: Dates, phenolic extracts, purification, anti-radical potential, hypocholesterolemic effect.

PO2270

EFFECT OF HIGH OLIVE OIL DIETS ON PLASMA GLP1 LEVEL AND ADIPOCYTE DPP4 ACTIVITY

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Background and objectives: Olive-oil enriched diets have demonstrated that increase GLP-1 release and improve glucose tolerance. GLP-1 is cleaved by the proteolytic-activity dipeptidyl-peptidase-IV (DPPIV), and several DPPIV-inhibitors have been developed for type-2-diabetes treatment. DPPIV is present on the surface of different cells, and there is a soluble

form in plasma. DPPIV also has been localized in epididymal adipose tissue, where it seems play and important role in the impaired glucose tolerance induced by high fat diets. In the present study, we analyzed the effect of different diet on plasma GLP-1 and DPPIV activity in adipose tissue.

Methods: We analyzed the effect of two diets, enriched with olive oil (OO) and virgin olive oil (VOO), on plasma GLP-1 and DPPIV-activity in epididymal adipose tissue, compared with a standard (S) and a high saturated fat diet (butter, B).

Results: Only B group had high body weight gain ($p < 0.05$). The weight of adipose tissue also was higher in B mice compared with S diet ($p < 0.01$). No changes were observed in fasting plasma glucose. However, insulin levels in OO and VOO groups were lower compared with B ($p < 0.05$), improving the index of insulin resistance (HOMA) in VOO compared with B ($p < 0.01$). It was accompanied by an increased levels of GLP-1 in VOO, although not significantly compared with S ($p>0.05$). DPP4-activity was significantly increases in epididymal adipose tissue of VOO compared with B ($p < 0.05$). A significant inverse correlation was demonstrated between adipose tissue DPP4-activity and several components of the metabolic syndrome cluster: body weight ($r=-0.52$, $p < 0.01$), and HOMA index ($r=-0.47$, $p < 0.05$).

Conclusions: These results indicate that the intake of a rich diet in VOO may be an effective prevention strategy for obesity and metabolic disorders.

Key words: olive-oil, DPPIV, GLP-1. Acknowledgements: Plan Propio UJA (PP2009/13/03) / PI Excelencia, Junta de Andalucía (AGR-6340).

PO2271

HIGH FAT DIETS AND PLASMA LEVELS OF ADIPOKINES: EFFECT OF DIETARY FATTY ACIDS

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Background and objectives: High fat diets are normally associated with the development of obesity, insulin resistance and abnormalities in the regulation of food intake. The long term administration of these diets plays an important role in the development of obesity and insulin resistant, and obesity is usually characterized by a 'low grade of inflammatory status'. However, it seems that the type of fat is critical for these effects. The main objective of this work was analyzed the effect of high fat diets, with different fatty acid profile and polyphenols contents, on postprandial levels of leptin, resistin and IL-6.

Methods: Four groups of male Swiss Webster mice ($n = 9$) were fed for 12 weeks with different diets: standard (S, 3% fat), and supplemented (20%) with olive oil (OO), virgin olive oil (VOO) or butter (B). After experimental period, only B group reached significantly higher body weight and visceral (epididymal) adipose tissue amount, compared with standard diet. Plasmatic postprandial levels (30 min after feeding) of leptin, resistin and IL-6 were determined by Luminex Assay.

Results: Data indicate significantly higher levels of leptin in B versus S and OO diets ($p < 0.01$). Similarly, the high level of plasmatic IL-6 corresponded to B compared with the others three diets ($p < 0.001$). B diet also increased significantly ($p < 0.001$) plasmatic levels of resistin.

Conclusions: These results indicate a specific effect of the fat type on plasma levels of adipokines involved in control of food intake, insulin resistant and inflammatory markers, and could support the beneficial effects of high monounsaturated fatty acids diets.

Key words: Leptin, resistin, IL-6, olive oil. Acknowledgements: Plan Propio UJA (PP2009/13/03) / PI Excelencia, Junta de Andalucía (AGR-6340).

PO2272

PREVALENCE OF FOOD INTOLERANCE AND DUMPING SYNDROME IN BARIATRIC SURGERY PATIENTS

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Background and Objectives: Obesity is considered a chronic disease whose prevalence has grown substantially. One of the treatments proposed for obesity is bariatric surgery, however, brings with it some important complications for healthy. This study is aimed at assessing the prevalence of food intolerance and dumping syndrome in bariatric surgery patients.

Methods: In a cross sectional study, subjects were asked to answer a questionnaire provided on a web-based platform linked to a blog specifically addressing bariatric surgery and nutrition themes and advertised on discussion groups and social networks.

Results: We evaluated 71 patients, both sexes, aged between 18 and 50 years who underwent bariatric surgery. The prevalence of food intolerance was 60.6% and of dumping syndrome was 66.1%. The main foods that triggered food intolerance were meat (28.1%), rice (11.2%) and vegetables (4.2%). The main foods that triggered dumping syndrome were ice cream (49.2%), condensed milk (49.2%) and fried foods in general (49.2%). The most common symptoms related to food intolerance were pinching (38%), abdominal discomfort (38%) and vomit (27%) and the main symptoms related to dumping syndrome were nausea (60.5%), 'wishing to lie down' (56.3%) and sleepiness (52.1%).

Conclusions: Although most subjects affirmed being familiar with the concepts of dumping syndrome and food intolerance, clinical and nutritional monitoring is fundamental before and after bariatric surgery in order to prevent the development of such complications.

Key words: dumping syndrome, bariatric surgery, food intolerance.

PO2273

MULTIPLE MICRONUTRIENT SUPPLEMENTATION IMPROVES SMALL BOWEL HISTOLOGICAL ARCHITECTURE AND ABSORPTIVE AREA IN ZAMBIAN ADULTS.

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Background and objectives: Disadvantaged populations in tropical and subtropical zones have a high incidence of environmental enteropathy (EE), characterized by abnormalities of small bowel architecture, intestinal permeability and absorptive capacity. This hitherto untreatable disorder may explain why oral vaccine efficacy in tropical populations is markedly reduced compared to Western populations. We investigated the effect of multiple micronutrient supplementation (MM) on small bowel architecture in EE.

Methods: As part of a randomised double blind placebo controlled trial (ISRCTN68751738) of MM on oral vaccine efficacy, consenting adults from Misisi, Lusaka, Zambia, were randomized to receive six weeks of 15 micronutrients as a daily capsule or placebo, followed by oral Typhoid vaccine (Ty21a). Small bowel biopsies were collected after the supplementation period, and 2-14 days after vaccination. For this study, correctly orientated biopsy sections were digitized and analyzed using a semi-automated image analysis program. Villous height (VH), crypt depth (CD), villous width (VW), villous perimeter (VP as a measure of epithelial surface area), villous cross sectional area (VA as a measure of villous compartment volume) and muscularis mucosae length were measured.

Results: 23 patients received MM and 23 received placebo. Baseline characteristics in the two groups were comparable. Mean VH was 12.9% greater and VP per 100μm of mucosa was 31.0% greater in the MM group (mean values MM vs placebo: VH 276.5μm v. 244.9μm, $p = 0.02$; VP 411.4μm/100μm v. 314.0μm/100μm, $p = 0.01$; Kruskal-Wallis). No significant differences were observed in VW, CD or VA per unit ML. There was no effect of HIV status. Well orientated biopsies before and after the vaccination phase were available for 14 patients; no changes were observed attributable to vaccination.

Conclusions: Multiple micronutrient supplementation improves small bowel villous height and absorptive area in adults with EE. This effect is independent of HIV status.

Key words: Evironmental enteropathy; morphometry; micronutrients; malnutrition.

PO2274

PARAOXONASE 1 ACTIVITY AND ITS RELATIONSHIP WITH OBESITY AND CARDIOVASCULAR RISK IN ADOLESCENTS

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Background and objectives: Obesity adolescence as a metabolic disorder considered an important factor for cardiovascular diseases in adults. Lipid profile, electronegative LDL [LDL (-)], non-esterified fatty acids (NEFAs), adipokines and paraoxonase 1 (PON1) are potential new risk factors for cardiovascular disease, however this biomarkers are sparkly monitored in adolescents. Our goal was to assess the PON1 activity and investigate its possible relationship with obesity and cardiometabolic risk factors of adolescents.

Methods: 237 adolescents, aged 10-19 years, both sexes from public school (Sao Paulo, Brazil) were included in this study. Anthropometric and body composition parameters were monitored. Lipid profile, LDL(-), anti-LDL(-) antibodies, NEFAs, α-tocopherol, leptin, resistin, adiponectin levels were analyzed in plasma. Statistical analysis was performed by linear tendency and Spearman test ($p < 0.05$).

Results: Adolescents were distributed in tertiles of PON1. It was not observed differences in total cholesterol, LDL-C and ApoB in function of tertiles of PON1. However, body mass index (BMI) ($p < 0.001$), waist circumference (WC) ($p < 0.001$), body fat mass (BFM) ($p < 0.001$), HOMA ($p < 0.001$), triglycerides ($p = 0.025$), NEFAs ($p = 0.020$), LDL (-) ($p = 0.029$), leptin ($p < 0.001$) and resistin ($p = 0.022$) were significantly higher in adolescents in the lowest tertile of PON1. In opposite, HDL-C ($p = 0.014$), ApoA1 ($p = 0.004$), anti-LDL (-) antibodies ($p = 0.003$), α-tocopherol ($p = 0.002$) and adiponectin ($p = 0.014$) showed higher values in adolescents in the highest tertile of PON1. The impact of PON1 on cardiovascular risk factors was confirmed by negative correlation with BMI ($r=-0.62$, $p < 0.001$), WC ($r=-0.60$, $p < 0.001$), BFM ($r=0.40$, $p < 0.001$), HOMA ($r=-0.28$, $p < 0.001$), NEFAs ($r=-0.14$, $p = 0.037$), leptin

(r=-0.49, p < 0.001) and resistin (r=-0.22, p = 0.007). Positive correlation were found between PON1 and HDL-C (r=0.16, p = 0.013), ApoA1 (r=0.23, p<0.001), α-tocopherol (r=0.15, p = 0.024), anti-LDL (-) antibodies (r=0.20, p = 0.002) and adiponectin (r=0.26, p = 0.001).

Conclusions: Elevated PON1 activity is associated as protector factor for obesity and cardiovascular risk of adolescents.

Key words: Adolescents, obesity, cardiovascular disease, PON1. Financial Support: FAPESP (07/57601-5, 07/57602-1).

PO2275

ELETRONEGATIVE LDL AND ITS AUTOANTIBODIES IN ADOLESCENTS WITH RISK FOR CORONARY ARTERY DISEASE

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Background and objectives: Recent studies indicate that the atherosclerotic process starts in the childhood. Early detection of high blood cholesterol in asymptomatic persons allows the identification of an important modifiable risk factor for coronary artery disease (CAD). Electronegative LDL [LDL(-)] and its autoantibodies could elucidate predictive information to evaluate atherosclerosis progression and it can represent a biomarker for CAD. Our goal was to determine LDL (-) and its autoantibodies in adolescents with risk for CAD.

Methods: 237 adolescents, aged 10-19 years, both sexes from public school (Sao Paulo, Brazil) were included in this study. Anthropometric and body composition parameters were monitored. Lipid profile, LDL(-), anti-LDL(-) antibodies, NEFAs, α-tocopherol, leptin, resistin and adiponectin concentration were analyzed in plasma. Statistical analysis was performed by t-student and Mann-Whitney (p < 0.05).

Results: The body mass index (BMI) was calculated, and adolescents were classified in Eutrophic and Overweight group, according WHO (2007). It was not observed differences in relation LDL(-), total cholesterol (TC), LDL-C, triglycerides (TG), ApoB and α-tocopherol concentration. Anti-LDL(-) antibodies (p = 0.001), HDL-C (p = 0.001), PON1 (p < 0.001), ApoA1 (p < 0.001) and adiponectin (p < 0.001) were significantly lower in Overweight group. Opposite results were found in TC/HDL-C (p = 0.008), ApoB/ApoA1 (p = 0.001), NEFAs (p = 0.012), leptin (p < 0.001) and resistin (p = 0.001). The waist circumference was measured, and adolescents were classified in Normal and CAD group, according Fernández (2004). It was not observed differences in relation TC, LDL-C, TG, ApoB and NEFAs. Anti-LDL(-) antibodies (p = 0.002), HDL-C (p = 0.002), PON1 (p < 0.001), ApoA1 (p = 0.047), HDL-C/ApoA1 (p = 0.004), adiponectin (p = 0.001) and α-tocopherol (p = 0.011) concentration were significantly lower in CAD group. Inverse results were observed for LDL(-) (p = 0.023), CT/HDL-C (p = 0.001), non-HDL (p = 0.025), ApoB/ApoA1 (p = 0.010), resistin (p = ep < 0.001).

Conclusions: High LDL(-) and low anti-LDL(-) antibodies concentration can be associated as risk factor for overweight and CAD in adolescents.

Key words: adolescents, overweight, CAD, LDL(-), anti-LDL(-) antibodies. Financial Support: FAPESP (07/57601-5, 07/57602-1).

PO2276

ASSOCIATION OF TRANS-FATTY ACIDS IN ABDOMINAL SUBCUTANEOUS AND VISCERAL FAT WITH DIABETES MELLITUS AND CARDIOVASCULAR RISK FACTORS IN MEXICAN WOMEN

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Background and objectives: Trans fatty acids (TFA) are produced as a result of the partial hydrogenation of cooking oils, so they are found in a variety of foods. Clinical and epidemiological studies indicate that these fatty acids may be deposited in abdominal subcutaneous tissue and be a risk factor for myocardial infarction. Objective: To determine if dietary TFA are deposited in the abdominal subcutaneous and visceral adipose tissues, and evaluate their potential associations with diabetes mellitus and cardiovascular disease.

Methods: The study was cross-sectional and included 18 adult women aged 22-54 years undergoing abdominal surgery. Body composition, diet (food frequency questionnaire), glucose, insulin, lipid profile, blood pressure, and the content of TFA of abdominal subcutaneous and visceral adipose tissues were measured.

Results: Results indicate that TFA are deposited in higher quantities in visceral compared to subcutaneous adipose tissue (1.8 vs 1.3%; <0.05). The main trans isomers in both tissues were the elaidic (18:1n9t) and linoelaidic (18:2n6t) acids. Positive correlations between TFA in visceral fat and body weight, waist circumference and % of fat were found (r = 0.62; r=0.61; r= 0.54 respectively; p <0.05). After adjustment for age, BMI, caloric intake from monounsaturated and saturated fat, the variability of HDL-C levels was explained by age and the 18:1

isomer in subcutaneous fat (R 2 = 0.87; p < 0.01). Insulin was related to the intake of saturated fatty acids and the 18:2 isomer of TFA in visceral fat (R 2 = 0.87; p < 0.01).

Conclusions: The dietary TFA are deposited in abdominal fat and affect HDL-C and insulin levels.

Key words: Trans fatty acids, adipose tissue, cardiovascular disease, diabetes mellitus.

PO2277

THE RELATIONSHIP BETWEEN DIETARY CALCIUM INTAKE, PHYSICAL ACTIVITY AND BONE LOSS RATE AMONG CHINESE PERIMENOPAUSAL WOMEN

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Background and objectives: Although a number of treatments have been taken in the therapy of postmenopausal osteoporosis, prevention of this disease is still considered more profound and mainly focused on increase dietary calcium intake and physical activity level, especially for Asian women. The aim of this study is to determine the relationship between dietary calcium, physical activity and their interaction with bone loss in Chinese perimenopausal women.

Methods: 189 perimenopausal women who go to women's health care center of Hunan province, China for routine physical examination were selected. The bone mineral density at Femoral Neck, Ward's triangle, trochanter, total hip and lumber 2~4 were measured, daily dietary calcium intake and physical activity were estimated by validated calcium FFQ and WHO recommended physical activity questionnaire. The BMD were retest 10~13 months later. Main effects of calcium intake, physical activity and their interaction on bone loss were analyzed.

Results: Among women dietary calcium intake low than 505.6 mg/d, insufficient activity lead to an additional 0.64% and 0.84% bone loss of the Wards triangle and total hip compared to the high active physical activity group. Among women whose dietary calcium intake ranged 505.6 mg/d~ 652.2 mg/d, insufficient activity lead to an additional 0.79% bone loss of the Wards triangle compared to the high active physical activity group. Among women dietary calcium intake between 652.2 mg/d~ 851.7mg/d, full sit-active group leading to an additional 1.67% and 1.88% bone loss of the torchanter and the totol hip.

Conclusions: The interaction between dietary calcium intake and physical activity level impacted the bone loss of Ward triangle, trochanter and total hip of Chinese perimenopausal women; dietary calcium intake low than 505.6 mg/d and full sit-active were of the greatest impact.

Key words: Postmenopausal Osteoporosis (PMOP), bone loss, dietary calcium intake, physical activity, mixed linear model.

PO2278

NUTRITION SUPPORT IN OLDER INPATIENTS AND ITS ASSOCIATION WITH NUTRITIONAL STATUS AND CLINICAL OUTCOME

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Background and objectives: Malnutrition is a medical condition caused by an improper or insufficient diet and associated with negative clinical outcomes. Older inpatients are easy to develop to malnutrition. Methods to improve or maintain nutritional intake are known as nutrition support (NS). Nutritional status and NS of Chinese older inpatient is unclear. This study intends to know the current situation of NS in China.

Methods: This study was taken at West China Hospital of Sichuan University in March and April of 2012. Two doctors take a questionnaire in 24 hours after patients' admission. Patients were followed up to discharge day or the 30th days after hospitalization. Mini Nutritional Assessment-Short Form (MNA-SF) and Nutritional Risk Screening 2002 (NRS) of nutritional status were used to assess nutritional status. SPSS Statistics version 19 was used for analysis.

Results: 933 older inpatients were included, 49 inpatients were excluded, and 407 patients were followed up (19 patients died). 14.5% patients assessed by MNA-SF and 41.2% patients assessed by NRS were malnourished. 532 patients received NS, comprised 36.8% (n = 196) patients with parenteral nutrition (PN), 54.4% (n = 279) patients with enteral nutrition (EN). NS was not associated with nutritional status assesses by MNA-SF (OR: 1.3, 95%: CI 0.9-1.9) and NRS (OR: 1.29, 95% CI 0.97-1.68). LOS of patients with NS was 17.5±9.7 days, and patients without NS was 11.3±7.1 days (p = 0.000). Four dead patients received NS, and 15 dead patients did not receive NS (OR: 15.9, 95% CI: 5.13-49.3).

Conclusions: Nutritional support was not guided by nutritional status in this study. Patients who were older, poor nutritional status were easy to receive PN. Though patients received NS had a longer LOS and a higher mortality than patients did not received in this study. More multicenter and larger researches about older patients' NS are needed.

Key words: malnutrition, nutritional support, aged, MNA-SF, NRS.

PO2279

RESVERATROL UPTAKE BY VASCULAR ENDOTHELIAL CELLS IS THROUGH PASSIVE DIFFUSION AND AN SGLT1-MEDIATED PROCESS

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Background and objectives: Resveratrol is a natural polyphenol that exerts potent effects on suppress atherosclerosis (AS). However, its low concentration in plasma has placed this role in doubt. Thus, resveratrol effects might be dependent on its transport into vascular endothelium; a question not previously addressed, in spite of its obvious and fundamental importance.

Methods: Human umbilical vein endothelial cells (HUVECs) were cultured and exposed to different doses (0.1, 1, 10 and 20 μM) of resveratrol. The uptake of resveratrol by HUVECs were detected by fluorescence microscopy and HPLC assays. and the role of sodium-dependent glucose transporter 1 (SGLT1) in resveratrol uptake were measured. Additionally, Sprague-Dawley rats were administrated intragastricly with resveratrol of 100mg/kg and the concentration of resveratrol in the blood and blood vessels were measured.

Results: Via HPLC, we found that resveratrol was absorbed by human umbilical vein endothelial cells in a temperature-, concentration-, and time-dependent manner suggesting the involvement of passive diffusion and active transport. As determined by confocal laser scanning microscopy, resveratrol primarily distributed throughout the cytoplasm. Furthermore, resveratrol absorption was modulated by serum proteins and sodium-dependent glucose transporter 1 (SGLT1), yet inhibited by glucose (an SGLT1 substrate) and phlorizin (an SGLT1 selective inhibitor) as well as SGLT1 siRNA transfection. Additionally, the concentration of resveratrol in blood vessels of rats administrated with resveratrol declined more slowly up to 24 h compared to that in the blood.

Conclusions: Our results suggested that the intracellular resveratrol pool was more important than the serum level in vivo and SGLT1 was a key factor in transmembrane polyphenol transport.

Key words: resveratrol, vascular endothelial cells, atherosclerosis, sodium-dependent glucose transporter, transmembrane transport. Acknowledgements This work was supported by the National Natural Science Foundation of China (grant number 81172670) and the Youth Innovation Foundation of the Third Military Medical University (2012XJQ06).

PO2280

SUPPRESSION OF DIABETES-ASSOCIATED GLOMERULAR ANGIOGENESIS BY ANTHOCYANIN-RICH PURPLE CORN EXTRACT

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Background and objectives: Diabetic nephropathy (DN) is one of the major diabetic complications and the leading cause of end-stage renal disease of which prevalence continues to increase. Abnormal angiogenesis results in new vessels that are often immature and play a pathological role in DN, contributing go renal fibrosis and disrupting glomerular failure. Purple corn utilized as a daily food exerts various disease-preventive activities. This study focused on the implication of HIF (hypoxia inducible factor)-1α-vascular endothelial growth factor (VEGF)-angiopoietin (Ang) in the development of diabetic kidney and on the therapeutic role of purple corn extract (PCE) in delaying diabetic glomerular angiogenesis.

Methods: Human endothelial cells were cultured in conditioned media of renal mesangial cells exposed to 33 mM high glucose (HG-HRMC) in the presence of 1-20 μg/ml PCE. Cellular expression levels of the angiogenesis biomarkers, endothelial HIF-1α, VEGF, Ang-1 and Ang-2, were determined by Western blot analysis. In the in vivo study db/db mice received 10 mg/kg PCE for 8 weeks. Plasma level of VEGF was determined by ELISA, and renal tissue levels of HIF-1α, VEGF, Ang-1, Ang-2 and Tie2 were measured by Western blot analysis.

Results: PCE inhibited endothelial expression of HIF-1α, VEGF, Ang-1 and Ang-2 induced by HG-HRMC conditioned media. Additionally, oral administration of PCE diminished plasma level of soluble VEGF. PCE alleviated glomerular angiogenesis of diabetic kidney by attenuating the induction of HIF-1α, VEGF, Ang-1, Ang-2 and Tie2 in kidney tissue of db/db mice. Accordingly, PCE appeared to antagonize glomerular angiogenesis due to chronic hyperglycemia.

Conclusions: PCE may be a potent therapeutic agent targeting abnormal angiogenesis in DN leading to kidney failure.

Key Words: Purple corn, diabetic nephropathy, glomerular angiogenesis, vascular endothelial growth factor, angiopoietin.

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PO2281

ANTIOXIDANT SUPPLEMENT HAD A LOWER EFFECT OF ATOPIC DERMATITIS IN YOUNG CHILDREN: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, CLINICAL TRIAL

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Background and objectives: Antioxidant intakes such as vitamin A, C and E have been reported to have an inverse association with the prevalence of atopic dermatitis (AD) in epidemiological studies. In order to confirm these findings, we conducted a randomized, double blind, and placebo controlled clinical trial in 109 young children with atopic dermatitis (n = 55 for the control group and n = 54 for the placebo group).

Methods: We developed an antioxidant supplement including vitamin E, vitamin C and β-carotene as a chewable tablet and provided the supplement to SG for 3 months. Placebo tablets were given to the control group children. Nutrient levels of the antioxidant supplement were approximately 30% of the upper levels for Korean young children. Besides the SCORing Atopic Dermatitis (SCORAD) index evaluation, we measured levels of blood antioxidant nutrients (α-tocopherol, β-carotene, and vitamin C), oxidative stress (blood malondialdehyde [MDA] and 8-isoprostane) and immune marker (serum IgE) before and after supplementation.

Results: Antioxidant supplementation had significant effects on increased serum α-tocopherol and β-carotene levels and decreased SCORAD scores ($p < 0.05$). No such effect existed in blood MDA.

Conclusions: These findings suggest that adequate doses of multiple antioxidant supplements may be beneficial for AD in young children.

Key words: atopic dermatitis, antioxidants, SCORAD, supplement, children.

PO2282

MARKERS OF INFLAMMATION ASSOCIATED WITH NAFLD

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Background and objectives: Non alcoholic fatty liver disease (NAFLD) is closely associated with obesity, being this a proinflammatory state. Pro-inflammatory cytokines such as tumor necrosis factor-alpha (TNF-alpha), interleukin-6 (IL-6) and C-reactive protein (CRP) or the antinflammatory adiponectin, could be critically involved in the pathophysiology of NAFLD. The objective of this work is to study the relation between NAFLD and inflammatory markers.

Methods: We studied 593 children and adolescents, age range 2 to 18 years. NAFLD presence was determinated by ultrasound by a single observer. Analytical data were collected assessing CRP by Inmulite 2000 Siemens autoanalyzer, TNF alpha by Inmulite one Siemens autoanalyzer, and adiponectin and IL-6 by radioinmunoassay.

Results: The prevalence of NAFLD in this sample (78.9% present overweight) is 17.8%. Most of children develop the grade I NAFLD (88.5%), 9.5% grade II, and only 1.9% grade III. Children with CRP serum levels above 3mg/l present higher percentage of NAFLD (22.8% vs 15.8%,$p = 0.002$). In relation to IL-6, 78.3% children and adolescents with levels below 7ng/l do not present NAFLD, 19.1% present grade I and only 2.6% of them develop grade II-III. Instead children with IL-6 levels above 7ng/l do not develop NAFLD in a lower percentage (68.7%), being more frequent mild and moderate-severe NAFLD in this group (26.7% and 5% respectively). Other markers such as TNF alpha and adiponectin no statistically significant differences observed regarding NAFLD.

Conclusions: In view of the results could be of interest performing liver ultrasound in children and adolescents with high BMI and high CRP and/or IL-6 levels, in order to diagnose the presence of NAFLD.

Key words: Obesity, citokynes, inflammation, non alcoholic fatty liver disease.

PO2283

KAEMPFEROL ATTENUATES AIRWAY FIBROSIS BY DISTURBING TGF-¥Â1-PAR-1 SIGNALING IN HUMAN BRONCHIAL EPITHELIAL CELLS AND OVALBUMIN-CHALLENGED MICE

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Background and objectives: Asthma is characteristic of the structural remodeling of airway epithelium accompanying epithelial damage, mucosal fibrosis, smooth muscle thickening and increased deposition of extracellular matrix components. Airway fibrosis entails epithelial cell modulation and matrix expansion increased submucosal cells expressing the profibrotic cytokine, transforming growth factor (TGF)-β. However, little is known about the localization of lung airway protease activated receptor-1 (PAR-1) and relationship between PAR-1 and epithelial to mesenchymal transition (EMT) in airway fibrosis. This study investigated that kaempferol attenuated airway allergic responses by blocking epithelial PAR-1 signaling activated by lipopolysaccharide (LPS)-associated TGF-β.

Methods: Epithelial BEAS-2B cells were pretreated with 1-20 μM kaempferol and stimulated with 2 μg/ml LPS or 10 ng/ml TGF-β1. BALB/c mice were sensitized with ovalbumin (OVA) and received a single dose of OVA with oral treatment of 10-20 mg/kg kaempferol. Cellular expression of several target gene proteins and matrix proteinase (MMP) activity were determined by Western blot analysis and gelatin zymography, respectively.

Results: Kaempferol nontoxic at 1-20 μM suppressed the LPS induction of epithelial PAR-1 and TGF-¥â1. This compound attenuated TGF-β1-enhanced MMP-9 secretion and cellular PAR-1 expression. Additionally, the TGF-β1 induction of mesenchymal marker proteins such as collagen I and smooth muscle α-actin through was attenuated by kaempferol through disturbing PAR1 activation. The epithelial adherence junction protein E-cadherin was substantially induced by treating kaempferol. Oral administration of kaempferol suppressed PAR-1 expression and encumbered smooth muscle cell excrescence in OVA-challenged mice. Therefore, kaempferol inhibited airway wall thickening and EMT via disrupting TGF-β1-PAR-1 signaling.

Conclusions: The dietary compound kaempferol may be a potent therapeutic agent for preventing airway fibrosis and remodeling due to endotoxin-associated profibrotic cytokine.

Key Words: Kaempferol, asthma, protease activated receptor-1, epithelial cells, ovalbumin.

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PO2284

A BETTER WAY TO REDUCE CARDIOVASCULAR RISK AMONG PATIENTS WITH METABOLIC SYNDROME? STUDY PROTOCOL FOR A HOSPITAL-BASED RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Non communicable diseases (NCD's) are the commonest cause of disease burden in Sri Lanka (SL), accounting for 85% of ill- health, disability and early death, contributed by behavioral risk factors leading to metabolic syndrome (MS) and increasing risk of cardiovascular diseases (CVD). Presently, management of NCDs in SL lacks an evidence based, culturally sensitive lifestyle intervention program for patients attending medical clinics. This randomized controlled trial aims to develop and assess effectiveness of a culturally relevant lifestyle intervention program for reduction of cardiovascular risk in urban adults with MS.

Methods: A culturally relevant lifestyle program, including an activity booklet will be designed after a participatory process involving patients, health staff and other stakeholders. N =423 participants with MS will be randomized into 3 groups: Group1 will follow routine care, group2, individually counseled for nutrition and lifestyle modification along with routine care while group3 in addition, will have peer support. The 6 month intervention will consist of individual counseling, peer support groups will complete the activity booklet in the peer group sessions (14- 15 members/group). At baseline and post intervention, participants will undergo an assessment regarding anthropometric measurements (weight, height, waist and hip circumference), medication, and blood pressure. Biochemical parameters; Fasting Blood sugar, HbA1c, lipid profile, liver function and inflammatory status will be assessed and knowledge, attitudes and practices regarding CVD risk, and dietary practices will be recorded.

Results: Outcomes of the study will indicate effectiveness of routine practice, individual dietary counseling with or without peer support in reducing chronic disease and CVD risk.

Conclusions: If culturally appropriate individual counseling and clinic based peer support is proved to be effective, it will be an invaluable tool in controlling and reducing MS and CVD risk.

Key words: randomized controlled trial, peer support, metabolic syndrome, cardiovascular risk, protocol.

PO2285

SOY FIBER IMPROVES WEIGHT LOSS AND LIPID PROFILE IN OVERWEIGHT AND OBESE ADULTS: A RANDOMIZED CONTROLLED TRIAL

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Background and objectives: Studies have suggested that food rich in dietary fiber may facilitate body weight loss, lower total and low-density lipoprotein cholesterol levels, and reduce body fat. However, few clinical trials have explored whether soy fiber contributes to weight loss and improves lipid profile of overweight and obese participants. The aim of this study was to examine the effects of soy fiber on body weight, body composition and blood lipids in overweight and obese participants.

Methods: Thirty nine overweight and obese college adults (19-39 y) were randomly assigned to consume control biscuits or biscuits supplemented with soy fiber for 12 weeks (approximately 100g/d).

Results: Body weight, body mass index, waist circumference, diastolic blood pressure, serum levels of total cholesterol, low density lipoprotein cholesterol and glucose of participants in soy fiber group were decreased significantly over the study period compared with the baseline. Body fat ($P < 0.05$) and trunk fat ($P < 0.01$) of participants in soy fiber group were also lowered significantly at week 12 than that of baseline.

Conclusions: Soy fiber had favorable effects on body weight, blood pressure, fasting lipid levels and body fat in overweight and obese adults. These effects may be beneficial in anti-obesity and the improvement of hyperlipidemia and hypertension.

Key words: soy fiber; weight loss; body fat; overweight; obesity.

PO2286

CALCIUM INTAKE IN SPANISH ADOLESCENTS IS RELATED WITH THEIR LEVEL OF BONE MINERAL DENSITY

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Background and objectives: Osteoporosis is considered one of the most prevalent chronic diseases caused by a misbalanced equilibrium between bone formation and bone resorption mechanisms. It is essential to optimize calcium intake during growth in childhood and adolescence since in this period around a 40% of total bone mass is gathered. The aims of this study were evaluate bone mineral density (BMD) in adolescents and the influence of daily calcium intake in their BMD levels.

Methods: A total of 170 Spanish healthy adolescent (11-18 years) at secondary school were included in the study. Calcium daily intake was assessed using a 72h-recall. BMD was evaluated through a dual-energy X-ray absorptiometry (DEXA) measurement at both calcanei. Data analysis was performed using the SPSS software.

Results: Calcium daylily intake was insufficient according to RDA recommendations for adolescent population (medium intake in study population 913.58 mg). After analyze the levels of BMD we found that a 27.4% of adolescents included in the study showed low levels of BMD in both legs (T-score less than -2.5 SD). Interestingly we observed a statistically significant relation between BMD levels and daily Ca intake ($p < 0.0001$).

Conclusions: Our results reveal that the percentage of healthy adolescents at risk of osteoporosis is worrying. In addition, we observe that low daily Ca intake is related with low levels of BMD.

Key words: calcium intake, bone mineral density, adolescent.

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PO2287

BONE MINERAL DENSITY AND PHYSICAL ACTIVITY ARE RELATED IN SPANISH ADOLESCENTS

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Background and objectives: Levels of bone mineral density (BMD) in adolescence is of great relevance to prevent osteoporosis in adult age. However, only a few studies have been performed to evaluate the bone mineral density in healthy ado-

lescents and none of them has assessed the relation between BMD and physical activity level. The aims of this study were evaluate BMD in a group of healthy adolescents and investigate the influence of physical activity in BMD levels.

Methods: Study population was composed of a total of 227 healthy adolescents (12-17 years) recruited in three secondary schools from Granada (Spain). Physical activity levels were assessed with the validated questionnaire "Krece-Plus". BMD was evaluated through a dual-energy X-ray absorptiometry (DEXA) measurement at both calcanei. Data analysis was performed using the SPSS software.

Results: Statistically significant differences were found when analyzing physical activity levels by gender (good physical activity levels in boys 33% compared to 23% in girls; p = 0.001). Most of adolescents included in the study showed good levels of BMD, however we observed that the number of girls with BMD levels at osteopenia was double than in boys (p = 0.009).

Conclusions: Our results suggest that physical activity level could influence BMD acquisition, since the worse level of physical activity in girls seems to correlate with worse levels of BMD (osteopenia).

Key words: physical activity, bone mineral density, adolescence.

Acknowledgements: This work was supported by grant of the "Campus de Excelencia Internacional Proyecto GREIB", subprogramme START-UP PROJECTS FOR YOUNG RESEARCHERS (GREIB.PYR_2011_27)

PO2288

IMPACT OF OBESITY AND PHYSICAL INACTIVITY ON FASTING BLOOD GLUCOSE, LIPID PROFILE AND HOMEOSTATIC MODEL ASSESSMENT (HOMA) AMONG CHILDREN

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Background and objectives: Obesity in children seem to be on the rise to become a significant public health problem. Excess adiposity is more than just a cosmetic problem, having substantial metabolic consequences. Insulin resistance, hyperinsulinemia, impaired fasting glucose, and frank diabetes are often seen in obese children. Aim of the study is to illustrate the impact of overweight and obesity on fasting blood glucose level and lipid profile among children, to test for the presence of insulin resistance among those with glucose and lipid disorders and to clarify the association between overweight, obesity in one hand and physical inactivity and bad dietary habits on the other hand.

Methodology: A cross sectional study included 200 child aged 2 -12 years was done to screen for plasma glucose, lipid profile and insulin abnormalities. They were assessed by interview questionnaires, anthropometric measures and by measuring their fasting blood glucose and plasma lipid levels.

Results: The risk for having high triglycerides and low HDL levels is more than double among obese children compared to non-obese. Physically inactive children have 7.8 times the risk for obesity compared to active children. Significant high percentages among obese as regards prediabetes state and insulin resistance. The consumption of unhealthy snacks was higher than vegetables and fruits regardless of BMI.

Conclusions: High BMI predisposes children to many of the medical complications of obesity found in adults, in particular components of insulin resistance syndrome: High HOMA –IR, dyslipidemia, and impaired glucose metabolism. Health care providers of overweight children need to pursue efficient screening procedures earlier in the progression of overweight in order to prevent children from developing type 2 DM and cardiovascular diseases.

Key words: screening, risk factors, fasting blood glucose, lipid profile,insulin resistance ,HOMA, children

PO2289

HYPOVITAMINOSIS D AND OBESITY

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Background and objectives: Obesity is a first order sanitary problem and the most frequent nutritional disorder in developed countries during the infancy and the adolescence.

The aim of the present study is to analyze the relation between the levels of vitamin D and the degree of obesity in a sample of children and teenagers from the northwest of Spain.

Methods: This is an observational, descriptive and cross sectional study performed in 466 children and adolescents evaluated in the Pediatric Nutrition Unit of a tertiary hospital, aged between 1.1 and 18.5 years. Those with vitamin D metabolism altered were excluded. The variables studied were weight, height, body mass index (BMI) and vitamin D (25(OH)

D) levels. Patients were stratified according to their BMI, following Cole`s international standards. Serum calcidiol levels were determined by immunoassay, defined as suitable for cellular health (>30 ng/mL), suitable for bony health (>20 ng/mL), insufficiency (15-20 ng/mL) and deficiency (<15 ng/mL).

Results: 25 (OH) D levels are negatively correlated with BMI (p = 0.005), so that the risk of hypovitaminosis D is increased in case of obesity. Serum calcidiol levels are significantly lower in obese subjects than in not obeses ones (26.51 ± 14.65 ng / mL vs 32.30 ± 18.91 ng / mL, p = 0.023). 20.4% of children and teenagers with obesity present 25(OH)D levels <15 ng/mL, opposite to 14 % of those with suitable weight. By contrast, the percentage of children with 25(OH)D >30ng/mL is lower in obese children (30.1 % vs 43.9 %).

Conclusions: Obesity seems to be a risk factor of hipovitaminosis D, and for not reaching the recommended levels that ensure cellular health. Therefore, we believe it would be interesting to determine vitamin D levels in obese children and adolescents, in order to establish appropriate intervention strategies.

Key words: Obesity, hypovitaminosis D, cellular health.

PO2291

PREDICTORS OF WEIGHT LOSS AND/OR WEIGHT LOSS MAINTENANCE: AN INTERNET BASED SURVEY

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Background and objectives: Overweight and obesity are amongst the major public health problems in our society affecting 30-80% of people in Europe with health care costs rising to £50 billion per year by 2050 in the UK alone. Current interventions are ineffective in the long term with most people regaining their weight loss within 5 years. Relapse is often due to poor behavioral adherence but predicting those susceptible to relapse is difficult. This study aimed to identify predictors of weight loss and/or weight loss maintenance in free-living individuals (male and female) who have previously attempted to lose weight using dietary, exercise, behavioral or other methods.

Methods: Over 500 participants completed an online survey which recorded demographic characteristics, details of weight loss strategies and body weight trajectory over the previous 6 months following dieting attempts. Validated psychological questionnaires to assess psychological and behavioral traits and eating behavior and diet satisfaction were completed.

Results: The relative contributions of individual, behavioral and psychological characteristics, which predict weight loss and/or weight loss maintenance were examined using multiple regression and structural equation modelling techniques. Body shape perception, eating behavior traits, diet satisfaction, depression, anxiety, stress and dichotomous thinking style were predictors of weight loss and /or weight loss maintenance with complex interactions depending on the weight loss methods, age and gender.

Conclusions: Obesity is a heterogeneous condition and different physiological, environmental and psychological factors interact to predict post intervention weight trajectory. Improving a person's ability to lose weight and prevent weight gain in the long term remains a major challenge. Identifying the predictors of weight loss and/or weight loss maintenance will enable prescription of tailored interventions with greater likelihood of long term success.

Key words: weight loss, predictors, psychological characteristics, internet survey.

PO2292

ANTHROPOMETRIC EVOLUTION IN PEDIATRIC PATIENTS TREATED WITH HOME ENTERAL NUTRITION

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Background and objectives: Home enteral nutrition (HEN) is an important treatment for children with chronic diseases or feeding problems. It is a safe and effective therapy that may improve weight and growth. Our objectives were to describe the characteristics of pediatric patients requiring HEN and analyze the improvement in weight gain, by body mass index (BMI)-forage Z-score, and improvement in growth, by height-for-age Z-score after treatment.

Methods: All patients under 18 years old requiring treatment with HEN between January 1995 and December 2004 were analyzed retrospectively.

Results: Two hundred seventy-six patients were studied. The mean age at the start of treatment was 4.04±4.07 years, median of 2.5 years. 104 patients (37.7%) were younger than 18 months. The most common indications were oncological disease in 87 patients (31.5%), followed by digestive disease in 82 (29.7%) and neurological disorders in 53 (19.2%). The mean duration of support was 293±530 days. Nutrients were delivered mainly by nasogastric tube in 202 patients (74%). All patients improved their BMI with a statistically significant increase (F = 20,847, p = 0.0001). The mean BMI for-age Z-score at baseline was -1.26 (SD = 1.94), and at the end of treatment was -0.50 (SD = 1.67). Height for age Z-score at baseline was -1.33 (SD = 1.74), and at the end was -1.10 (SD = 1.84), height improved in all patients (F = 13,406, p = 0.0001). Both, Z-BMI and Z-height increases were associated with the duration of the support. Z-BMI changes were similar in all diagnostic groups but in Z-height we observed variations depending on the diagnosis.

Conclusions: The longitudinal anthropometric assessment conducted after the implementation of HEN shows a statistically significant increase in the height and BMI Z-scores for age.

Key words: home enteral nutrition, children, body mass index, height.

PO2293

DOWNREGULATION OF EPIDERMAL GROWTH FACTOR RECEPTOR BY CURCUMIN-INDUCED UBE1L IN LUNG CARCINOGENESIS

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Background and objectives: UBE1L, ubiquitin activating enzyme E1-like, is the activating enzyme of ISG15ylation. Loss of UBE1L and activation of epidermal growth factor receptor (EGFR) signaling are common events in lung carcinogenesis. Curcumin, known as a chemopreventive agent, was able to down-regulate EGFR. In the present study, a novel chemopreventive mechanism of curcumin was explored as curcumin could UBE1L which down-regulated EGFR and its downstream signaling in lung carcinogenesis.

Methods: Human bronchial epithelial (HBE) Beas-2B cells and lung cancer A549 cells were used as the cell models. Immunoblot analysis and reverse transcription-polymerase chain reaction was used to measure the EGFR and other protein and mRNA expression respectively. Immunoprecipitation and pull down analysis were used to detect the ISGylation. Transient transfection of UBE1L and siRNA targeting UBE1L were for overexpression and knockdown of UBE1L. EGFR internalization analysis was performed. Lung cancer tissues and adjacent tissues were collected from patients. The relative proteins expressions in the tissues were analyzed.

Results: Curcumin decreased EGFR expression in HBE Beas-2B cells and A549 cells. For the first time, UBE1L was found to be induced by curcumin in HBE cells. Interestingly, overexpression of UBE1L reduced EGFR at post-translational level in HBE cells. UBE1L triggered EGFR membrane internalization and promoted a complex between ISG15 and EGFR. Curcumin decreased EGFR downstream signaling pAKT and NF-kB. Overexpression or knockdown of UBE1L also resulted in down-regulation or up-regulation of PI3K/AKT/NF-kB correspondently. There was a reverse relationship between UBE1L and EGFR-AKT-NF-kB in non-small cell lung cancer tissues and adjacent tissues.

Conclusions: These results uncover a novel chemopreventive mechanism of curcumin which induce UBE1L and downregulate EGFR signaling in HBE and lung cancer cells.

Key Words: Curcumin; UBE1L; EGFR.

PO2294

PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG HIV-INFECTED PATIENTS IN DAR ES SALAAM, TANZANIA

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Background and objectives: Overweight and obesity are increasingly prevalent among HIV-infected populations in Sub-Saharan Africa. We describe the prevalence of overweight

and obesity, and associated risk factors, among HIV-infected adults in Dar es Salaam, Tanzania.

Methods: A cross-sectional study of HIV-infected adults was conducted at enrollment into the Harvard PEPFAR- supported Management and Development for Health (MDH) HIV care and treatment program from 2004-2011 to determine the proportion of patients who were overweight or obese. Multivariable relative risk regression models were fit to identify risk factors.

Results: 53,825 patients were included in the analysis. Median age was 35 years, median BMI was 22, and 69% were female. The proportion of women and men who were overweight was 21% and 12% and obese was 9% and 3%, respectively. 47% of the overweight and obese patients had CD4+ cell counts < 200 cells/mm3 and 58% had WHO HIV stage III or IV. In multivariable analyses, compared to patients aged <30, the prevalence ratios for obesity among patients aged 30-<40, 40-<50, and >50 were 2.0 (95%CI: 1.8-2.2), 3.0(95%CI: 2.7-3.3) and 3.2(95%CI: 2.8-3.7), respectively (P for trend < 0.0001). Compared to men, women had an almost 5-fold increased risk of obesity. CD4+ cell count and hemoglobin were positively associated with obesity and overweight and WHO HIV disease stage was negatively associated with obesity and overweight.

Conclusions: Overweight and obesity were highly prevalent among HIV-infected patients. Given the adverse health consequences associated with obesity, screening for overweight and obesity and focused interventions should be integrated into routine HIV care.

Key words: obesity, overweight, HIV.

PO2295

LIQUIRITIGENIN INHIBITS SERUM-INDUCED HIF-1α AND VEGF EXPRESSION VIA THE AKT/MTOR-P70S6K SIGNALLING PATHWAY IN HELA CELLS

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Background and objectives: Tumor angiogenesis plays an important role in the tumor growth, invasion and metastasis. Abundance studies have demonstrated that many flavonoids have antiangiogenesis effects. Liquirigenin(LQ) is a flavanone existed in Radix glycyrrhizae glycyrrhizae, with the polyphenolic structure. The objective was to investigate the anti-angiogenesis effects of LQ on angiogenic growth factors VEGF and HIF-1α in human cervical carcinoma (HeLa) cells and study the mechanism of the effects on the gene expression and PI3K/AKT/mTOR-p70S6K and ERK1/2 pathways.

Methods: RT- PCR was used to detect mRNA levels of VEGF and HIF-1α. The protein levels of VEGF, HIF-1α, PI3K/AKT/mTOR-p70S6K and ERK1/2 pathways were detected by western blot, and the degradation and synthesis of HIF-1α protein were detected.

Results: (1) HeLa cells were treated with LQ (25, 50, 75 and 100 μM) for 12h, the expression of VEGF at the protein and mRNA levels were both decreased, and the HIF-1α protein accumulation was inhibited, but no obvious effects on HIF-1α mRNA were observed. (2) HeLa cells were treated with cycloheximide (CHX) or proteasome inhibitor MG132, LQ reduced HIF-1α protein accumulation by reducing its stability and decreasing its synthesis. (3) LQ inhibited the PI3K/AKT/mTOR-p70S6K pathway in HeLa cells. To further confirm the result, HeLa cells pretreated with PI3K inhibitor LY294002 and p70S6K inhibitor Rapamycin, respectively, the expression of VEGF and HIF-1α which mediated by PI3K/AKT/mTOR-p70S6K pathway were also decreased. The results were consistent with the previous study, but there was no obvious inhibitory effect on ERK1/2.

Conclusions: LQ inhibited angiogenic growth factors VEGF and HIF-1α expression in HeLa cells and the molecular mechanism was related to PI3K/AKT/mTOR-p70S6K signaling pathway.

Key words: Liquiritigenin (LQ), VEGF, HIF-1α, PI3K/AKT/mTOR-p70S6K.

PO2296

FEEDING PROBLEMS OF THE DIABETICS AND ITS IMPLICATIONS IN THE TREATMENT OF DIABETES IN IDEMILI NORTH L.G.A OF ANAMBRA STATE, NIGERIA.

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Background and objectives: Obtaining information on the knowledge and practices of a target group is essential for the development of effective health education programs. This study was conducted to investigate the feeding problems of the diabetic patients and its implications in control and management of diabetes in Idemili North Local Government Area of Anambra State,Nigeria.

Methods: Selected towns and hospitals were visited and questionnaires were administered personally to the respondents and collected back after completion. Data on feeding pattern of diabetics, types of food eaten andproblems encountered with their feeding practices were captured. Interpretation of data was done using percentage, mean for score percentage. Monte Carlo proportion was used to compare right answers.

Results: The result shows that the major problems the respondents encounter with their feeding is the high cost of their food items (100%), 90% indicate that the foods are seasonal, 50% indicate that the foods are scarce in the market, 83.3% indicated that the foods needed are highly perishable and 40% indicate that some foods are not easily prepared. Seventy-seven percent (77%) admitted that the guide or advice was given them by a medical doctors, 4% by pharmacist; 14% by dietitian while 5% by nutritionist. Nineteen percent (19%) of the respondents reported that they had been seen by dietitians or nutritionist while 81% had never been seen since their diagnosis. 100% of the foods listed in the questionnaire were taken without restriction, because they were not properly guided they eat whatever they believed was good for them.

Conclusions: Findings of the study suggest the need for health education programs by Nutritionist, taking care to reach the grassroots disseminating information on the importance of meeting the Nutritionist and Dietitians for proper diet guides on how to make the food items readily available.

Key words: Diabetes, Nigeria, health education.

PO2297

NUTRITIONAL STATUS ASSESSMENT OF CELIAC CHILDREN FROM THE BASQUE COUNTRY

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Background and objectives: Celiac disease is a common digestive disorder that appears at any age from childhood onward. The only effective treatment consists on a lifelong strict gluten-free diet, which can affect the nutritional status and growth of celiac children. Thus, we aimed to assess the nutritional status of celiac children by analyzing their body and diet composition.

Methods: 32 celiac children, up to 14 years (8.2±2.7 years), from Basque Autonomous Community were recruited. Height, weight and body composition (by electrical impedance) were measured. Children completed three pass 24-hour dietary recalls and energy consumption and macronutrient distribution of their diet were analyzed.

Results: Celiac infants presented a BMI=17.3±2.5 kg/m2. Nobody was obese, most of the children were under P50 and 91% within normality ranges (P15-P85). Although only 9% of them had a high value of BMI, when fat mass was measured more than 20% (n = 7) of the infants had an excess of fat mass (> 25%). With regard to diet composition, the majority of participants met the recommendations of energy intake (2029±465 kcal). Macronutrient distribution was as follows: protein intakes slightly exceed distribution ranges (16.2±2.1%), carbohydrate intake was insufficient (43.0±4.9%) and high fat intakes (40.7±4.3%) were observed. Dietary cholesterol was very high (284±93 mg) in the vast majority of children.

Conclusions: Body weight and fat mass were slightly lower than those observed for general population. Overall, children from this study did not meet recommendations of the balanced diet, mainly due to insufficient carbohydrate intake. Thus, specific tools for nutritional education need to be developed in order to improve eating habits and nutritional status among celiac children.

Key words: celiac, body composition, macronutrient distribution.

PO2298

EVALUATION OF BODY COMPOSITION AND DIETARY BEHAVIOUR IN ADULT CELIAC WOMEN FROM THE BASQUE COUNTRY

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Background and objectives: Celiac disease is one of the most common digestive disorders in Western countries. The only current treatment for this disease consists on a lifelong strict gluten-free diet (GFD), which can often represent an unbalanced diet. Thus, we aimed to evaluate the nutritional status of a group of adult celiac women following a GFD, by anthropometric and food consumption analyses.

Methods: 47 adult celiac women from the Basque Country took part in the study (age=37±12 years). Weight and height were measured. Bioelectrical impedance was used for body composition analysis. Food Frequency Consumption Questionnaires were collected from each patient.

Results: Celiac women showed a BMI=21.6±2.4kg/m2 and none of the analyzed patients were obese. Body weight and body fat mass were inside the normality ranges for most of them (87% and 73% respectively). With regard to food consumption, dairy products and fruit intakes met the recommendations of an equilibrated diet. 79% of the women consumed an excessive amount of meat portions/week and only half of the patients ate enough fish. Gluten free cereals or gluten-free rendered foods consumption was very low (47% consumed less than 2 portions/day). Whereas vegetables consumption was not enough, legume consumption was higher than that observed in the Spanish population (2 portions/week) in 2/3 of the patients. Nevertheless, dietary fiber consumption was very low (16.4±5.7g/day).

Conclusions: Celiac women showed a lower body weight and fat mass, and thus lower obesity incidence, when comparing to the general population. Although a wide diversity of gluten free cereals exists in the market, the consumption of these foods, and thus that of complex carbohydrates, was very low in the studied patients. Thus, strategies for nutritional education need to be developed in order to improve eating habits among adult celiac women.

Key words: Body composition, Celiac, Food Consumption.

PO2299

EFFECT OF ALMOND SUPPLEMENTATION ON THE CARDIO-VASCULAR RISK FACTORS IN TYPE 2 DIABETES

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Background and objectives: Asian Indians are at a high risk for development of the metabolic syndrome and type 2 diabetes mellitus (T2DM). Cost effective strategies focusing on correct nutrition can help in lowering the cardio-vascular risk factors. Some studies indicate beneficial effect of almond supplementation on human health. However, no data is available on use of almonds in dyslipidemia and T2DM among Asian Indians. Hence, the present study was planned to investigate the effect of almond supplementation along with lifestyle management (including energy controlled diet) on cardio-vascular risk factors of Asian Indians with T2DM.

Methods: This prospective twenty four-week observational cohort study was conducted in 50 T2DM patients (LDL-C levels > 100 mg/dL) in New Delhi, India. The intervention was preceded by a diet and exercise run-in period of 3 weeks. All the patients were followed up for 6 months to study the long term effects of almond supplementation. Raw almonds (20% of energy intake) were provided to the patients for consumption along with diet and physical activity counseling. Patients were assessed for anthropometry, blood pressure, measures of glycaemia (fasting blood glucose (FBG), glycosylated hemoglobin (HbA1C), lipids [total cholesterol (TC), triglycerides (TG), high density lipoprotein cholesterol (HDL-c), low density lipoprotein cholesterol (LDL-c), lipoprotein (a) (Lp (a))], fatty liver, surrogate marker of atherosclerosis (Pulse Wave Velocity), and marker of inflammation (hs-CRP) at baseline and after intervention period.

Results: Statistically significant difference in mean values for various parameters and percent improvement post intervention were as follows: WC ($p < 0.03$, 1.6%), waist-to-height ratio ($p < 0.005$, 1.6%), TC ($p < 0.002$, 6.9%), TG ($p < 0.004$, 12.3%), glycosylated hemoglobin ($p < 0.4$, 5.2%) and hs-CRP ($p < 0.01$, 20%). Remarkable improvement was observed for pulse wave velocity ($p < 0.06$, 3.7%) post intervention.

Conclusions: Intervention with almonds led to reduction in cardio-vascular risk factors in Asian Indians with T2DM.

Key words: CVD, almonds, Indians, T2DM.

PO2300

DETECTION OF S-(2-SUCCINYL) CYSTEIN (2SC) IN ADIPOCYTES AND IN SERUM BY LC-MS/MS AS A MARKER FOR ADIPOSE TISSUE METABOLISM

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Background and objectives: S-(2-Succinyl) cysteine (2SC) is formed by reaction between thiol group of proteins and fumarate of the Krebs cycle intermediate, a process termed succination of protein. We previously demonstrated that 2SC significantly increased during maturation of 3T3-L1 fibroblasts to adipocytes. Fumarate concentration increased > 5-fold during adipogenesis in medium containing 30 mm glucose, producing a > 10-fold increase in 2SC-proteins in adipocytes compared with undifferentiated fibroblasts grown in the same high glucose medium. Furthermore, several of the prominent and well resolved proteins such as adiponectin, cytoskeletal proteins, enzymes, heat shock and chaperone proteins were identified by matrix-assisted laser desorption ionization time-of-flight/time-of-flight mass spectrometry. However, little is known about the presence of 2SC in serum. In the present study, we have measured 2SC level by liquid chromatography tandem mass spectrometry (LC-MS/MS) in serum.

Methods: Murine fibroblasts (3T3-L1) were cultured on 10-mm plates in basal Dulbecco's modified Eagle's medium containing 5 mM D-glucose supplemented with 10% fetal bovine serum. Differentiation of confluent fibroblasts into adipocytes was induced by the addition of dexamethasone, 3-isobutyl-1-methylxanthine, insulin, and glucose in complete culture medium for 2 days. This mixture was then replaced with basal medium containing a 25 mM glucose and insulin for a further 2-8 days. Human serum was hydrolyzed in 6 M hydrochloric acid at 100 °C for 24 h. The samples were dried in vacuo, and brown materials were removed by application to a

C-18 Sep Pak column, followed by elution of polar amino acids with H2O and then analyzed by LC-MS/MS on a TSQ Vantage (ThermoFisher Scientific).

Results: 2SC was detected in human serum as well as matured adipocytes by LC-MS/MS.

Conclusions: This result demonstrates that the metabolic condition of adipocyte could be estimated by measuring 2SC in serum sample.

Key words: Adipocyte, obesity, diabetes, succination, post-translational modification.

PO2301

THE EFFECT OF COMBINATION OF LAURIC AND OLEIC ACIDS ON LIPOTOXICITY

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Background and objectives: Long-chain saturated fatty acids such as palmitic acid (PA) have been reported to induce cell death (lipotoxicity), which is attenuated by supplementation of unsaturated fatty acids such as oleic acid (OA). Medium-chain saturated fatty acids such as lauric acid (LA) have little effect on lipotoxicity which is promoted by OA, however it is unclear how the combination of LA with OA induces cell death.

Methods: Fatty acids (LA with OA, or PA alone)-induced cell death of human fibrosarcoma-derived HT1080, lymphoma-derived Jurkat and hepatoma-derived HepG2 cells were analyzed by MTT assay. The reactive oxygen species (ROS) production, mitochondrial deporalization, caspase-3 activation and lipid droplet formation of these cells were detected by using fluorescent probe or substrate, and the fluorescent intensities in each cells were analyzed by flow cytometry. Fatty acid uptake was analyzed by counting intracellular 14C-fatty acid.

Results: The treatment of LA with OA dramatically decreased the cell viabilities of several cell lines (Jurkat, HepG2, HT1080). While the cell death accompanies ROS production, mitochondrial deporalization, caspase-3 activation in Jurkat cells, they were not seen in HepG2 and HT1080 cells. The lipid droplet formation was increased in all these cells by LA with OA but not PA alone. LA also markedly promoted uptake of OA.

Conclusions: These results suggest that LA increase the uptake of OA and the excess amount of intracellular OA induce cell death by lipotoxic stress response which vary by cell type. ·

Key words: Fatty acid, lipotoxicity, combination.

PO2302

INSULIN RESISTANCE IN GLUCOSE TOLERANT OBESE ADOLESCENTS ARE ASSOCIATED WITH INCREASED LEVEL OF PLASMA HSCRP AND URIC ACID

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Background and Objectives: The increasing prevalence of insulin resistance and obesity has also affected adolescent. This study aimed to compare the level of insulin resistance and metabolic disorder indicators between obese and non-obese male adolescent.

Methods: Thirty nine male Indonesian adolescent students with no family history of type 2 diabetes were enrolled in this study. They were classified as obese, overweight, and normal weight according to International criteria. After a 12-h overnight fast, blood vein was taken for measurement of fasting blood glucose, insulin, hsCRP, uric acid, and antioxidant status (AOS) and OGTT was performed.

Results: Of 39 subjects 9 were obese, 16 were overweight and 14 were normal weight. Obese subjects were clearly insulin resistant compare to overweight and normal weight subjects evidenced by higher insulin level with value of 14.177±6.921, 6.55±4.72, and 4.48±4.51 respectively ($p < 0.001$) and higher HOMA-IR i.e., 2.66±1.464, 1.193±0.891, and 0.607±0.347 respectively ($p < 0.001$). Interestingly, these were associated with significant higher level of hsCRP and uric acid in obese subjects. Level of hsCRP in obese, overweight, and normoweight subjects were 2.32± 2.23, 1.10±0.43, and 0.56±0.40 respectively ($p < 0.003$). Whereas uric acid level for obese, overweight, and normal weight subjects were 7.406±1.3025, 6.878±1.1959, and 5.704±1.0406 respectively ($p < 0.001$). The values of 2 h-pp blood glucose level during OGTT in obese, overweight, and normal weight subjects were 96.90±17.38, 98.92±17.49, and 90.65±14.46 respectively ($p < 0.433$). Similarly, insignificant difference of AOS was observed between obese, overweight, and normal weight subjects with value of 1.98±0.34, 1.96±0.33, and 1.99±0.35 respectively ($p = 1.232$).

Conclusions: There was a clear association between high IMT with insulin resistance markers and increased plasma uric acid level and are moreover associated with increased level of

plasma hsCRP in male adolescents with normal glucose tolerance.

Key words: adolescents, obesity, insulin resistance, hsCRP, Uric acid.

PO2303

OBESITY AND MASTICATORY EFFICIENCY

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Background and objectives: Obesity is a heterogeneous disorder that involves genetic and phenotypic components, which affect endocrine metabolism and regulatory events of the organism. Actually, it is considered by the World Health Organization as a major and increasing public health problem. The stomatognathic system is responsible for vital functions, such as chewing and swallowing and there is evidence to be less effective in obese people, compared to normal weight individuals. This can be considered another factor that impairs chewing and therefore, the adequate dietary intake of obese individuals. The objective of the present study was verifying the influence of the obesity on the eletromiographic activity, bite strength and masticatory efficiency.

Methods: Were included in this study 28 subjects, all female, aged between 24 and 63 years. They were divided into two groups: G1 – obese (14 subjects); G2 – healthy (14 subjects, matched each subject with G1). The masticatory efficiency was evaluated by eletromiographic activity of masseter and temporal muscles, registered in different clinical posture conditions of the mandible, using the EMG Myosystem BR-1 and the bite force, with a dinamometer adapted for oral condition.

Results: The eletromiographic averages showed statistically significant differences (test t of Student, $p < 0,05$) for the rest, right and left laterality and protrusion conditions and the higher values were from the obese group. In the evaluation of maximal molar bite force and the mastication, the obese subjects showed lower values in both activities, with results statistically significant.

Conclusions: The eletromiographic results showed that for the obese individuals maintain the positions of the jaw postural, they requested more muscle fiber trigger, compared with healthy subjects. Furthermore, lower values in bite force, lead to the conclusion that obesity directly affects the function of the masticatory system, reducing the mastication efficiency.

Key words: Obesity, stomatognathic system, masticatory efficiency.

PO2304

"KIDS IN MOTION" PROGRAM FOR OBESE MEXICAN POPULATION: A CASE REPORT

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Background and objectives: Currently, Mexico has the highest prevalence of childhood obesity worldwide. It is necessary to address effective interventions, proven and culturally adapted to the Mexican population. This case study documents the effect of the Spanish program 'Kids in Motion', that aims to cause changes in the child and their family, in lifestyle, eating habits and emotional factors that contribute the weight gain.

Methods: Group of ten Mexican children, diagnosed as overweight or obese according to WHO standards. The three-month intervention consisted of 11 group sessions where children worked through fairy tale as symbolic framework, included activities such as drawing, music, dancing and games. The main topics were: nutrition, food false advertising, body image, communication, conflict resolution, assertiveness, self-esteem, relaxation and physical activity. The evaluation compared the variables: BMI, waist circumference, food intake, physical activity, anxiety, depression, body image and self-esteem. After the intervention the participants were interviewed and joined a focus group.

Results: Discrete changes (10%) in abdominal circumference of children and their mothers. The main changes were reported in daily habits such as increased consumption of vegetables (15%), skim milk (30%) and slowly absorbed carbohydrates (32%). Decreased the consumption of foods and beverage high in sugar (soft drinks 23%). Participants learned to work by goals, being the easiest: try new vegetables for a week, and the most difficult: to do 30 minutes of physical activity every day. The interviews highlighted that the intervention was successful in children's self-esteem and improved communication skills of parents.

Conclusions: The program had a positive effect. Need to be modified for Mexican population: language, exercises of as-

sertiveness in parents and to include available Mexican food. The symbolic framework caused enthusiasm and impact in children, who immediately identified with the story and its characters.

Key words: child obesity, psychology intervention, Mexico.

PO2305

APLLICATION OF NUTRITION CARE PROCESS FOR HIV POSITIVE PATIENTS IN INDONESIA: AN EXPLORATORY STUDY

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Background and objectives: Nutrition care process is a standardized process utilized by professional dietitians and serves as a framework for decision making and problem solving in nutrition. The activity includes four critical tasks; nutrition assessment, diagnosis, intervention as well as monitoring and evaluation. It is a guideline to provide proper nutrition care for patients. Nutrition plays a significant role on treating patients with HIV and AIDS. It should be an integral element of hospital care to ensure that HIV positive patients get the benefit of treatment. The main objective wasto evaluate the implementation of nutrition care process for HIV positive patients in HIV referral hospitals in Yogyakarta, Indonesia.

Methods: This study was a qualitative research using an exploratory study design done in five HIV referral hospitals in Yogyakarta, Indonesia between September and October 2012. There were 34 dietitians participated in the study comprising of dietitians who work in the decision-making process (structural level) as well as in the operational level. Information was obtained from an in depth interview with respondents and recorded at verbatim.

Results: This study found that four out of five HIV referral hospitals in Yogyakarta have set a guideline for nutrition care that complies with the NCP principles. However, there were only 85.3% of dietitians working in those hospitals aware of the guideline. In terms of nutrition care for HIV cases, some hospitals have set instruction for HIV general treatment and protection to staffs, though; most dietitians in the operational level were unaware of the guideline. Yet, no HIV referral hospitals in Yogyakarta have clear protocols for HIV-nutrition treatment.

Conclusions: NCP has been implemented in HIV referral hospitals in Yogyakarta, Indonesia; nonetheless, an individualized nutrition protocol for HIV cases is still unavailable.

Key words: nutrition care process, HIV, patients, exploratory study

PO2306

THE MAGNITUDE OF OVERWEIGHT AND OBESITY AMONG UNDER-FIVE CHILDREN IN IDO AND IBADAN NORTH LOCAL GOVERNMENT AREAS NIGERIA

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Background and Objectives: Childhood obesity is one of the most serious public health challenges of the 21st century. The problem is global and is steadily affecting many low and middle-income countries, particularly in urban settings. It is associated with an increased risk of adult obesity, which is a major risk factor for chronic diseases. However there is dearth of information on childhood obesity in Nigeria. It is against this background that this study was conducted to determine the prevalence of obesity among under-five children in Ido and Ibadan North Local Government Areas (LGA), Nigeria.

Methods: A four stage random sampling technique was used to select 450 under-five children from Ibadan North (Urban settlement) and Ido LGAs (Rural settlement) of Oyo State, Nigeria. A pre-tested, interviewer administered semi-structured questionnaire was used and anthropometric indices of weight and height measured according to the international standards were used to calculate the body mass index for age. The classification of overweight and obesity was based on World Health Organization growth standard.

Results: The total mean age of the children in the Study was 29.8±17.0 months (Ibadan North=29.1±16.8, Ido= 31.9±17.4 months) with 52.6% being Female. The magnitude of overweight and obesity in the LGAs were 14.4% and 20.2% respectively (Ibadan North= 17.2% and 22.1%, Ido= 5.0% and 13.9%) while underweight, wasting and stunting were 4.9% and 16.8%, 2.9% and 11.9% and 28.9% and 38.6% in Ibadan North and Ido respectively.

Conclusions: The study shows a significant difference ($p < 0.05$) between the urban (Ibadan North) and rural setting (Ido LGA)as the prevalence for overweight and obesity were almost 3.5 times for overweight and two times for obesity higher in the Urban than rural LGA, emphasizing the need for timely nutritional and educational interventions to prevent associated morbidity and mortality.

Key words: obesity, overweight, magnitude, under-five, children

PO2307

LIFESTYLE INTERVENTIONS IN OBESITY TREATMENT

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Background and objectives: Weight reduction can be achieved in several ways but dietary regime, moderate physical activity and behavior modifications remain the current fundament of obesity treatment. Weight-loss maintenance is more successful if diet and exercise are accomplish in groups formed by similar body weight (BW), health status and nutritional habits with constant medical support.

Methods: This ongoing intervention study include participants with BMI > 30. Next measurements and tests were conducted at the beginning and end of three months program: body composition, anthropometry, waist circumference, blood pressure (TA), ergospyrometry, blood analyses, diet record, Beck Depression Inventory (BDI), Pittsburgh Sleep Quality Index (PSQI) and International Physical Activity Questionnaire (IPAQ). Lifestyle changes include diet regime with meal replacement, nutrition education with group workshops and moderate physical activity. Regular controls are conduct by physician.

Results: First group of 13 participants aged 46.2±12.0 y had average BMI 36.6±5.8 kg/m2, mean BW 109.0±24.9 kg and body fat percentage (F%) 38.2±6.6 at the start of program. 80% had metabolic syndrome and 50% hypertension. Mean VO2 max (21.6±4.7 ml/kg/min) indicated a low body shape that is confirmed with IPAQ low level of physical activity. Half participants was rated as 'poor sleepers'. At the start depression was observed in three patients. Significant difference at the end of program existed for: BW (106.5±24.3kg), BMI (35.6±5.5), body fat mass (2.5±21.1kg), F% and fat mass in both arms. Systolic TA were significantly lowered for 21.8±11.9 mmHg and diastolic for 20.7±12.0 mmHg. Fat free mass did not change.

Conclusions: Lifestyle interventions in this program lead to reduction in BW without health consequence. Program caused a significant change in the body composition, morphological and nutritional status but still requires further evaluation of additional participants.

Key words: obesity, life style, meal replacement.

PO2308

PROTEIN AND CALCIUM INTAKE AND ITS RELATIONSHIP WITH BONE REMODELING MARKERS DURING THE REPRODUCTIVE AGING OF WOMEN

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Background and objectives: Calcium and protein are components of bone tissue, and are related to bone mass peak and formation of bone matrix, respectively. The study evaluated dietary protein and calcium intake and its relationship with bone remodeling markers in different stages of the reproductive aging of women.

Methods: Food record method was used to assess food intake and body mass index (BMI) was also calculated. Serum osteocalcin (OC) and urinary deoxypyridinoline (DPD) were determined. Women were divided into four groups according to information about their menstrual cycle or amenorrhea, and hormonal profile (serum follicle stimulating hormone and estradiol). The serum concentrations of parathormone, 25-hydroxyvitamin D and serum calcium demonstrated that the bone metabolism of the participants appeared to be in homeostasis. It was performance linear regression and ANOVA with the aid of the SAS 9.2 software (p value < 0.05).

Results: The study was conducted on 42 healthy women aged 42 to 64 years. According to BMI, 52% of the women were overweight. Dietary intake above recommended values was observed for protein (median = 0.86 g/kg current weight/day; range = 0.52-2.05 g/kg current weight/day) and phosphorus (median = 827.93 mg/day; range = 343.6-1282.07 mg/day), while intake below recommended values was observed for calcium (median = 632.44 mg/day; range = 82.17-1185.28 mg/day) and magnesium (median = 170.62 mg/day; range = 94.93-293.64 mg/day), according to the Dietary Reference Intake (DRI) recommendations. Models of linear regression analysis showed that after adjustment for the factors inherent to the groups, protein and calcium intake was found to be negatively associated with OC concentrations.

Conclusions: Despite the associations detected between nutrients and bone formation marker, the present results suggest that the hormonal variations occurring during reproductive aging in women have a greater impact on their indicators of bone health.

Key words: protein, calcium, menopause. bone markers.

PO2309

INCREASING WHOLE GRAIN FOOD CONSUMPTION SEEMS TO BE A PROMISING STRATEGY IN PROMOTING WEIGHT LOSS IN OVERWEIGHT OR OBESE ADULTS.

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Background and objectives: Epidemiological data indicate that a diet rich in whole grains is associated with lower BMI, waist circumference and risk of being overweight. On the other hand, few intervention studies have examined the effect of whole grain intake on body weight regulation of overweight or obese individuals. The majority of these trials have examined that as part of a hypocaloric diet. Aim of the present study was to explore the effect of increasing the consumption of whole grain foods, on body weight of overweight or obese adults, in the absence of calorie restriction.

Methods: Thirty apparently healthy overweight or obese adults (53% men, BMI range 25.2-30.7kg/m2) participated in a two-month dietary intervention. Anthropometric and dietary characteristics were assessed at the begging and at the end of the study. After baseline evaluation, all participants were informed about the recommended consumption of whole grain foods and were randomized into two groups: 1) Control group (CG) (n = 15), 2) Whole grain group (WG) (n=n = 15). Participants of the CG received no other contact until the end of the study. Participants in the WG received nutritional counseling, aiming at the increase of consumption of whole grain products, provided in 7 weekly small-group sessions, until the end of the study.

Results: At the end of the study, the two groups differed in the changes of consumption of all whole grain foods evaluated ($p < 0.002$), as well as in body weight changes ($p = 0.030$). In specific, patients in the WG decreased their body weight (85.4±13.1 vs. 84.8±12.3 kg, $p = 0.016$) whereas patients in the CG maintained it (80.1±10.2 vs 80.3±9.4 kg, $p = 0.55$).

Conclusions: Increasing whole grain food consumption seems to be an effective strategy in promoting body weight loss in overweight or obese people in the absence of calorie restriction.

Key words: whole grains, obesity, group counseling, weight loss.

PO2310

EFFECT OF NUTRITIONAL COUNSELING BASED ON QUALITY AND QUANTITY OF CARBS ON METABOLIC PARAMETERS IN INSULIN-RESISTANT ADOLESCENTS (IR)

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Background and objectives:: currently, nutritional counseling to treat Insulin Resistance (IR) is based on counting carbohydrates (CHO). Objective: To compare the effect of nutritional counseling based on carbs quantity v/s nutritional counseling based on both quality and quantity of carbs.

Methods: Seven female individuals were studied, from 14 to 18 years old suffering from IR, treated exclusively with diet and/or Metformin. The adolescents were subjected to two nutritional interventions: the first based on counseling on carbs quantity and exchange portions (conventional treatment) and the second based on counseling regarding quality of carbs, using glycemic index (GI) as the backbone of the intervention. Besides, a third session was included to evaluate outcomes. Variables studied were: glycaemia, insulinemia and weight. Through a 24 hour reminder GI and g of carbs of the diet were obtained in the two periods of intervention. Results were tabulated and processed by SPSS software version 18.0. To determine significant differences between both interventions ANOVA of repeated samples and DMS Test were used. It was considered significant $p < 0.05$.

Results: insulinemia ($p = 0.049$) as well as GI ($p = 0.005$) had a significant decrease in time considering both interventions. By comparing the effect of quality and quantity based counseling with the one only based on quantity of carbs, showed a BMI ($p = 0.032$), insulinemia (0.027) and GI (0.008) all of them had a significant decrease.

Conclusions: the current research shows that carbs quality counseling should be included in IR treatments.

Key words: Insulin resistance, glycemic index, carbohydrates, insulinemia, glycaemia.

PO2311

RELATIONSHIP BETWEEN ENERGY INTAKE, BODY COMPOSITION AND RISK OF HYPERTENSION IN AN ADULT MALE PUNJABI MIGRANT POPULATION IN KENT, UK

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Background and objectives: Chronic non-communicable disease (NCD) trends in England show disproportionately higher prevalence of diabetes and hypertension among migrant populations including South Asians and current guidance on primary and secondary prevention appear not to be well tailored and culturally specific. In this study, our objective was to examine relationships between energy intake, body composition and risk of hypertension in a homogeneous migrant adult male population of Punjabi origin in Kent, UK.

Methods: A random sample of 137 free-living apparently (undiagnosed) males aged 21 - 55 years meeting the selection criteria were recruited for the study. Dietary energy intake was satiated from the mean of three repeat 24-hour recalls; physical and physiological parameters were measured. Systolic and diastolic blood pressure (SBP, DBL) were also measured. Body mass index (BMI), Waist and Hip circumference (WC; HC) were used as proxy measures of overweight and obesity (OW+OB). Spearman's coefficient of determination was used to test relationships and single factor ANOVA applied to test their significance.

Results: Mean (±SD) of age, weight, height and BMI, were 37 (7.35) yrs; 86.34 (9.21) kg, 1.74 m(0.07) and 28.22 (2.34) respectively. Mean (±SD) WC, HC and WHR were 88 (5.49) cm, 101 (9.55) cm and 0.87 (0.07). Mean energy intake (EI) was 3201kcal/day (1218.48). An excess intake of 646 kcal/d compared to recommended values for a sedentary population. Mean (SD) SBP and DBP were 135.78 (9.95) and 86.25(5.17) mmHg respectively. Over 91% of subjects were OW+OB with 31.3% with BMI> 30. Despite positive coefficients of determination, ANOVA did not show significance. Significant relationships were established between BMI v. SBP (r2, 0.291; $p < 0.001$); BMI v. DBP (r2, 0.285; $p < 0.001$); BMI v. WC (r2, 0.465; $p < 0.001$); and WC v. DBP (r2, 0.224; $p = 0.008$).

Conclusions: This population is largely sedentary, is overweight and obese and has evidence of pre-hypertension requiring appropriate and culturally tailored intervention.

Key words: Risk of Hypertension, Non communicable diseases, south asian, body mass Index, overweight and obesity.

PO2312

EXERCISE IS A LEPTIN SIGNALLING MIMETIC, AND WHEY PROTEIN INGESTION FACILITATES LEPTIN SIGNALLING IN HUMAN SKELETAL MUSCLE

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Background and objectives: Leptin and leptin receptor (LEPR) polymorphisms have been associated with obesity and muscle hypertrophy. LEPRs are increased in the dominant arm of tennis players. The aim of this study was to determine whether exercise up-regulates the expression of LEPRs and the leptin signaling cascade in arm and leg muscles. **Methods:** Fifteen overweight men first performed 4 days of prolonged exercise (45min of one-arm cranking followed by 8h walking each day) with caloric restriction (0.8 g whey protein (PRO) (n = 8) or sucrose (SU)(n = 7) per kg body weight each day) (designated PE+CR period). Thereafter followed 3 days of reduced exercise and balanced diet (isoenergetic with their usual diet)(designated CD). Muscle biopsies from both deltoid and vastus lateralis (135 biopsies in all) were used to determine: LEPR mRNA, the protein levels of SOCS3 (inhibitor of leptin signalling), and the total and phosphorylated levels of LEPR (Tyr1141 and Tyr985), JAK2, and STAT3.

Results: LEPR were more abundant in arm than leg muscles. Serum leptin was reduced by 64 and 50% following PE+CR and CD, respectively ($P < 0.05$). After PE+CR, LEPR mRNA was increased in exercised muscles, but the protein expression of LEPR was increased only in the arms, more in the PRO than in the SU ($P < 0.05$).After CD, LEPR mRNA returned to basal levels whilst LEPR expression was increased in all muscles ($P < 0.05$). The fraction of LEPR activated (Tyr1141 and Tyr985 phosphorylated) was reduced in arms but not in leg muscles. LEPR phosphorylation was correlated with JAK2 (upstream kinase) and STAT3 (downstream kinase) phosphorylation (r=0.67-89, $P < 0.05$). SOCS3 remains unaltered in exercised muscles.

Conclusions: The leptin signaling system is very active in human skeletal muscles. Exercise can be considered as a leptin mimetic because it increases the expression of LEPR and facilitates leptin signaling. Whey protein ingestion facilitates these effects.

Key words: Leptin, obesity, exercise.

PO2313

WEIGHT LOSS BEFORE BARIATRIC SURGERY: HOW LONG PATIENTS REACH THE GOAL?

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Background and objectives: To determine how much time patients take to reach the weight loss goal in the preoperative bariatric surgery. To Ddetermine how long patients pre-surgery stage of bariatric surgery.

Methods: This is a retrospective observational study. The sample was composed by 44 patients who were undergone gastric bypass in 2011, and assessed in two moments: first and last nutritional pre-surgery evaluation. Three groups were divided for time analyses (T1: 1-6 Months, T2: 7-12 months, T3: 13-18 months).

Results: There was meaningful difference in weight loss, BMI and alimentary consumption on preoperative stage ($p < 0.001$) with an average time of nutritional evaluation of patients of 9±4.46 months. Comparing the in-group variables, the results showed weight loss in the T1 group was more favorable to the number of evaluation than in the other groups ($p = 0.028$). On group T3, it was meaningful related to %EWL with a variation of energetic consumption.

Conclusions: The average time to reach the weight loss goal was set to 9 months. Thus might improve life quality of patients on the post-surgery stage.

Key words: Bariatric surgery, gastric bypass, preoperative weight loss, morbid obesity.

PO2314

VARIABLES ASSOCIATED WITH ABDOMINAL OBESITY IN ADULTS: POPULATION-BASED STUDY IN CAMPINAS/SP.

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Background and objectives: Obesity is the major and increasing nutritional problem among adult Brazilian population. The main goal was to analyze factors associated with abdominal obesity.

Methods: Cross-sectional study with a population-based random sample of residents in Campinas/SP city. In 2011-2012 were interviewed 546 people, 18 years or older. Abdominal obesity was defined as waist circumference (WC) in women >80cm and >94cm in men. Association analysis was performed by calculating crude odds ratio (OR) for each independent variable. A multiple logistic regression model was built with the variables that were associated with WC at a significance level of less than 0.20, in the final model remained those with $p < 0.05$.

Results: The prevalence of abdominal obesity was 77.2%. There was no association with: paid work, being head of household, social class and depression. The chance of having abdominal obesity was four times higher among women (OR 4.66, 95% CI 3.03 to 7.16) ($p = < 0.001$); twice: among those older than 35 years (OR 2.32, 95% CI 1.52 to 3.54) ($p = < 0.001$) and who reported hypercholesterolemia (OR 2.56, 95% CI 1.50 to 4.36) ($p = 0.001$), seven times more among those who reported having diabetes mellitus (OR 7.24, 95% CI 2.23 to 23.4) ($p = 0.001$). Having hypertension showed nearly four times more likely to have abdominal obesity and arthritis three times more likely. In the final regression model with a higher chance of having abdominal obesity remained: lower education (OR 1.96, 95% CI 1.14 to 3.36) ($p = 0.014$); socioeconomic class A or B (OR 2.33 95% CI 1.33 to 4.09) ($p = 0.003$); diabetes (OR 5.35, 95% CI 1.18 to 24.2) ($p = 0.029$) and hypertension (OR 3.52, 95 1.84 to 6.7%) ($p = < 0.001$).

Conclusions: Obesity was more common among women and lower educational level. Individuals with excessive abdominal fat were more likely to have chronic diseases.

Key words: abdominal obesity, chronic diseases, population survey.

PO2315

OPPORTUNITIES AND CHALLENGES IN OBESITY PREVENTION AND CONTROL: STUDY DESIGN AND BASELINE FINDINGS FROM A PILOT STUDY IN CHINA

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Background and Objectives: Obesity prevention and control is one of the work priorities in Non-communicable chronic diseases (NCD). Although developments in theory and technology improved interventional practices in obesity control greatly, there are still many challenges in study design and program implementation. The aim of this study is to indicate some important issues in study design and program implementation in some settings with limited resources and funding.

Methods: In 2012, we designed an obesity control intervention study for Chinese children and adolescents. Based on the three approaches for setting priority areas for action in obesity prevention (The stepwise framework, the modified problem/solution tree, and the Analysis Grid for Elements Linked to

Obesity£¬ANGELO process) and literature reviews, we designed a cross-sectional study for identifying energy ¨C balance related behaviors (eg., unhealthy eating, physical activity and sedentary lifestyles) and for needs analysis in 7200 children (6-18 years) in three provinces. Then, we designed a set of interventional components based on some behavior change theories and the corresponding intervention techniques. The school teachers/doctors were designated for organizing intervention activities for the obese students (1.0 hour per week for six consecutive weeks) and parents (1.0 hour per month for) in school. A manual with pictures is provided to each student for learning and behavior monitoring.

Results: The intervention components were welcomed. Most obese children expected to lose weight and be ready for behavior change, but some children were absent in intervention activities due to time pressure and worrying about obesity bias. Few parents with obese children participated in the lectures. Inadequate health education curricula and parents' unawareness about child obesity hampered the program implementation.

Conclusions: Web-based intervention and other new technologies maybe promising for child obesity intervention.

Key Words: Obesity prevention, behavior change, study design, Chinese children.

PO2316

ASSESSMENT OF DIETARY KNOWLEDGE AND INTAKE AMONG PEOPLE LIVING WITH HIV/AIDS IN NEPAL

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Background and objectives: In Nepal there are approximately 63,500 people living with HIV/AIDS (PLHA); or 0.4% of the adult population. As nutrition is important for immunity and general heath in HIV/AIDS, this study aimed to measure dietary intake and nutritional knowledge among PLHA in Nepal.

Methods: 601 PLHA (M: 314 and F: 287) were recruited from the Kathmandu valley and Terai highway, nutrient intake was measured using a food frequency questionnaire which also contained questions on nutritional knowledge, socio-economic and demographic information. Height and weight were measured for calculation of BMI.

Results: The median age of the participants was 34 (IQR 29 - 38) years and 29% were classified as undernourished (BMI <18.5kg/m2). The mean energy intake of men and woman was 1960 (SD±195) and 1880 (SD±261) kcal/d respectively, which is lower than WHO recommendations, particularly for men. Fat, protein and carbohydrate contributed 12%, 10% and 79% to total energy intake respectively. Iron, vitamin C and vitamin A intakes tended to be lower than WHO recommendations. 82% of participants believed that PLHA need a special diet but less than half of these reported changing their diet after diagnosis. A major reason for not being able to follow a healthy diet was insufficient income: 46% of participants reported not being able to afford sufficient food for the whole year, with 57% of those borrowing food for more than 4 months a year.

Conclusions: PLHA in Nepal are aware of the importance of a good diet but have insufficient intake of energy and essential micronutrients. Poverty is the main reason for the poor diet and low nutrient intake.

Key words: diet, Nepal, HIV/AIDs.

PO2317

EVALUATION OF PLASMA ANTIOXIDANT STATUS AND ANTIOXIDANT ENZYME ACTIVITY IN TYPE 2 DIABETES MELLITUS PATIENTS AND NON-DIABETIC CONTROLS

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Background and objectives: Oxidative stress is implicated in the pathogenesis of diabetes and its complications. Chronic exposure to elevated levels of glucose generates oxidative stress. The aim of the study was to evaluate plasma antioxidant status in patients with uncomplicated type 2 diabetes mellitus (T2DM) in order to understand interactions between its components with glycemic control.

Methods: Male and female T2DM patients (n61) and non-diabetic controls (n43) were compared for adiposity (BMI, waist circumference (WC), waist:hip ratio (WHR), fasting glucose (FG), insulin, glycosylated hemoglobin (HbA1c), lipid profile, total protein (TP), uric acid (UA), superoxide dismutase (SOD) and glutathione peroxidase activity (GPx). Homeostatic Model Assessment of Insulin Resistance (HOMA-IR) was derived. Total antioxidant capacity of plasma (TAC) was determined using Ferric Reducing Antioxidant Capacity of Plasma (FRAP).

Results: T2DM patients had significantly higher age and BMI-adjusted WHR, FBG, HbA1c and triacylglycerol (TAG)

and significantly lower LDL, total: HDL cholesterol, insulin, UA, TP, GPx and SOD compared to controls. There was no significant difference in FRAP, HOMA-IR and other lipid variables between T2DM and controls. Among the T2DM, FRAP showed significant positive correlation with UA (r = 0.52); SOD had significant inverse correlation with HbA1c (r = -0.64); GPx had significant inverse correlation with BMI (r = -0.42), WC (r = -0.29) and TAG (r = -0.28). HOMA-IR was positively correlated with WC (r = 0.32) and WHR (r = 0.29) and inversely correlated with HDL (r = -0.29) and TP (r = -0.28). Among the controls, SOD had significant positive correlation with FRAP (r = 0.40) and negative correlation with GPx (r = -0.35). UA (R=1.35) was an independent predictor of FRAP among T2DM (R^2 = 0.27).

Conclusions: T2DM had lower levels of antioxidant enzyme activity and unfavorable glycemic and lipid milieu despite similar levels of TAC as determined by FRAP compared to controls. Adiposity and HbA1c have inverse relation with antioxidant enzymes. Uric acid is an independent predictor of TAC of T2DM.

Key words: type 2 diabetes mellitus, total antioxidant capacity.

PO2318

BODY COMPOSITION AND CARDIOVASCULAR RISK FACTORS IN PATIENTS WITH SCHIZOPHRENIA

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Background and objectives: Patients with schizophrenia treated with antipsychotics are at increased risk for weight gain, metabolic syndrome and cardiovascular disease. The purpose of this study was to assess body composition and the prevalence of some cardiovascular risk factors in schizophrenic patients compared with healthy controls in Serbia.

Methods: We studied 60 patients with schizophrenia (22 men and 38 women, mean age 40,1±10,7 treated with antipsychotics and 60 control subjects (16 men and 44 women, average age 38,7±11,1). For all participants anthropometric measurements including weight, height, waist circumference, body fat as well as lipids profile, glycaemia and blood pressure were determined.

Results: Patients with schizophrenia when compared to the control group had significantly higher body mass index (27.9±4.9 kg/m 2 to 24.5±3.3), higher waist circumference (96.4±13.9, to 84.0±11.3) and higher percentage of body fat (33.4±9.3% to 29.5±7.7%). Based on classification of nutritional status by body mass index, the group of schizophrenic patients was the most overweight (36.7%) and obese (33.3%), while the control group was normal (53.3%) or overweight (36.7%). A total of 51.7% of patients met the criteria for the metabolic syndrome of the International Diabetes Federation (IDF). The most common risk factors linked to metabolic syndrome were abdominal obesity (81.7%) and dyslipidemia (81.7%), followed by hyperglycemia (61.7%) and hypertension (23.7%).

Conclusions: Antipsychotic therapy increases the risk of obesity and developing metabolic and cardiovascular disease. It is necessary to continually monitor parameters of nutritional and metabolic status. The implementation of appropriate measures will reduce the cardiovascular risk of patients on antipsychotic therapy.

Key words: body composition, schizophrenia, antipsychotics, metabolic syndrome, cardiovascular disease. This work was supported by the Ministry of Education, Science and Technological Development, Republic of Serbia, Project No III-46001.

PO2319

COMORBIDITIES ASSOCIATED WITH OBESITY BEFORE AND ONE YEAR AFTER BARIATRIC SURGERY IN A PUBLIC HOSPITAL IN BRASÍLIA, BRAZIL.

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Background and objectives: To determine the prevalence and possible remission of comorbidities associated with morbid obesity before surgery, at six and twelve months after surgery in a public hospital in Brasília-DF, Brazil.

Methods: This is an observational retrospective analytical study. Patients were studied from April to July 2011. Patients were analyzed in four stages: first and last preoperative nutritional visits, at 6 months and 1 year after surgery.

Results: Analyzing the sample, it is observed that 89.5% were women, mean age was 41.3±9.88 years. Mean the BMI, preoperative were: 42.7±7.24 kg / m^2. The main comorbidities preoperatively and their prevalence: hypertension, 71%; DM2, 39.4%, dyslipidemia, 36.8%; syndrome of obstructive sleep apnea (OSA) 39.4%. On the sixth postoperative, 100% showed remission of DM2 and OSA, and one year after, only 13.5% still had hypertension. Eighty-seven percent were using at least one medication in preoperative phase. After 6 and 12 months, the use of medicines is summarized antihypertensive 18% and 10.5%, respectively.

Conclusions: In this way, weight loss influences preoperative weight loss of greater postoperative and helps lower incidence of hypertension after surgery. The GRDIYR, then, is an effective tool in weight loss and helps in improving expressively and remission of comorbidities in severely obese.

Key words: Bariatric Surgery, Diabetes Mellitus 2, hypertension, sleep apnea.

PO2320

HYPERTRIGLYCERIDEMIC WAIST PHENOTYPE AND LIPID MARKERS OF CARDIOMETABOLIC RISK IN ADOLESCENTS

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Background and objectives: The atherogenic risk markers have great clinical and epidemiological importance because they can provide early identification of cardiometabolic risk. This research aims to investigate the relationship between the hypertriglyceridemic waist phenotype (HW) and lipid markers of cardiometabolic risk.

Methods: Cross-sectional study with a random sample of 1,076 adolescents aged 11 to 17 years, both sexes, students from public schools in a large urban center. We conducted anthropometric assessment, self-assessment of pubertal stage of development and determination of serum total cholesterol (TC), cholesterol of low density lipoprotein (LDL-C), lipoprotein cholesterol (HDL-C), cholesterol of high density lipoproteins did not (non-HDL) and triglyceride (TG). We calculated the ratios TC / HDL-C, LDL-C/HDL-C, TG / HDL-C and phenotype HW (simultaneous presence of increased waist circumference and high triglycerides). We used the correlation coefficient tetracoric and Kappa to evaluate the relationship between the phenotype HW and the lipid markers.

Results: The phenotype HW was identified in 7.2% of adolescents and high non-HDL cholesterol in 41.3%. It was found that 41.4% of adolescents had reasons TC / HDL-C high, 38.1% and 32.7% of them had, respectively, LDL-C/HDL-C reasons and TG / HDL-C high. The correlation between the phenotype HW, non-HDL cholesterol ratios and TC / HDL-C, LDL-C/HDL-C and TG / HDL-C was moderate and agreement between them poor.

Conclusions: The results of this study showed that the correlations between the phenotype HW, non-HDL cholesterol and ratios TC / HDL-C, LDL-C/HDL-C and TG / HDL-C were moderate and poor agreement.

Key words: hypertriglyceridemic waist, fat, non-HDL cholesterol, lipid ratios, cardiometabolic risk.

PO2321

PREVALENCE OF UNDETECTED COELIAC DISEASE IN CHILDREN BETWEEN 2 AND 4 YEARS OLD, STUDIED BY A RAPID INMUNOCROMATOGRAPHIC TEST

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Background and objectives: screening of coeliac disease (CD) is cost-effective as its prevalence is usually underestimated and there is a useful treatment. Our aim is to study the prevalence of hidden CD and to analyze the diagnostic yield for undetected CD with a new rapid test in children between 2 and 4 years old.

Methods: we designed a transversal study, taking as reference population children from 2 to 4 years old from the same metropolitan area (Maracena, Granada-Spain). We included apparently healthy subjects, and collected clinical, anthropometric, analytical and serological variables (IgA and IgA antiendomisium and antitranglutaminase, that were the "gold-standard" for the screening test study). We also measures antigliadin and antitransglutaminase IgG and IgA with a rapid immunocromatographic test (CD1WB y CD2WB, from Operón®). Statistical analysis was performed with SPSS 17.0 program (Chicago, USA®).

Results: we included 198 children to whom the complete protocol was applied and who signed the informed consent document. Mean age 32.2±8.8 months, 52% males. CD prevalence basing on the serological test was 3% (CI 95% 1.4-64.4%). The diagnosis was histologically confirmed in all of them. Sensitivity and negative predictive value in our population of the immunocromatographic system CD2WB was 100% and 1 respectively. Sensitivity of CD1WB was 16.6% with a high specificity (89.1%).

Conclusions: Hidden prevalence of CD in our population of children between 2 and 4 years old was higher than the one found by other authors. Immunocromatographic system CD-2WB showed as an excellent diagnostic screening test with a high sensitivity and negative predictive value.

Key words: celiac disease, serum biomarkers, screening, biochemical test.

PO2322

VITAMIN C DEFICIENCY DURING CHEMOTHERAPY FOR COLORECTAL CANCER

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Background and objectives: Some studies evidenced that blood vitamin C concentration falls after surgery. There is no information available on further decreases on vitamin C serum levels during chemotherapy for colorectal cancer. The objective was to compare vitamin C serum levels on patients undergoing chemotherapy cycles for colorectal cancer.

Methods: We conducted this longitudinal study with 16 colorectal cancer patients from a university hospital (Chemotherapy Group). The data was obtained in four occasions: before the first, second, third and fourth chemotherapy cycles. Nutrient intake, BMI and vitamin C serum levels were determined during all of the study phases. The experiment included 19 healthy subjects (Control Group), paired by age (64±16 vs. 63±9) and gender. We used Statistica 8.0 with significance set at $p < 0.05$.

Results: The Chemotherapy Group presented the lowest BMI (23.5±5.2 vs 28.4±4.7 kg/m2), vitamin C intake [90 (27-409) vs 213 (32-562) mg] and serum levels (0.12±0.05 vs 0.34 ±0.18 mg/dL), even before the treatment. Vitamin C intake varied among the subjects, without statistical significance. When compared to the initial values, we noticed a decrease on serum vitamin C levels prior to the second cycle (0.09±0.02 mg/dL). Levels remained low before the third (0.09±0.03 mg/dL) and fourth (0.08±0.03 mg/dL) chemotherapy cycles.

Conclusions: Patients undergoing chemotherapy presented vitamin C deficiency, which demands supplementation and/or orientation towards ingesting food rich in vitamin C.

Key words: nutritional status; chemotherapy; vitamin C.

PO2323

ABETALIPOPROTEINEMIA: VENEZUELA CASE REPORT

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Background and objectives: Abetalipoproteinemia (ABL) is a rare autosomal recessive disorder with a frequency <1 in 100,000, approximately 100 cases described worldwide. ABL can results from mutation in the gene encoding the large subunit of microsomal triglyceride transfer protein (MTP). Phenotypically ABL is characterized by hypocholesterolemia, low apolipoprotein B, chronic malabsorptive diarrhea, malnutrition, polyneuritis, ataxia, retinitis pigmentosa and acanthocytes in blood smears.

Methods: We present a thirteen month-old infant, with steatorrhea, failure to thrive, hepatic steatosis, iron deficiency anemia, Vitamin E deficiency, low serum cholesterol (31 mg/dl) and low apolipoprotein B (< 11 mg/dl) were detected since second month of life. Duodenal biopsy revealed normal villi and lipid deposition in cytoplasm of affected cells. Genetic analysis revealed that our case was homozygous for a p.Ala835Pro mutation in MTP gene. This mutation, to the best of our knowledge, has not been described before and is the first case of ABL clearly documented in Venezuela. The nutritional treatment consisted in dietetic controlled fat plan <25g total fat/day (42 to 50% medium-chain triglycerides (MTC)), which was provided by breast milk, semi-elemental formula with MTC and MTC oil. To complete caloric and protein requirements, protein and carbohydrate modules were used, also high doses of fat soluble vitamins and IV lipid emulsion to avoid essential fatty acid deficiency were administered three times per week.

Results: After 5 follow-ups over a year period, a substantial nutritional improvement was accomplished; with favorable changes in body composition parameters: mid-upper arm circumference and triceps skinfold increment of the order of 3.5 and 2.8 z-score each. Weight-age increased 2.7 z-score and height-age, deeply affected (-5.8 z-score) before our treatment, increased 1.7 z-score, but still remains below normal, although steadily improving.

Key words: Abetalipoproteinemia, MTP, p.Ala835Pro.

PO2324

EFFECT OF SUPPLEMENTATION WITH BETA-GLUCAN FROM PLEUROTUS OSTREATUS IN CHILDREN WITH RECURRENT RESPIRATORY TRACT INFECTIONS

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Background and objectives: Recurrent respiratory tract infections (RRTIs) are among the most frequent consultations in pediatric practice especially in children of preschool age. A variety of nutritional supplements have shown clinical efficacy in the prevention of RRTIs, but only few of them are supported by scientific evidence. Our objective was to evaluate the preventive effect of a syrup containing beta-glucan from Pleurotus ostreatus and vitamin C on the frequency of RRTIs in children.

Methods: 166 children from 1 to 10 years old (3.0±1.7) from 20 pediatric consultations with a history of at least 6 RRTIs during the previous year were enrolled in a prospective observational multicenter study. Children received supplementation with beta-glucan from Pleurotus ostreatus and vitamin C (1ml syrup/5kg) for 3-months and followed-up until 6 months. Number of respiratory infections, emergency visits and hospitalizations were registered during four visits and compared with the same 6 months period from previous year. Product acceptability was also measured.

Results: Total respiratory infections were significantly reduced compared to the previous year (4.08±2.25 vs 8.80±3.41, $p < 0.001$) either in children under 3.5 years old (4.67±2.17 vs 9.51±3.12, $p < 0.001$) or above (3.37±2.05 vs 7.41±3.44, $p < 0.001$). There was a statistically significant reduction of each of the infections except for pneumonia: 50.53% otitis (OR[IC95%]:3.85 [2.34-6.36]); 27.03% common cold (OR[IC95%]:5.29 [2-66-10.65]), 44,14% pharyngitis (OR[IC95%]:4,16 [2,5-6,94]); 72,78% laryngitis (OR[IC95%]:4.98 [2.48-10.15]) and 45.73% bronchitis (OR[IC95%]: 3.61 [2.2-5.93]). Pneumonias were reduced 46.7% (OR [IC95%]:2.04 [0-93-4.5] $p = 0.55$). Significant reduction of number of emergency visits was observed. Product acceptability was either good or very good in 90.6% of children.

Conclusions: Results from this study demonstrate that supplementation with beta-glucan from Pleurotus ostreatus and vitamin C syrup is effective in the prevention of RRTIs in children.

Key words: Pleurotus ostreatus, Nutritional supplement, recurrent respiratory tract infections, Children.

PO2325

GLYCEMIC INDEX DIET AND RELATION WITH WEIGHT LOSS IN WOMEN WITH SEVERE AND MORBID OBESITY UNDERGOING BARIATRIC SURGERY.

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Background and objectives: At present, studies show an association between the glycemic index (GI) diet and weight loss in individuals undergoing bariatric surgery, however the evidence is not enough. The main objective to determine the correlation between GI diet and weight loss in women undergoing gastric bypass and sleeve gastrectomy. Method: in 40 (Sleeve gastrectomy, 20. Gastric bypass, 20) women with severe and morbid obesity it was assessed their GI diet at 6 and 12 months after bariatric surgery through three-day food records. In addition, body weight was measured during follow up. Quantitative variables were analyzed with Pearson correlation test, considering significant a $p < 0.05$.

Results: the average of GI at 6 and 12 month was 47.6 ±6.4 and 52,7±6.7 respectively. Percentage of weight loss at 6 and 12 months was 67.1± 14.6% and 78±20.1% respectively. A negative relation between GI of the diet and percentage of weight loss ($r = -0.4$ $p = 0,004$) was obtained at 6 months after surgery. Furthermore, a negative correlation ($r = -0.34$, $p = 0,048$) was found between GI of the diet and percentage of weight loss at 12 months after surgery. **Conclusions:** according to the current research the GI diet shows a negative association with the percentage of weight loss at 6 and 12 months after bariatric surgery.

Key words: Glycemic index, weight loss, diet, bariatric surgery. FONDECYT 1080576.

PO2326

EFFECTS β-GLUCAN IN GENE EXPRESSION OF MCF-7 CELL ON NUTRITIONAL ASSESSMENT, HEMATOLOGICAL, BIOCHEMICAL AND OXIDATIVE STRESS, WOMEN WITH BREAST CANCER.

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Background and objectives: β-glucan (βG) with S.cerevisae is polysaccharide binding (beta 1-3, 1-6 beta), considered as a biological response modifier and contribute repair the DNA damage. The purpose of this study was evaluated the Effects of βG in vitro on the expression of genes CCNA1, CASP9, SOD1 in cell MCF-7 and in vivo the profile of the dietary, status nutritional, hematological, and biochemical indicators of oxidative stress (OS) in women with breast cancer undergoing chemotherapy. In this in vitro tests were used the concentration 50 μg/mL of G and 0.1 g/mL to doxorubicin (DOX). Results demonstrated that MCF-7 cells exposed to G increased gene expression CASP9, inducing apoptosis, but was not able to stop cell cycle. The simultaneous exposure of these cells the βG and DOX increased the expression CCNA1 and SOD1, indicating that this association may be responsible for the increase intracellular antioxidant defenses and thus contribute to inhibition of proliferation of MCF-7 cells and contribute to repair the DNA damage caused by chemotherapy. We investigated 52 patients with breast cancer before and after supplementation with 1 gram of βG or gelatin during 84 days of anticancer treatment. The nutritional assessment carried out identified the prevalence of overweight and obesity. A significant increase in blood levels after supplementation with βG: hemoglobin ($p = 0.031$), hematocrit ($p = 0.021$), basophils ($p < 0.001$) and eosinophils ($p = 0.005$) and a significant reduction in plasma levels of LDL cholesterol ($p = 0.021$) and triglycerides ($p = 0.005$), whereas in the control group, significant reductions hemoglobin ($p = 0.013$), leukocytes ($p = 0.001$), lymphocytes ($p < 0.001$) and eosinophils ($p = 0.046$), the analysis of OS markers showed significant reduction in plasma concentrations of NO ($p < 0.001$) after supplementation with βG. Therefore, it is suggested that the βG can be important nutrient for patients with of anticancer treatment.

Key words: β-glucans, cancer.

PO2327

THERMAL IMAGINE OF BROWN ADIPOSE TISSUE ACTIVITY IN CHILDREN BORN TO OVERWEIGHT, OBESE AND DIABETIC PREGNANT WOMEN

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Background and objectives: Brown adipose tissue (BAT) persists beyond the neonatal period and is primarily located within the supraclavicular regions in adults of all ages. Its growth during gestation is largely dependent on glucose supply from the mother to the fetus. Normal fat development profiles in the offspring are modified by changes in maternal diet at defined stages of pregnancy, ultimately leading to adverse long-term outcomes. The aim of the present study is to analyze BAT activity in overweight, obese, gestational diabetic women 2 years after delivery, and in their offspring at 3.5 years.

Methods: 51 'mother-children pairs' participants in the PREOBE study* were invited to evaluate their BAT using thermal imagine at supraclavicular regions in the mothers, 2 years after delivery and in their children at 3.5 years; the methods followed is extensively published in The Journal of Paediatrics by Symonds, et al., 2012. 22 healthy and normoweight mothers ($n = 22$), women with overweight (pre-pregnancy $25<BMI<30$) ($n=9$), obese women (pre-pregnancy $BMI\geq30$) ($n =8$) and mothers which developed gestational diabetes ($n =10$) were included in this study.

Results: No differences in BAT activation were shown between the mothers and between children of the different groups. Close correlations were established between lifestyle indicators in the mothers during pregnancy and BAT activity in their offspring at 3.5 years: sleeping hours at 24 weeks of pregnancy ($r = 0.39$, $p = 0.012$); smoking before pregnancy ($r = -0.36$, $p = 0.046$), the perception of wellness in the mother 6 months after delivery ($r = 0.56$, $p = 0.001$)..

Conclusions: Lifestyle during pregnancy and body composition are factors influencing the BAT activity in their offspring at 3.5 years. A programming effect is suggested.

Key words: Brown adipose tissue, thermal imagine, obesity.
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PO2328

NUTRITIONAL PROFILE OF PATIENTS IN PREOPERATIVE CARDIAC SURGERY.

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Background and objectives: The obesity increased in Brazil has been observed together with the economic and epidemiologic changes, and as consequence some comorbidities, like cardiovascular diseases. Changes in Brazilian population' eating habit, with the higher consumption of high-caloric food, with saturated fat, sodium and sugar, shows an important association with the increase in cardiac complications. Therefore, it becomes necessary to evaluate the nutritional state and the food consumption in patients of cardiac surgeries in preoperative status at a Sergipe's public hospital.

Methods: The study was characterized as descriptive and cross-sectional, composed by 110 patients which were submitted to a nutritional evaluation status by weight, height, body mass index, waist and arm circumference, triceps skinfold thickness and a food consumption analyses with the application of a quantitative questionnaire of food frequency.

Results: From the total of the patients, 58.2% were male and 41.8% were female, the most prevalent comorbidity was the systemic arterial hypertension and the most accomplished surgical procedure was the Myocardial revascularization. The anthropometric evaluation revealed that the population is in nutritional risk, due to the overweight/obesity prevalence (56%), body mass index, and raised risk of metabolic complications in agreement with the waist circumference.

Conclusions: Patients scheduled for cardiac surgery presented high prevalence of hypertension and a risk nutritional profile due the inadequate nutritional status with predominance of overweight/obesity, a low potassium, calcium, vitamin E and fiber consumption and a high saturated fat, sodium and cholesterol consumption.

Key words: Nutritional status. food consumption. cardiac surgeries.

PO2329

SELENATE PREVENTS DIET-INDUCED OBESITY WITH IMPROVED INSULIN SENSITIVITY IN VIVO

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Background and Objectives: Selenium is an essential micronutrient required for optimum human health. Although various forms of selenium are known to be beneficial in preventing some chronic diseases such as cancer and cardiovascular disease, the role of selenium in obesity remains elusive. We recently found that selenate, an inorganic form of selenium, exhibits an anti-adipogenic function through induction of transforming growth factor-beta1 signaling pathway in preadipocytes with no effect on cell viability in vitro. The objective of this study is to test a hypothesis that selenate is a novel anti-obese micromineral that prevents the development of diet-induced obesity in vivo.

Methods: 3-week old mice were placed on a high fat-diet (HFD) with control water or water supplemented with selenate (20% of LD50) for 8 weeks.

Results: Selenate administration resulted in little effect on overall food intake, water intake and fecal calories in mice groups in control HFD and HFD with selenate (HFD-Se). While HFD group developed adiposity with increased adipose tissue weight, mice in HFD-Se showed decreased body weight and body fat mass with smaller adipocyte size. In addition, HFD induced hyperglycemia and insulin resistance. However, mice in HFD-Se displayed lower blood glucose, insulin, and free fatty acid and glycerol levels with improved glucose tolerance. Real-time PCR analysis revealed that adipose tissue isolated from mice in HFD-Se exhibited reduced levels of genes involved in adipogenesis, lipid metabolism and altered transforming growth factor-beta1 signaling pathway compared with those in HFD mice.

Conclusions: Collectively, our results demonstrate that chronic administration of low dose of selenate at a safe concentration abrogates adiposity and its associated insulin resistance in a mouse model of diet-induced obesity. This suggests that selenate is a novel anti-obese dietary micromineral.

Key words: selenate, selenium, obesity, insulin resistance.

PO2330

CORRELATION OF NUTRITIONAL FACTORS WITH THE QUALITY OF LIFE AND FATIGUE INTENSITY AMONG PATIENTS UNDERGOING CHEMOTHERAPY CYCLES

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Background and objectives: Fatigue is a prevalent symptom among individuals under chemotherapy and it may result in reduced overall quality of life (QoL). The aim of this study was to correlate the fatigue intensity and the QoL with the nu-

tritional status on patients undergoing chemotherapy cycles for colorectal cancer.

Methods: We conducted this longitudinal study with 24 colorectal cancer patients (63.2 ±14.9 years, 62.5% female) from a tertiary university hospital. The data was obtained in four occasions: before the first, second, third and fourth chemotherapy cycles. The FACIT Fatigue Scale and the QoL questionnaire were determined during all of the study phases. The energetic and protein intake, body mass index (BMI), serum levels of hemoglobin and albumin were also obtained.

Results: There was no statistical difference in QoL and fatigue intensity among chemotherapy cycles. The energy and protein intakes did not show correlation with QoL and fatigue intensity. However, before the first chemotherapy cycle, there was a correlation of QoL with serum levels of hemoglobin ($r = 0.57$, $p = 0.01$) and albumin ($r = 0.73$, $p = 0.004$). Similarly, there was a correlation of fatigue intensity with serum hemoglobin ($r = 0.48$, $p = 0.04$) and albumin ($r = 0.63$, $p = 0.02$).

Conclusions: The QoL and the fatigue intensity before the first chemotherapy cycle showed correlation with the serum levels of hemoglobin and albumin, probably due to colorectal surgery. The BMI showed correlation with QoL and fatigue at a later stage, before the 4º chemotherapy cycle.

Key words: nutritional status; chemotherapy; quality of life; fatigue.

PO2331

REGULATION OF HEPATIC BRANCHED-CHAIN ALPHA-KETOACID DEHYDROGENASE COMPLEX IN RATS FED A HIGH-FAT DIET.

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Background and objectives: Branched-chain alpha-ketoacid (BCKA) dehydrogenase complex (BCKDC) regulates branched-chain amino acid (BCAA) metabolism at the level of BCKA catabolism. It has been demonstrated that the activity of hepatic BCKDC is markedly decreased in type 2 diabetic animal models and increased in type 1 diabetic animal models.

Methods: In this study, we examined the regulation of hepatic BCKDC in rats with diet-induced obesity (DIO). Rats were fed a control or a 60% of energy high-fat diet (HFD) for twelve weeks. Concentrations of blood components and the activities and protein amounts of hepatic BCKDC and its specific kinase (BDK) were measured.

Results: The concentrations of plasma glucose, insulin, and corticosterone were significantly elevated in DIO rats compared to those fed the control diet, suggestive of insulin resistance. Blood BCAA concentrations were not increased. The activity of hepatic BCKDC that was present in the active form in the liver was higher in DIO rats compared to controls, although the total activity and the enzyme amount were not different between two diet groups. The activity of hepatic BDK and the abundance of BDK bound to the BCKDC were decreased in DIO rats. The total amount of hepatic BDK was also significantly decreased in DIO rats. In rats made obese through HFD feeding, in contrast to prior studies in rat models of type 2 diabetes, hepatic BDK was down-regulated and thereby hepatic BCKDC was activated, suggesting that DIO promotes liver BCKA catabolism.

Conclusions: In this model there was no evidence that increased blood BCAAs drive DIO-associated insulin resistance, since concentrations of BCAAs were not altered by DIO.

Key words: BCKA, high-fat diet, BCAA.

PO2332

EARLY INDICATORS OF CHRONIC DISEASE IN OVERWEIGHT MEXICAN CHILDREN

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Background and objectives: A question arising from the childhood obesity epidemic is when chronic diseases start. The study objective was to evaluate insulin resistance (IR) and Reactive C Protein (RCP) as indicators of early chronic disease in children aged 5 to 9, from a Health State Unit in San Luis Potosi, Mexico.

Methods: Transversal study of 124 children attending routine medical screening excluding those with recent infection, inflammatory disease or using anti-inflamatory medication. Anthropometric measurements, clinical history, physical activity (PA) questionnaire (Serra, 2006), and biochemical analysis were performed..

Results: 2% had low body weight, 67% normal, 13% overweight and 18% obesity. Average values for waist circumference (WC) were 50, 55, 64 and 72 cm for each Body Mass Index (BMI) category respectively. PA was not different among groups. Biochemical analysis of 96 children reported 7.4% abnormal fasting glucose (AFG), 1% hyperinsulinemia (HI), 25% IR and 4.2 % positive RCP. According to BMI categories 4.5% normal and 18.7 obese had AFG ($p < 0.06$). Average insulin levels were 3.7, 6.2 and 8.9 for the normal, overweight and obese children. HI was present in only one child (8.3% of overweight children) . IR was found in 14.1%,16.7% and 68.8% of normal, overweight ($p < 0.03$) and obese ($p < 0.0001$) children respectively , (OR 12.5) and positive RCP in 4.5% normal and 6.3%

obese (PO.06) (OR 1.4) There was a positive correlation among increasing levels of BMI, WC , IR and Insulin. Abdominal adiposity measured by WC was greater >p85 BMI. ($p < 0.0001$) and a value >65cms was positively related to IR ($p < 0.0001$).

Conclusions: Risk of early chronic disease only demonstrated by IR was 12.5 greater for BMI>p85. A WC value>65 cm was related to IR and it is an easy anthropometric measurement to be considered in populations studies.

Key words: BMI, Waist circumference, Insulin resistance, c reactive protein.

PO2333

ASSOCIATION OF MACRONUTRIENT INTAKE WITH OVERWEIGHT AND OBESITY AMONG BANGLADESHI POPULATION: A HOSPITAL BASED STUDY

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Background and objectives: Obesity is one of the most important risk factors for diabetes and other disorders of metabolic syndrome. Nutritional intake is a major determinant of obesity and it needs to be studied in various population groups In the present study we have investigated the nutritional intake of a group of Bangladeshi non-diabetic and diabetic subjects in relation to their demographic and anthropometric status.

Methods: It was an observational exploratory study with 4063 subjects (1571 male and 2492 female; 1552 non-diabetic and 2511 diabetic) attending 20 healthcare centers and hospitals run by the Diabetic Association of Bangladesh. Anthropometric measurements (height, weight, waist and hip) were done by standard techniques. Dietary data were collected by 3days food frequency method. A BMI of 23 was taken as the cut-off point for overweight as defined by WHO for this population.

Results: The mean (± SD, years) age of the subjects was 46±14. The proportion of subjects with lower, middle and upper socioeconomic classes were 20.6%, 51% and 28.4% respectively. BMI was 24.71±5.24 and Waist-Hip ratio was 0.91±0.57. The proportion of calorie contributed by the three principal macronutrients was as follows: carbohydrate 58%, fat 25%, and protein 17%. On group comparison between overweight plus obese (BMI>23) and normal weight individuals the intake of carbohydrate and protein did not vary between the groups, but fat intake was paradoxically lower in the overweight group. Logistic regression with normal weight and over weight (plus obesity) as dependent variables carbohydrate and protein intake was found to be associated with overweight when other confounders were adjusted.

Conclusions: Weight gain in Bangladeshi subjects (both non-diabetic and diabetic) is associated with higher carbohydrate intake and a targeted approach to modify this nutritional behavior need to be taken in non-diabetic as well as diabetic population.

Key words: macronutrient, overweight, obesity, Bangladesh, diabetes.

PO2334

EFFECTS OF A DIET RICH IN OLIVE OIL AND AN EPA + DHA PHARMACEUTICAL COMPOUND IN THE RHEUMATOID ARTHRITIS

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Introduction and Objectives: For years many scientific evidences provide benefits to certain nutrients and diets with positive effects on biological variables and inflammatory activity in rheumatoid arthritis (RA). This is the case of polyunsaturated fatty acids omega 3 and olive oil. It is known that especially eicosapentanoic acids (EPA) and docosahexaenoic acid (DHA) have anti-inflammatory, immunomodulatory and cardioprotective. Our goal is to compare the effect of a diet rich in omega 3 versus another enriched olive oil on biochemical markers of inflammation in patients with rheumatoid arthritis.

Methods: We included 106 patients previously diagnosed with RA and pretreatment. Were assigned to three groups with different treatments were added to standard treatment of RA itself. Group A: 35 subjects with diet supplemented with 30 ml of olive oil, group B: 35 subjects, with a capsule every twelve hours consisting of 465 mg EPA and 375 mg DHA, C: control group (standard treatment only AR). Were determined serum biochemical markers proinflammatory proi-inflammatory

markers (TNF-α, IL-1, IL-6, ferritin, CRP) at baseline and at 6 and 12 months. To compare differences of values in each group, we conducted a repeated measures ANOVA. For differences between groups ANOVA test was performed.

Results: The groups A and B showed a significant decrease in TNF-α decreased between 0 and 6 months ($p = 0.043$, $p = 0.039$). Also reduced IL-1 between 0 and 6 months ($p = 0.037$, $p = 0.046$). No significant differences were observed between groups A and B.

Conclusions: Fatty acids enhance proinflammatory profile in patients with RA. No significant differences were detected between providing a supplement of olive oil and a pharmaceutical EPA + DHA.

Key words: fatty acids, rheumatoid arthritis, proinflammatory biomarkers.

PO2335

FUNCTIONAL COMPOUNDS IN COMBINATION WITH NANO-GOLD PARTICLES MODULATE APOPTOSIS AND MIGRATION POTENTIAL IN HUMAN COLORECTAL CARCINOMA CELLS

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Background and objectives: Colorectal cancer (CRC) is the third leading cause of cancer deaths in Taiwan. High mortality rate of CRC is caused by malignancy metastasis. Recent researches demonstrated that nanogold particles (AuNPs) are high biocompatibility, which can be used as pharmaceutical carriers to promote drug efficacy. Functional compounds of lycopene and DHA were effective for CRC treatment. The aims of this study were to examine whether AuNPs in combination with functional compounds enhanced cytotoxicity of CRC cells and its molecular mechanisms.

Methods: Human colorectal carcinoma HT-29 cells was treated with 1~3 nm, 3~5 nm and 10~15 nm AuNPs after 24 h exposure by MTT assay. Apoptotic death and migration potentials are evaluated by flow cytomics analysis and wound healing assays.

Results: AuNPs at 3~5 nm size significantly induced cellular death by decreased viability of 64% and 71% for the concentrations of 25 and 30 ppm respectively ($p < 0.05$). The half lethal dosage (IC50) of 3~5 nm AuNPs in HT-29 cells was determined at 20.7 ppm. A time course study has investigated the AuNPs induced death. Significant growth inhibition as well as necrotic and apoptotic phenotypes were observed in the 24 h AuNPs treated HT-29 cells. An apparent cell death, 3~5 nm AuNPs significantly increased 34% of apoptosis in HT-29 cells stained with Annexin V, but there was no effect on necrosis by staining with the PI. In addition, HT-29 cells treated 3~5 nm AuNPs 24 h significantly increased the migration. Lycopene or DHA in combination with AuNPs at lower dose enhanced apoptosis and migration of HT-29 cells, possibly through modulation of intracellular molecular signaling.

Conclusions: Our data demonstrated that AuNPs alone or in combination with functional compounds enhanced apoptosis and migration that it may affect potential metastasis of human colorectal carcinoma cells metastasis.

Key words: Colorectal cancer, nanogold particles, apotosis, Migration.

PO2336

RECOMMENDATIONS FOR CANCER PREVENTION WORLD CANCER RESEARCH FUND (WCRF): ANALYSIS FOR CHILE

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Background and objectives: Cancer is the second leading cause of death in the Americas and in Chile, representing 25.6% of all deaths in 2009. The main diet-related cancer sites include colorectal, lung, breast in postmenopausal women, stomach, esophagus, prostate, and pancreas. After tobacco; obesity is the leading cause of cancer, accounting for one third of all cancers. Obesity related exposure that define cancer risks include total body fat, abdominal fat and weight gain in adulthood. These are potentially modifiable risk factors; consuming a healthy diet and living an active life can significantly reduce body fat and thus cancer risk. The aim of this study was to analyze recommendations published by the International Fund for Cancer Research (WCRF) and American Institute for Cancer Research (AICR) for the prevention of cancer in 2007.

Methods: We compared these recommendations with the situational analysis of risk factors described, based on national studies that report prevalence of these factors in Chile. We

propose National recommendations in accordance with the WCRF 2007 document.

Results: The pattern of food consumption in Chile is characterized by over consumption of products that increase risk of cancer (alcoholic drinks, sugary juices and ultra-processed foods high in sodium and total fat) and low consumption of protective foods (legumes, vegetables, fruits high in antioxidants and fiber).

Conclusions: The analysis reveals that Chile has an increase cancer risk associated with poor quality diets, high Body Mass Index (BMI), and sedentary behavior. We recommend the promotion of healthy diets and active lifestyles conducive to lower cancer risks and good health across all stages of the life-course.

Key words: Diet, cancer, risk factor, chronic non communicable disease, health promotion.

PO2337

REDUCED SERUM CONCENTRATIONS OF OSTEOCALCINARE ASSOCIATED WITH RISK OF DEVELOPING TYPE-2 DIABETES MELLITUS IN A HIGH CARDIOVASCULAR RISK POPULATION

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Background and objectives: Becauseit has been suggested that osteocalcin, an osteoblast-derived hormone, is a new link between bone and glucose metabolism, we tested whether serum carboxylated (cOC) and undercarboxylatedosteocalcin (ucOC) levels are independently associated with the development of type-2 diabetesin subjects at high cardiovascular risk.

Methods: A prospective,nested case-control study was conducted using data from the PREDIMED study. We included 153 cases of newly diagnosed diabetes and 306 individually matched-controls free of diabetes identified during a mean 5-year follow-up. Conditional logistic regressionmodels were used to estimate matched ORs for incident diabetes according to categories of both forms of osteocalcin measured by ELISA.

Results: Baseline serum concentrations of both forms of osteocalcin were significantly lower in cases than in controls. In incident cases, concentrations of cOC, but notucOC, were inversely and significantly associated with insulin and HOMA-IR levels (r= -0.334 and r= -0.323, respectively), and with fasting glucose concentrations (r= -0.058) in controls, independently of the intervention group, sex, age and BMI. In the conditional logistic model that took into account the matching factors, the ORs for diabetes incidence in the highest vs the lowest tertile of cOC and ucOC were 0.49 (95% CI: 0.32-0.75) and 0.53 (0.35-0.80), respectively. Further adjustment for family history of diabetes, lifestyle and other confounding factors did not appreciably changethe magnitude of these associations.

Conclusions: In a population at high cardiovascular risk, elevated concentrations of serum cOC and ucOC were strongly associated with a decreased risk of incident diabetes.

Key words: Carboxylatedosteocalcin, undercarboxylatedosteocalcin, PREDIMED study, biomarkers, type 2 diabetes mellitus.

PO3146

INCIDENCE OF INSTITUTIONAL FOOD SERVICE PRACTICE MANAGEMENT ERRORS IN THE KITCHEN OF A GENERAL HOSPITAL, CHUBU REGION, JAPAN

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Background and objectives: Institutional food service practice is an important medium for therapeutic patient education in hospitals in Japan. Thus, institutional food service practice management errors are major issues. Such errors in the kitchen are caused by some professionals who are the members of the nutrition section, i.e. registered dietitians, dietitians, chefs, cooks and others. Objective: To assess the incidence of institutional food service practice management errors in the kitchen of a general hospital, Chubu region, Japan.

Methods: A cross-sectional study was conducted on incident reports based on institutional food service practice management errors from January 1 to December 31, 2011. Data was collected from incident reports of the kitchen using a structured format. Data was edited and coded. Descriptive statistics were computed to determine specific errors. Prior to the

start of data collection, permission was obtained from hospital management to use it. Health professionals were replaced with codes to avoid individual identifiers. We assessed times, day of the week, work complex and practitioner condition.

Results: The prevalence of institutional food service practice management errors in the kitchen of this general hospital was 42 times in 365 days. Many errors occurred on Thursday and Friday. Commonly prescribed errors included serving a different menu or mixing contents of the menu. When practitioners were busy and got tired, many errors occurred.

Conclusions: Institutional food service practice management errors in the kitchen were common in this general hospital. An error-free system is required through continued therapeutic patient education.

Key words: Institutional food service, practice management errors.

PO3344

DEVICE INVENTION FOR ASSESSMENT AND TRAINING BETWEEN HOSPITALS BASED ON PRACTICE PROBLEMS

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Background and objectives: This article presents a field work experience analysis related to an UBACyT 2010-2012 research plan. Its main goal was to characterize collaborative interchange patterns, training and knowledge production in work situation between different levels of complexity hospitals from diverse provinces and their incidence in institutional changes.

Methods: An assessment experience and training between Garrahan Hospital´s Food and Dietetic area and pediatric hospitals of several provinces is analyzed. It develops different stages in which the project was implemented and how interventions were defined from "field" problems. Empirical workers in health institutions, usually not taken into account, are considered a priority in these training programs. This consideration and conditions created to facilitate the implementation are explained.

Results: Interinstitutional net building is analyzed as well as its incidence among different provinces, government instances, hospitals and universities. Importance of academic accreditation for field training, effects due to developed devices in every day work and in the participants` subjectivity are considered. Documentary information, field observations and interviews were systematized for this study.

Key words: Ground training, permanent education, institutional psychology, institutional assessment.

PO3345

THE KETOGENIC DIET FOR THE TREATMENT OF DRUG-RESISTANT EPILEPSY AND OTHER SYNDROMES: STRATEGIES TO IMPROVE COMPLIANCE AND THERAPEUTIC EFFECT

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Background and objectives: The classic ketogenic diet (CKD) has been used by our department as an effective, for children with seizures of different etiologies since 1988, in a multidisciplinary team using a treatment protocol. Of 66 patients treated from 2008 to 2012, 40 children stayed on the KD between 3 years and 6 months and 26 discontinued the diet. In 20% discontinuation was due to non-medical causes. The objective was to search for tools to improve compliance in patients treated with the KD.

Methods: From June 2012 to May 2013 a literature review was conducted to identify strategies to improve compliance with the CKD. Information for the patients and their families, health awareness, the professional-patient relationship, availability of recipes and meal plans, and forms of preparation were looked for to increase adherence to the KD in 40 patients who have been on the oral CKD successfully.

Results: Forty-two recipes were selected, adapted, and prepared (27 main courses, 7 desserts, 10 bread preparations, 3 snacks) of which 26 were approved and added to recipe books or meal plans and were divided into three categories (training, problem solving, motivation). Additionally, our 40 patients who are successfully following the oral CKD received at least one of the tools. To evaluate the impact of the strategy, a questionnaire was designed and administered personally or by phone to 19 families (47%) . Of these families, 100 % had tried at least one of the possibilities, agreed that they were useful, and were willing to try additional tools.

Conclusion: The tools assessed were well accepted by the families. Nevertheless, further studies should be conducted to measure the true impact of the strategies for the improvement of adherence to the CKD.

Key words: Ketogenic diet, adherence, epilepsy.

PO3346

THE KETOGENIC DIET: A RETROSPECTIVE STUDY OF THE EXPERIENCE OF NUTRITION SUPPORT SERVICES

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Background and objectives: The ketogenic diet (KD) is a non-pharmacologic treatment proven effective for the management of epilepsy of different etiologies in centers throughout the world, using different protocols and forms of administration. We has worked in a multidisciplinary fashion together with the departments of neurology and clinical nutrition since 1988, using a treatment protocol. the objective was to evaluate different diet types and administration modalities of the KD used at our center.

Methods: Between 1988 and 2012, 203 children were put on the MCT ketogenic diet, the classical ketogenic diet (CKD) or the modified ketogenic diet (MKD) Data of 66 patients with different etiologies who received the diet between January 2008 to December 2012 were retrospectively assessed.

Results: Forty-eight of 66 children received the CKD in a 4:1 or 3:1 ratio orally, 12 through a nasogastric (NG) tube or gastrostomy (GT), and six received the MKD orally. Of all 66 children treated with the KD, 60% responded well to the treatment and stayed on the diet. Three children adhered to the oral CKD and one to the CKD through a NG tube for more than 3 years. Four children kept on the oral CKD, three on the CKD through a NG tube or GT, and one on the oral MKD for more than 2 years. Nine children adhered to the oral CKD and four to the CKD through a NG tube or GT for more than 1 year. Fifteen patients have been on the CKD (13 orally and two who started on the NG tube and switched to the oral CKD) and three have been on the MKD for more than 6 months. Twenty-six children discontinued the KD for different reasons.

Conclusion: The KD is successfully managed at the hospital, using different types of diets and forms of administration.

Key words: Ketogenic diet, epilepsy.

PO3347

EFFICACY OF A LOW-FAT YOGURT SUPPLEMENTED WITH A ROOSTER COMB EXTRACT ON JOINT FUNCTION IN MILD KNEE PAIN PATIENTS: A SUBJECT-LEVEL META-ANALYSIS

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Background and objectives: The aim of this meta-analysis was to determine the effects of daily consumption of a low-fat dairy product supplemented with Mobilee™, a rooster comb extract rich in HA and other glycosaminoglycans (80 mg/d), on muscle function, echographic evolution and knee discomfort using a Visual-Analogue-Scale (VAS) compared with a low-fat dairy product consumed by 3 months on affected knee.

Methods: The individualized results from 148 volunteers of Intention-To-Treat population (ITT) (51 men; aged from 20 to 75y) of two randomized, controlled, double-blind, parallel trials (68 volunteers; Martinez-Puig D, 2012) and 80 volunteers; ClinicalTrials.gov Identifier: NCT01303432) performed on patients with mild knee pain (VAS between 30 and 50 mm) developed in Barcelona and Reus (Spain) by implementing the same protocol. The muscle function determined by peak torque, total work, and power mean in flexion and extension at speeds of 180º/s and 240º/s using an isokinetic dynamometer Biodex 4. The outcomes evaluation was performed by an ANCOVA model with the baseline value as covariables without missing data imputation on the ITT.

Results: After 3 months, compared to control, improved total work in flexion at 180º/s (P=0.039); reduced synovial effusion (P =0.037); 3) and perception of pain diminished (P=0.003) on affected knee, particularly in men older than 50.

Conclusions: Long-term low-fat dairy product supplemented with HA consumption improves muscle strength, synovial effusion and pain providing clinical benefit on patients with mild knee pain, specially in men 50 years and older.

Key words: Glycosaminoglycans, knee pain.

PO3348

DIETARY INTAKE OF FOLATE, VITAMIN B6 AND RIBOFLAVIN AND RISK OF DEVELOPMENT OF DIFFERENT MOLECULAR SUBTYPES OF BREAST CANCER IN THE ORDET COHORT

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Background and objectives: Vitamins involved in one-carbon metabolism have been hypothesized to influence the risk of breast cancer (BC). Epidemiologic studies that examined associations between folate or vitamin B intake and BC risk have provided inconsistent results. Recent studies suggest that molecular subtypes of BC defined by expression of HER2, estrogen receptors (ER), progesterone receptors (PR), differ in terms of the risk factors influencing their occurrence. We prospectively also examined whether the consumption of folic acid and vitamin B was associated with the incidence of breast cancer and breast cancer tumor characteristics.

Methods: Participants were 10,766 women enrolled in the ORDET study, who completed a dietary questionnaire 1987-1992. Cox proportional hazard models adjusted for energy intake and confounders, estimated Relative Risk (RR) and 95% CIs for breast cancer.

Results: After a mean of 16 years of follow-up, 388 incident cases of BC were ascertained. The multivariate RR of total BC for riboflavin intake was 0.49 (95% CI, 0.33-0.72 highest vs. lowest quartiles; P trend=0.001) and 0.57 (95% CI, 0.38-0.87 highest vs. lowest quartiles; P trend=0.009) for vitamin B6. Folic Acid intake was inversely associated with BC (RR of 0.66, 95% CI, 0.45-0.96). When relations between folic acid and vitamins B and risk of BC expressing various receptor combinations were assessed, riboflavin and folic acid were significantly associated with decreased risk of estrogen and progesterone receptor-positive cancers. High riboflavin intake was also associated with decreased risk of both HER2-negative and HER2-positive cancers whereas folic acid intake was inversely associated with HER2-negative cancer.

Conclusions: These findings support an overall association between folic acid, riboflavin and vitamin B6 intake and decreased risk of overall BC, and suggest that folic acid and riboflavin intake may be inversely associated with ER+/PR+ and Her2-tumors.

Key words: Vitamin B, folate, breast cancer, receptor status.

PO3349

DRINKING RAW MILK: DOES THIS AFFECT ALLERGY RESPONSES?

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Background and objectives: Epidemiological studies have shown an association between consumption of raw farm milk and reduced incidence of allergy. We fed untreated raw, gamma-sterilized, heat-treated milks or water to groups of mice then compared their responses to allergen exposure and challenge, in a model of gastrointestinal allergy.

Methods: Raw farm milk was collected and not treated, gamma-sterilized or heated to 85^{a}C, cooled and strained. Levels of bacteria and milk proteins were assessed in milk samples. From weaning (3 weeks), groups of Balb/c mice (n=8/group) received milks via drink bottles. Control groups received water and all mice were fed standard (dairy-protein free) rodent diet. At 6 and 8 weeks, mice were given intra-peritoneal injections of ovalbumin/alum, to sensitize them to antigen. At week 10, mice were challenged four times on alternate days by intra-gastric gavage with 50 mg ovalbumin or saline. Following the final gavage, serum levels of total and specific IgE, IgG1 and IgG2a antibody and Mouse Mast Cell Protease-I (MMCP-I) were determined. Interleukin-4, interleukin-10 and interferon-gamma responses following activation with antigen were measured in cultured splenocytes.

Results: Sterilized and heated milks contained no viable bacteria, in contrast to raw milk. Heating and sterilizing milks reduced the detectable level of many milk proteins. Mice drinking raw milk had the highest levels of MMCP-I of all groups and higher levels of specific IgE compared with mice drinking heated milk. Cultured splenocytes from ovalbumin-primed mice produced similar levels of interleukin-4 when incubated with ovalbumin; however, interleukin-10 levels were highest from mice drinking raw milk.

Conclusions: The data suggested that consumption of raw (untreated) milk enhanced allergy responses compared with treated milks. The change in response may be due to milk components and/or bacteria in raw milk that are modified or removed during treatment processes.

Key words: Milk, allergy, raw milk.

PO3350

INADEQUATE MICRONUTRIENT INTAKE FOR FOOD SECURITY SITUATION OF BENEFITING PRESCHOOL CHILDREN OF BOLSA FAMÍLIA PROGRAM, VIÇOSA, MINAS GERAIS, BRAZIL

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Background and objectives: The investigation of individual food intake is able to detect, with fidelity, food insecurity situation in the investigated period. The objective is to evaluate the inadequate micronutrient intake for food security situation.

Methods: Sectional study with 243 children 2-6 years of age, beneficiaries of Bolsa Família of the Federal Government, living in the city of Viçosa, Minas Gerais, Brazil. The sampling was random, based on the registration of beneficiaries of Bolsa Família of the Department of Social Welfare of the city, using 80.3% prevalence of food insecurity in the Southeast Brazil. Food consumption has been assessed by the 24-Hours Dietary Recall on two separate days, the average being used for analysis. The adequacy of intake of micronutrients (vitamins A, C and D, calcium, iron, selenium and zinc) was based on the Estimated Average Requirement (EAR). The analyzes were separated for children 2-3 years and 4-6 years, depending the values of EAR and food insecurity: mild and moderate/severe. The study was approved by the Ethics Committee.

Results: The mild food insecurity was present in 37.7% (n = 29) and 51.8% (n = 86) of children 2-3 years and 4-6 years, respectively, while the moderate or severe 27.3% (n = 21) and 24.1% (n = 40), respectively. The median intake of vitamin D and calcium was below the recommendations (p>0,05), independent of the child's age and situation (in) security. The intake of vitamin A, calcium and iron of children 2-3 years there was difference (p <0.001) between the groups, as well as of children 4-6 years to calcium and selenium (p <0.05).

Conclusions: Inadequate intake of micronutrients is present in children receiving the Program, and differs according to the situation (in) food security for some micronutrients.

Acknowledgement: Support by FAPEMIG and CNPq

Key words: Food security, food consumption, preschool.

PO3351

POST-PRANDIAL GUT HORMONE RELEASE AFTER A HIGH-FAT MEAL CHALLENGE DIFFERS BETWEEN HEALTHY NORMAL WEIGHT AND OBESE VOLUNTEERS

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Background and objectives: Obesity is associated with chronic low-grade inflammation[1]. In response to a meal there is a transient increase in the blood concentrations of inflammatory markers[2]; this is referred to a post-prandial inflammation. We are investigating the anti-inflammatory action of n-3 fatty acids in normal weight and obese subjects.

Methods: Normal weight (18.5–25 kg/m2) and obese (30–40 kg/m2) volunteers were randomised to receive either fish oil (3g fish oil, containing 1.8g/day EPA + DHA) or placebo (3 g corn oil) daily for three months prior to a high-fat meal challenge. The gut hormone content of protease-treated plasma was assessed in post-prandial samples collected from 25 subjects (n=11 normal weight and n=14 obese) for analytes including amylin, ghrelin, GIP, GLP-1, insulin, leptin, PP and PYY. Area under the curve data was analysed by two-way ANOVA to assess the effect of obesity status and fish oil treatment.

Results: A significant effect of obesity status was observed upon post-prandial ghrelin (p=0.001) and leptin (p=0.002) concentrations with a trend upon GLP-1 (p=0.063) and insulin (p=0.072) concentrations. Obese subjects had lower post-prandial ghrelin and GLP-1 and higher insulin and leptin compared to normal weight subjects. No significant treatment effects or obesity x treatment interactions were identified.

Conclusions: These data indicate that healthy obese subjects have an altered gut hormone response to a high-fat meal in comparison to normal weight individuals. Our data are consistent with data suggesting leptin resistance and increased ghrelin-sensitivity as a feature of obesity[3]. Further work will identify whether post-prandial gut hormone responses relate to measures of post-prandial inflammation.

References: [1] Tilg H, Moschen AR (2006) Nature Reviews Immunology [2] Hansen, Sickelmann, Pietrowsky, et al. (1997) American Journal of Physiology [3] Klok, Jakobsdottir & Drent (2007) Obesity Reviews

Key words: Obesity, omega-3, gut hormones.

PO3352

ANTIOXIDANT EFFECT EXERTED BY MEAT EXTRACTS IN A CELL MODEL OF ANGIOTENSIN II INDUCED DAMAGE

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Background and objectives: Oxidative stress is directly related to the development of hypertension and hypertensive heart disease. One of the ways to slow the processes related with chronic hypertension has focused on the search of natural antioxidants from the diet. This study evaluated the antioxidant capacity of hydrophilic (HFL) and hydrophobic (HFB) fractions of pork meat products in a cellular model of damage induced by angiotensin II (Ang-II), one of the main factors involved in the development and complications of hypertension.

Methods: Mouse adult cardiomyocytes (HL-1) were subjected to damage induced by Ang-II (48 h, 1 μM). Oxidative stress was evaluated by measuring the levels of reactive oxygen species (ROS) and activity of the antioxidant enzymes catalase (CAT) and glutathione peroxidase (Gpx-3). 50 g of each product (dry-cured pork sausage and cooked pork ham) was processed following standard protocols to obtain their respective HFL and HFB fractions. Results are expressed as percentage of control ± standard deviation.

Results: The exposition of HL-1 cells to Ang-II was associated with an increase on ROS levels (210±30%) and a decrease of CAT (30±9%) and Gpx-3 activity (43±8%). The pre-exposition for 24h with the HFL fraction of either product was able to prevent the increase in ROS (109±10%, cooked; 120±20%, cured) and the lost of CAT (62±8%, cooked; 98±10%, cured) and Gpx-3 activity (73±15%, cooked; 89±17%, cured) induced by Ang-II. The pre-exposition for 24h with HFB fraction of either product showed preventive effects similar to those observed for HFL fractions. The administration of different fractions in the absence of Ang II did not affect levels of ROS or antioxidant activity.

Conclusions: Extracts from selected elaborated pork products exert a cardioprotective effect against oxidative stress induced by Ang-II, which may suggest a potential beneficial effect associated with anti-hypertensive activity.

Key words: Meat extracts, hypertension, cardioprotection.

PO3353

ASSOCIATION BETWEEN CENTRAL BODY ANTHROPOMETRIC MEASURES AND CARDIOVASCULAR RISK FACTORS IN ADOLESCENTS

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Background and objectives: The use of central body anthropometric measures is important in the evaluation of cardiovascular risk due to the rise of obesity prevalence in adolescents. The objective was to evaluate the association between several anthropometric measurements in the diagnosis of cardiovascular risk factors in adolescents, according to sex regardless body mass index (BMI) and percentage body fat (%BF).

Methods: it was a cross-sectional study involving 336 adolescents of both sexes aged 10-13 years old from Viçosa, MG, Brazil. The nutritional status was evaluated according to the World Health Organization and the %BF by bioelectrical impedance. We measured the waist circumference (WC), hip circumference (HC), neck circumference (NC), waist-height ratio (WHtR), waist-to-hip ratio (WHR), serum total cholesterol (TC), HDL, LDL, triglycerides (TG), uric acid (UA), insulin, fasting glucose, Homeostasis Model Assessment-Insulin Resistance (HOMA-IR) and the blood pressure (BP). We used the Kolmogorov-Smirnov test, Student's t test and Mann-Whitney test and multiple logistic regression, adjusted for BMI and %BF. We adopted a significance level of $p<0.05$. The study was approved by the Ethics Committee of the institution.

Results: mean age was 11.6 ± 1.1 years old, 53.3% male, 39.3% had excess body fat and 25.0% were overweight by BMI/age. Multiple regression analysis in females presented positive associations between TG, TC/HDL with WHtR and WHR, regardless of BMI, and insulin, HOMA-IR with WC and NC, regardless of %BF. In males, positive associations between TC, LDL, insulin, HOMA-IR, AU and measures WHtR, WC, HC, and NC remained significant, independently of %BF. When adjusted for BMI, the positive association between TC/HDL and WHR persisted.

Conclusions: all central body anthropometric measures associated with at least one cardiovascular risk factor independently of nutritional status and body composition, especially in males, and could be used to assess the nutritional status of adolescents. Support: FAPEMIG/ CNPq.

Key words: Adolescent; cardiovascular diseases; anthropometry; body fat.

PO3354

COMPARISON OF TREATMENT EFFECTS BETWEEN STERIOD THERAPY AND STEROID-TCM THERAPY IN IGA NEPHROPATHY USING QUANTITATIVE PROTEOMICS

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Background and objectives: Primary IgAN is characterized by deposition of the IgA antibody in the glomerulus, while diverse efficacies would be resulted from different treatments and individual specification.

Methods: In the present study, we used a strategy combining chemical-labeling and peptide fractionation coupled with mass spectrometry to quantify the protein changes in IgAN urine treated by steroid and steroid combined Traditional Chinese Medicine (TCM).

Results: More than 1000 proteins were quantified in the urine of IgAN before and after treatment by steroid and steroid-TCM therapy. Both PCA analysis and HCA analysis can clearly distinguish the treatment by steroid and steroid-TCM. Additionally, quantified proteins were clustered into different group according to the change trend by fuzzy c-means cluster and proteins shown significant change were also submitted to David GO analysis. We found some proteins were consistently changed by both therapies, such as pro-epidermal growth factor, collagen alpha-1(I) chain and Ras-related C2 botulinum toxin substrated 1,etc.,. However, the change curves of certain proteins are different between the two therapies.

Conclusions: Our data provided potential disease-related biomarkers for evaluation of treatment by steroid and steroid-TCM therapy, and the TCM may play a role in protection of renal function.

Key words: IgA nephropathy, steroid combined Traditional Chinese Medicine, chemical-labeling, protection of renal function.

PO3355

EFFECTS OF DIETARY INDUCED WEIGHT LOSS ON PLASMA AMINO ACID PROFILES

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Background and objectives: Both low-carbohydrate (LC) and calorie-restricted (CR) diets could effectively reduce body weight. However, little is known about the changes of plasma amino acid (AA) profiles during the dietary induced weight loss. Thus, this study aimed to investigate the changes of plasma AA profiles and their relationships with cardiometabolic risk factors in a randomized controlled feeding trial.

Methods: A total of 50 overweight or obese Chinese women (age: 47.9 „b 6.6 years; BMI: 26.7 „b 2.3 kg/m2) were randomly assigned to either a low-carbohydrate non-calorie-restricted diet (initial carbohydrate intake 20 g/d, with 10 g increase weekly) or a calorie-restricted diet (carbohydrate 156-205 g/d, 35% average energy reduction) for 12 weeks. Plasma AAs before and after the intervention were measured by gas-chromatograph/mass-spectrometer.

Results: Mean weight losses were similar in two groups (LC: -5.27 [95%CI -6.08, -4.46] kg; CR: -5.09 [95%CI -5.50, -4.67] kg, P=0.67). Twenty-two AAs were detected from plasma samples. Three AAs in the LC group (alanine, -18.9%, P=6.3e-4; glycine, -23.0%, P=2.5e-4; serine, 22.8%, P=5.5e-4), and six AAs in the CR group (alanine, -18.3%, P=1.1e-4; glycine, -25.0%, P =6.5e-6; serine, 26.7%, P=3.8e-5; asparagine, 22.1%, P=1.9e-3; glutamine, 22.0.%, P=6.2e-4; and lysine, 15.4%, P=1.1e-3) changed significantly. The ratio of triglycerides to HDL cholesterol (P=0.01) reduced more in the LC group than those in the CR group. However, no between-group difference was observed for any plasma AA. Meanwhile, none of the AA changes were correlated with changes in body mass index, weight, waist circumference, or plasma concentrations of glucose, triglycerides, total cholesterol, and HDL or LDL cholesterol.

Conclusions: Although certain plasma AAs fluctuated during dietary induced weight loss, reduced body weight and improved lipid profiles could not be explained by changes of plasma AA profiles.

Key words: Plasma amino acids, weight loss, Chinese women.

PO3356

EFFECTS OF INDIVIDUAL BRANCHED-CHAIN AMINO ACIDS DEPRIVATION ON INSULIN SENSITIVITY AND GLUCOSE METABOLISM IN MICE

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Background and objectives: We have previously shown that serum insulin levels decrease threefold and fed blood glucose levels remain normal in mice fed a leucine-deficient diet, suggesting increased insulin sensitivity. The goal of the present study was to investigate the effect of branched chain amino acids (BCAAs) deficiency on insulin sensitivity and underlying mechanisms.

Methods: Changes in metabolic parameters and expression of genes and proteins involved in regulation of insulin sensitivity and glucose metabolism were analyzed in mice, human HepG2 cells, primary hepatocytes and C2C12, a mouse myoblast cell line under different BCAAs deprivation.

Results: We showed that all three BCAAs deprivation for 7 days improves hepatic insulin sensitivity via General Control Nondepressible 2/mammalian Target of Rapamycin and AMP-activated protein kinase pathways. Different from leucine, valine or isoleucine deprivation for 7 days significantly decreased fed blood glucose levels, possibly by decreasing expression of a key gluconeogenesis gene glucose-6-phosphatase. Finally, we showed that insulin sensitivity is rapidly improved in mice 1 day following maintenance on a diet deficient for any individual BCAAs.

Conclusions: Our results showed that the effect of leucine deprivation represents a general effect of BCAAs on regulation of insulin sensitivity, but not glucose levels, suggesting that each individual BCAA has unique feature in metabolism regulation. These observations are also important for understanding the molecular mechanisms underlying regulation of insulin sensitivity during different BCAAs deprivation and provide a rationale for short-term dietary deprivation or restriction of BCAAs for the treatment of insulin resistance and associated metabolic diseases. The effect of other individual amino acids will be investigated in the future.

Key words: Leucine deprivation, valine deprivation, isoleucine deprivation, insulin sensitivity, glucose metabolism.

PO3357

HEALTH BENEFITS OF VITAMIN E IN HUMAN STUDIES: EPIDEMIOLOGY VERSUS RANDOMIZED CLINICAL TRIALS

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Background and objectives: Evidence from various observational studies indicates that vitamin E has beneficial effects on the cardiovascular system. However, results from RCTs did not consistently confirm these findings. Based on the available data, our aim is to propose a more holistic approach in defining daily intake recommendations for vitamin E.

Methods: Existing evidence from epidemiological studies and randomized clinical trials was reviewed, summarized, evaluated and the respective conclusions were drawn.

Results: Outcomes of the main epidemiological studies show a 24% risk reduction for cardiovascular events at vitamin E plasma concentration above 30 μmol/l. Data from the WHS and ATBC studies suggest that vitamin E supplementation may reduce the risk of venous thromboembolism and can increase the life expectancy of some population groups. In contrast, discrepant results have been obtained by the CHAOS study with a vitamin E supplementation of 400-800 IU/d and results of the GISSI-Prevenzione (300 mg/d) and HOPE (400 IU/d) trials suggest the absence of relevant clinical effects. However, data also show that the genotype appears to be important in this regard. In the ICARE study the primary composite outcome was myocardial infarction, stroke, and cardiovascular death, which was significantly reduced in diabetics receiving 400 IU/d vitamin E (2.2%) compared with placebo (4.7%; p=0.01). These findings were confirmed in a post-hoc analysis of the HOPE study: Risk for cardiovascular events was significantly reduced only in the diabetics carrying the Hp 2-2 gene. Conclusions: Observational studies might be useful for identifying target plasma concentrations associated with health benefit(s), which then can be translated into respective intake recommendations to achieve these plasma concentrations. However, there still exists a great need for well-designed RCTs to address potential health benefits of vitamin E on relevant clinical health outcomes.

Key words: Vitamin E, health benefits, epidemiology, randomized clinical trials.

PO3358

INTERACTION BETWEEN BMI AND PERSONALITY SUBTYPES IS ASSOCIATED WITH CHANGES IN HPA-AXIS REACTIVITY

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Background and objectives: Interaction between BMI and Personality subtypes is associated with changes in HPA-axis reactivity. The reinforcement sensitivity theory (RST) of Gray explains individual differences in emotional and motivational behaviour and is funded on two brain systems that control behaviour. The behavioural approach system (BAS) controls appetitive approach, motivation and dominance and depends on dopamine levels. High BAS is associated with strong impulsivity, proneness to addiction and sensitivity to food-related cues. Low BAS individuals seek substances that activate the dopamine-mesolimbic system (DA-ML). The behavioural inhibition system (BIS) is associated with activation of the hypothalamus-pituitary-adrenal (HPA)-axis that controls cortisol dependent anxiety-based avoidance. Both DA-ML and HPA-axis have been reported to play a role in addiction. We examined DA-ML and HPA-axis activity in the BIS/BAS groups by measuring the cortisol awakening response. We hypothesise that individual variance in CAR contributes to differences in susceptibility to food addiction.

Methods: 95 participants aged 20-25 years were included and divided into BIS/BAS group based on the relevant questionaire. BMI (body mass/square of height) was classified as healthy, overweight or obese. Interaction between BIS/BAS and BMI was analysed by Two-way ANOVA and posthoc analysis.

Results: We find a significant effect of obesity on CAR-response in the low BAS group who increase food intake to augment DA levels. DA activates the HPA axis thereby stimulating cortisol production. Through a negative feedback mechanism cortisol shuts down the HPA axis. On continuous activation by stress or DA, as we see in the obese low BAS group, cortisol is unable to shut down the HPA-axis resulting in a rise in cortisol levels and responsiveness.

Conclusion: These data support our hypothesis that, at least for the low BAS group, individual variance in cortisol responsiveness accounts for differences in susceptibility to food addiction.

Key words: Obesity, Dopamine Mesolimbic-system, hypothalamus-pituitary-adrenal, BIS/BAS.

PO3359

MEAT PORK EXTRACTS PROTECT CARDIOMYOCYTE AGAINST DAMAGE INDUCED BY ISCHEMIA

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Background and objectives: Oxidative stress is a main process in ischemic heart disease. Processed meat pork products represent a potential source of antioxidants that may protect against the deleterious effects of ischemia. This study evaluated the antioxidant activity of the hydrophilic (HFL) and hydrophobic (HFB) fractions from two meat products on a cardiac model of ischemic damage.

Methods: Each meat pork product (cooked ham and dry-cured sausage) was processed to obtain their respective HFL and HFB fractions. Adult mouse cardiomyocytes —HL-1 cell line— were subjected to oxidative stress induced by ischemia (15 h under <2% oxygen in absence of glucose). Cell damage was characterized analyzing percentage of cell viability, generation of reactive oxygen species (ROS) and activity of the antioxidant enzymes catalase (CAT) and glutathione peroxidase (Gpx-3). Results are expressed as percentage of control (%) ± standard deviation.

Results: After ischemia, HL-1 cells showed a decrease in cell viability, as showed by decreasing in survival index (35%±9) compared with control. Ischemia also increased ROS levels (190±20%) and reduced CAT (22±8%) and Gpx-3 activity (45±6%). The pre-treatment for 24h with HFL fraction of either product was able to partially prevent the lost of cell viability induced by ischemia (59±6%, cooked; 45±8%, cured), to block the increase of ROS levels (110±15%, cooked; 99±10%, cured) and to prevent the lost of antioxidant activity: CAT (81±15%, cooked; 82±20%, cured) y Gpx-3 (68±10%, cooked; 85%±12, cured). The pre-treatment for 24h with HFB fraction of either product did not restore survival index (21±5%, cooked; 30±8%, cured), but it blocked ROS generation (115±20% cooked; 98±10%, cured) and attenuated the lost of CAT (80±8%, cooked; 90±10%, cured) and Gpx-3 activity (92±15%, cooked; 79±6%, cured).

Conclusions: Extracts from processed meat pork products exert a cardioprotective effect against oxidative stress induced by ischemia.

Key words: Pork meat, ischemia, cardioprotection.

PO3360

RAPID INCREASES IN PLASMA ANTI-INFLAMMATORY AND PRO-RESOLVING LIPID MEDIATOR SPECIES WITH OMEGA-3 EPA AND DPA SUPPLEMENTATION

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Background and objectives: EPA and DHA are the predominant dietary omega-3 species in the diet, capable of generating bioactive metabolites with anti-inflammatory activity including resolvins, protectins and maresins. Additionally, there is an appreciable contribution of dietary DPA, although the metabolic fate of DPA is poorly understood. Using a target lipidomics approach, the human plasma profile of lipid mediator species derived from cyclooxygenase (COX-1 and 2), lipooxygenase (5-, 12, 15-LOX), and epoxygenase (CYP) pathways was determined.

Methods: In a randomized cross-over study, female subjects (n=8) ingested 2 grams daily of pure EPA, DPA, or placebo control (olive oil; OO) for 7 days. Fasting plasma was drawn before (day 1) and following (day 8) dietary fatty acid supplementation.

Results: In total 126 lipid mediator species resolved by LC-MS. 29 lipid mediator species were influenced by OO supplementation, whilst EPA and DPA supplementation uniquely regulated a further 37 and 27 lipid mediators, respectively. In response to OO supplementation, eicosanoids derived from linoleic acid (LA) (HODEs, HOTrEs & EpOMEs) and dihomo γ -linolenic acid (DGLA) (HETrEs) were suppressed. The arachidonic acid (AA)-derived prostaglandins (PGE2 & TXB2) were also increased almost 2 fold in response in OO. EPA supplementation, circulating EPA metabolites, most notably LOX-derived hydroxyl-eicosapentaenoic acids (HEPEs), 8-HEPE and 18-HEPE increased >10 fold. Additionally, EPA derived prostaglandins (PGE3), leukotrienes (LTB5), and remaining HEPEs (5-, 9-, 11-, 12, 15-HEPE) were elevated (~2 fold). DPA supplementation resulted in marked (≥20-fold) increase in plasma concentration of the putative bioactive DHA metabolites 7,17-DiHDoPE and 19,20-DiHDoPE. Additionally, the DHA metabolites resolvin D1 (RvD1) and 7(S)-Maresin1 were increased (30-60%) by DPA. All EPA metabolites remained unaltered following DPA supplementation.

Conclusions: There is a complex inter-relationship between lipid mediators derived from the omega-3 and -6 FA families. Lipidomic analysis was able to resolve the unique metabolites derived from differing dietary omega-3 species.

Key words: Inflammation, lipidomics, omega-3 fatty acids. protectins, resolvins.

PO3361

ROLE OF EDUCATION IN THE MANAGEMENT OF TYPE 2 DIABETES DURING RAMADAN FASTING

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Background and objectives: Undertaking fasting during Ramadan constitutes a real challenge for people with diabetes, for their health care providers and even for their families. The therapeutic strategy should be individualized and patients who want to fast Ramadan safely should be previously educated in order to avoid diabetes complications during this period.

Methods: 125 patients with diabetes type 2 aged of 51±7 years were selected before Ramadan 2011 in Sidi-Bel-Abbes city (West of Algeria). Before Ramadan, 70 individuals, among the studied population (group 1), have been given advices and training on how to manage their diet, medication and monitoring their serum glucose. The rest (group 2) did not. The food consumption was assessed using the three days food record. FSG (fasting serum glucose), PPG (postprandial serum glucose), HbA1c, total cholesterol, HDL-c, LDL-c and Lp (a) lipoprotein a, were measured before during and after fasting month.

Results: Results showed that 96% of group 1 were able to fast more than 21 days with a frequency of hypoglycemic episodes of 9 fold lower than group 2. 16 patients from group 2 were hospitalized because of severe hypoglycemic events (<3.3 mmol L-1) and therefore interrupted fasting. Significant differences ($p<0.05$) have been noticed between the two studied groups for FSG, HbA1c, total cholesterol and Lp (a).

Conclusion: Education people with diabetes type 2, who want to fast safely Ramadan, will help greatly to prevent metabolic complications such as hypoglycemia and hyperglycemia during this period.

Key words: Ramadan fasting, type 2 Diabetes, education.

PO3362

SELECTED DIETARY NUTRIENTS AND THE PREVALENCE OF METABOLIC SYNDROME IN ADULT MALES AND FEMALES IN SAUDI ARABIA

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Background and objectives: In recent decades, Saudi Arabia has developed very fast economically and socially. This pace of change has affected the general dietary intake pattern of the Saudi Arabian population diverging from traditional foods towards increased consumption of energy dense and processed foods that are high in fat, sugar and salt. We aimed to examine the relationship between selected dietary nutrient intakes and prevalence of metabolic syndrome in the general population of Riyadh, Saudi Arabia, including adult males and females.

Methods: In this cross-sectional study, 185 Saudi adults aged 19 to 60 years (87males and 98 females with a mean age of 35.6 ± 13.2, 37.6 ± 11.7 respectively) were included. The criteria for metabolic syndrome were based on those of the International Diabetes Foundation (IDF) and the dietary food intake was assessed by the two 24 hour dietary recall method.

Results: The odd ratios (ORs) of metabolic syndrome across quartiles of selected dietary nutrients had significantly lower inverse relationships for carbohydrate and protein, as well as for vitamin A, C, E, K, calcium, zinc and magnesium ($p<0.05$ for all) in the female group with metabolic syndrome as compared to those without metabolic syndrome.

Conclusions: The pattern of daily dietary intake of selected nutrients among the general population of Riyadh raises concern and this dietary imbalance could increase the risk of high prevalence of metabolic syndrome in particular in adult females compared to males.

Acknowledgements: We thank the Prince Mutaib Chair for Biomarkers of Osteoporosis for technical and financial support. Special thanks to Mr. Benjamin Vinodson for the statistical analysis

Key words: Dietary micronutrients, metabolic syndrome, vitamins, Saudi Arabia.

PO3363

S-EQUOL ENHANCES THE PROLIFERATION OF PANCREATIC BETA-CELLS

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Background and objectives: Type 2 diabetes mellitus is one of the major health problems worldwide. Decrease of pancreatic ß-cell mass, which is the result of impaired cell proliferation and increased ß-cell death, is observed in type 2 diabetes mellitus patients and has been directly linked to defects in insulin secretion. The aim of this study is to identify food factors that enhance the proliferation and reduce the cell death of ß-cells.

Methods: We examined the effects of food factors on the proliferation and alloxan-induced cell death of INS-1 rat ß-cells.

Results: S-Equol, a metabolite of the soy isoflavone daidzein, enhanced the proliferation of INS-1 cells. Although the transcriptional activation of estrogen receptor by S-equol (10 μM) were comparable to that by R-equol (10 μM) or 17ß-estradiol (10 nM), growth stimulation were only observed in the presence of S-equol. The estrogen receptor antagonist ICI182,780 did not affect the S-equol-enhanced INS-1 cell growth. H89 (an inhibitor of protein kinase A signaling), but not LY294002 (an inhibitor of PI3K/Akt signaling), abolished S-equol-enhanced proliferation of INS-1 cells. S-Equol elevated intracellular cAMP levels and induced cAMP-response element-mediated transcription measured by luciferase reporter assay. S-Equol suppressed alloxan-induced cell death. H89 diminished the cytoprotective effects of S-equol against alloxan. The cytoprotective activity of S-equol was not observed in the presence of cycloheximide.

Conclusions: These results indicate that S-equol increases proliferation and survival through activation of protein kinase A signaling. Our data suggest that S-equol is effective for prevention of type 2 diabetes mellitus.

Key words: S-equol; pancreatic ß-cell; type 2 diabetes mellitus; protein kinase A signaling; soy isoflavone.

PO3364

VITAMIN D IN BARIATRIC SURGERY PATIENTS

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Background and objectives: Bariatric surgery is the only demonstrated method that causes enough weight loss to control long term comorbidities in morbid obesity. This surgery could increases Vitamin D deficit, observational studies have demonstrated an association between obesity and lower 25-hydroxyvitamin D serum levels (25(OH)D). The objective was to aanalyze the relation between weight loss, surgical techniques and serum 25(OH)D concentration in bariatric surgery patients..

Methods: We reviewed the medical records of morbidly obese patients referred to our clinic prior to bariatric surgery between January 2001 and December 2011. All patients had a complete medical history including physical examination, surgical technique, vitamin D levels and weight loss percentage.

Results: 435 patients, 76.6% women. Mean age 46,57±10,96 years. Following mean time 39,01±23,56 months, 56,52±22,83% of loss weight. Vertical banded gastroplasty and gastric bypass were practiced in 92,4% of patients, tubular gastrectomy in 1,8% and adjustable gastric band in 5,5%. After surgery, insufficient vitamin D serum levels were found in 11,1% patients (25(OH)D <20 ng/dl), low levels in 51% (25(OH)D 20 -30 ng/dl), normal levels in 37,2% (25(OH)D >30 ng/dl). Mean Vitamin D levels of 31,50+/- 15,57 after Vertical banded gastroplasty and gastric bypass; 33,45 +/- 12,74 after tubular gastrectomy and 39,91 +/- 16,14 ng/dl after adjustable gastric band without statistical differences (p 0,528). Obese patients after surgery (IMC ≥ 30 kg/m2) have significant lower serum Vitamin D (30,87 ±14,17 ng/dl) than patients with normal weight (IMC < 30 kg/m2; 35,99 +/- 20,12 ng/dl) (p = 0,021). No statistical differences between serum vitamin D levels and weight loss percentage were founded (p=0,695).

Conclusions: Vitamin D deficiency was similar to general population even with 880 UI calcidiol supplementation. No statistical differences were founded in serum vitaminD levels, surgical technique and weight loss percentage. Obese patients after surgery have significant lower serum VitaminD levels than patients that normalize weight.

Key words: Bariatric surgery, calcidiol, obesity, 25-hydroxyvitamin D, vitamin D.

PO3365

REPRODUCTIVE FACTORS AND THE RISK OF BREAST CANCER: STUDY OF A POPULATION OF WOMEN IN GRANADA (SPAIN)

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Background and objectives: Breast cancer is the second cause of cancer deaths in women, and accounts for 19% of all malignant tumors. Thus, the objective of this study was to discover whether there was a possible link between factors such as duration of maternal breast-feeding and its correlation with the subject's age at breast cancer diagnosis.

Methods: In this study, the sample population consisted of 199 women 30-85 years of age, with no family history of breast cancer, who had been diagnosed and treated for the disease at the Virgen de las Nieves University Hospital in Granada (Spain). Data from the clinical histories of each patient in the study were collected and statistically analyzed.

Results: This study found that those subjects who had not breastfed their children had been diagnosed with breast cancer at a younger age. In contrast, when the lactation period was from three to six months, the subject's age at diagnosis was more advanced (54 years of age). However, those women who had breastfed their children for over six months had been diagnosed with breast cancer significantly (p<0.005) later in life.

Discussion: These results coincide with those of other studies, which found that a lactation period of over six months reduced the risk of breast cancer.

Conclusions: The results obtained showed that maternal breast-feeding for more than six months favors a later development of breast cancer.

Key words: Breast cancer, Breastfeeding duration, Age of Menarche, Prevention.

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T5. Nutrients and Nutritional Assessment

PO2338

MACRONUTRIENTS AND ENERGY INTAKE OF ADULTS WITH SICKLE CELL DISEASE

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Background and objectives: Nutritional factors play crucial roles in the expression of a variety of chronic diseases; their roles in sickle cell disease pathophysiology and treatment have not been fully examined. Sickle cell disease (SCD) is a debilitating disease resulting in chronic hemolytic anemia and vaso-occlusion in almost all organs leads to significant morbidity and early death. The objective wass to assess the dietary intake of adults with sickle cell disease and healthy controls.

Methods: Twenty-two (22) adults participated in the study – fourteen controls and eight homozygous sickle cell disease (SCD) individuals. A weighed food intake was conducted. Independent sample t-test was used to assess differences between groups.

Results: Based on the calculated estimated energy requirement (EER) values, the participants' energy intakes were exceeded by 27.64% and 64.59% by the control and the sickle cell groups respectively. The SCD group had a significantly higher intake of energy, fats, and carbohydrates ($p<0.01$). Calories from fats and sugars accounted for 66% of the total energy intake in the SCD group compared to 57% in the control group.

Conclusions: Further studies are required to examine the impact of diet in the management of SCD and decreasing the dietary risk factors for developing other chronic diseases.

Key words: Sickle cell disease (SCD), Energy, Carbohydrates, Fats

PO2339

COMPARISON BETWEEN BIOELECTRICAL IMPEDANCE ANALYSIS AND BODY MASS INDEX METHODS IN DETERMINATION OF OBESITY PREVALENCE AMONG IRANIAN WOMEN

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Background and objectives: Obesity has an increasing trend worldwide. application of body mass index (BMI) cutoff points of obesity classification for all population studies has been questioned. On the other hand, bioelectrical impedance analysis (BIA) is a safe, accurate, reliable and inexpensive method for screening the overweight and obesity in such studies. Objective was identifying the prevalence of obesity and overweight using BMI and BIA methods among Tehrani women.

Methods: In this cross-sectional study, one hundred and eighty-seven healthy healthy women 18¨C45 years aged were recruited. Demographic and anthropometric data were collected by the trained students. Body fat percent (%BF) and body fat mass (BFM) were measured using BIA method. BMI≥25 and ≥30 kg/m2 were used as criteria for determining the overweight and obese women, respectively. %BF≥30% and %BF≥35% was regarded as cutoff for defining over fat and obesity. results Mean age±SD. of the women was 34.9±8.1 years.

Results: the BMI, %BF and waist-to-hip ratio were: 27.7(5.8) kg/m2, 35.5(6.9)% and 0.77(0.08), respectively. Central obesity was prevalent in 32.6% of the subjects. Prevalence of obesity determined by BMI and BIA methods was 35.8 and 57.8% and women within normal ranges were detected in 28.9 and 23% of the subjects by these methods, respectively. About one half of the women were overweight or obese. Women with higher age levels had higher BMI than the other subjects but this different are not significant for body fat percentage ($p=0.134$).

Conclusions: Obesity and overweight is prevalent in about one-half of the Tehrani women and more than one-third of the subjects have central obesity. BIA and BMI methods are different in determining the thin, normal and obese women.

Key words: Overweight, obesity, bioelectrical impedance analysis, body mass index, women

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PO2341

VALIDITY OF ENERGY INTAKE REPORTS IN RELATION TO DIETARY PATTERNS

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Background and objectives: The role of under- and over-reporting of energy intake in determining the dietary patterns is yet unclear, especially in Middle Eastern countries. This study identifies the prevalence of misreporting among Tehranian women and to compare the dietary intake patterns of plausible and all energy reporters

Methods: In this cross-sectional study, dietary intakes of 187 women aged 18-45 years were assessed using food frequency questionnaire. Demographic, medical and anthropometric data were collected using pre-tested questionnaires. FitMate™ metabolic analyzer and Goldberg equation were used to determine the under/over- reporting of energy intake among participants. Cluster analysis was performed for extraction of dietary patterns.

Results: Under-reporters (35.3% of subjects) were more likely to be overweight and older compared to plausible reporters. Three dietary patterns emerged for all reporters (healthy, unhealthy and mixture patterns) and two were identified for plausible reporters (healthy and unhealthy patterns). The mean intakes of fish, poultry, low-fat dairy products, fruits, other vegetables, green vegetables, tomato, dry fruits, grain, potato, nuts, sauce and yogurt drinks were significantly higher in "healthy food cluster" compared to "unhealthy food cluster" ($p<0.01$). Plausible reporters in "healthy food cluster" consumed more other vegetables, potato, yellow vegetables and tea compared to "unhealthy food cluster". Using only plausible reporters to determine dietary patterns was not similar to using all reporters. The proportion of under-reporters was 59.3 % in the mixture cluster; 30.4 % in the unhealthy cluster and 35.3 % in the healthy cluster ($p<0.05$).

Conclusions: Among Tehranian women, under-reporting of energy intake is not uniformly distributed among dietary pattern clusters and tends to be less severe among subjects in the unhealthy cluster. Our data suggested that misreporting of energy intake might affect the dietary pattern analysis.

Key words: Validity, energy under-reporting, dietary patterns, women

PO2342

DIETARY DIVERSITY AND NUTRITIONAL STATUS OF URBAN PRIMARY SCHOOL CHILDREN FROM IRAN AND INDIA

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Background and objectives: Nutritional status of children is influenced by diet. Better dietary diversity helps ensure adequate intake of essential nutrients especially for growing school going children.

Methods: The present study examined dietary diversity, weight-for-age (WA) and height-for-age (HA) and weight-for-height weight-for-age z-scores and nutritional status of 4570 children aged 6-9 years, including 2234 Iranian (1016 boys, 1218girls) and 2336 Indian (1240 boys, 1096 girls) attending primary schools residing in Mumbai and Ahwaz, Iran, from low and middle income categories. Dietary diversity scores were assessed based on frequency of consumption of individual food items categorized into 11 individual food groups.

Results: Total dietary diversity scores were significantly higher for Indian children who had normal weight or who were overweight ($F=32.197$, $p=0.000$) and lowest for underweight children. Similar trends were observed for the children from Iran ($F=9.345$, $p=0.000$).Total food group scores increased with better height status of the children. In both countries, severely and moderately stunted children had lower total mean scores than those who had normal and above average height. Wasting was also associated with lower total mean scores. Analysis of data for individual food groups showed that increasing weight was associated with higher scores for almost all food groups in India. In Iran, mean scores for vegetables, beverages, sweets and fats increased with increasing weight. Height for age z-scores were positively associated with mean score for pulses in both countries and dairy products, beverages and fats. Higher BMI was associated with higher scores for cereals, fruits, vegetables, dairy products, mixed dishes, beverages, sweets and fats.

Conclusions: Higher consumption of energy dense foods may contribute to overweight and obesity whereas low dietary diversity may be associated with undernutrition.

Key words: Nutirional status, dietary diversity, school children

PO2343

ANTHROPOMETRIC MEASUREMENTS AND NUTRITIONAL STATUS OF URBAN PRIMARY SCHOOL CHILDREN IN SELECTED AREAS OF IRAN AND INDIA: A COMPARATIVE STUDY

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Background and objectives: Malnutrition is a widespread problem in developing countries. Information on nutritional status of school children are not enough in Iran and India. The present study, made to assess prevalence of undernutrtion, stunting and wasting among children in India and in Iran.

Methods: Height and weight of 4570 including 2234 Iranian (1016 boys, 1218girls) and 2336 Indian (1240 boys, 1096 girls), aged 6-9 years, attending primary schools residing in Mumbai (India) and Ahwaz (Iran) were measured and the body mass index (BMI) calculated. The World Health Organization's (WHO) anthropometric indices of weight-for-age (WA) and height-for-age (HA) and weight-for-height were used to assess the children's nutritional status.

Results: Underweight, stunting and wasting occurred in 3.2%, 1.5% and 4.1%% of Indian and 0.2%, 5.4% and 1.7% of Iranian children. WAZ mean scores were -0.071±1.195 for boys and -0.287±3.241 for girls in Iran and -0.238±0.823 for boys and 0.108±1.080 for girls in India. HAZ mean scores were -0.163±1.219 for boys and -0.515±3.141 for girls in Iran and -0.028±0.770 and -0.017±0.993 for girls in India. Iranian children 0.2% (X2=30.428, p=0.000) and 3.2% Indian had weight for age z-scores - 2 SD (X2=55.361, p=0.000). Only 1.5% Indian children and 5.4% Iranian had height for age z-scores below -2SD (X2=11.553, p=0.000 and X2=24.034, p=0.000). In Iran 1.7% and 4.1% of Indian children were wasted (X2=11.176, p=0.004 and X2=40.088, p=0.000). Indian children, 1.3% had weight for height z –scores > +2SD compared to 3.6% Iranian.

Conclusions: Most of children in both countries were well nourished. Stunting was more prevalent in Iran than India. In India children were more wasted than Iran. The percentage of stunted children was more in Iran than in India, and a slightly higher percentage of Iranian children tended to be overweight / obese compared to Indian children.

Key words: Anthropometry, nutritional status, schoolchildren

PO2344

ZINC, RETINOL AND CD4 STATUS OF HIV/AIDS PATIENTS IN ABEOKUTA, NIGERIA.

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Background and objectives: This study was both qualitative and quantitative which investigated the zinc, retinol and Cluster of Differentiation 4 (CD4) status of the People living with HIV/AIDS (PLWHA) in Abeokuta, Nigeria.

Methods: Purposive sampling technique was used to select two hundred PLWHA respondents at the Federal Medical Center (FMC) Idiaba, Abeokuta. Blood samples were carefully collected from subsamples of hundred subjects for serum zinc, retinol and CD4 counts analysis.

Results: The values obtained were compared with Centers for Disease Control (CDC), reference values. 62% of the respondents had mean CD4 cell count moderately low (200-499 µl), 38% had a mean CD4 cell count below 200 cell/µl. Using 1993 CDC guidelines, majority of the patients had moderate HIV disease i.e stage B, while the remaining respondents had advance HIV disease i.e. stage C. The correlation coefficient of zinc and CD4 ($r = -0.080$ $p<0.05$) showed very weak negative relationship, unlike retinol and zinc ($r = 0.11$ $p<0.05$) so also retinol and CD4 ($r = 0.036$ $p<0.05$), they both showed weak positive linear relationship.

Conclusions: The government of Nigeria should provide adequate diets for PLWHA as part of component for positive living and not just provision of free drugs in order to boost the CD4 counts and immunity of PLWHA.

Key words: HIV/AIDS, serum zinc, serum retinol, CD4 counts.

PO2346

COMPARISON OF HEIGHT FOR AGE BY STANDING AND ESTIMATED HEIGHT BY SHOULDER-ELBOW, KNEE-HEEL AND TIBIA-MALLEOLUS, IN COLOMBIAN SCHOOL CHILDREN

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Background and objectives: The measure of size is essential for the nutrition assessment of pediatric patients, but in some circumstances it is difficult to take height by standing, due to pathological complications that may occur in hospitalized patients. The segments can be measured by estimating the size in those patients who can not be measured by standing. The objective is to identify in school children in a public school in Bogotá, Colombia, the best approach to height by standing (H/A) when compared with the estimated size by shoulder-elbow (H/SE), knee-heel (H/KH) and tibia-malleolus (H/TM) according to Stevenson and Chumlea techniques.

Methods: The study included 432 children from a public school in Bogotá, Colombia, between 5 and 9 years of age who are taking the height in centimeters by standing and estimated size was calculated as H/SE, H/KH and H/TM.

Results: We included 432 children aged 7 years 7meses ± 1 year 3 months (range 5 to 9 years 11 months), 242 were female (56.0%), the mean ± standard deviation measures: H/A = 122.6±9.2 cm, H/SE = 132.3±10.0 cm, H/KH = 124.3±16.6 cm and H/TM = 112.1±63.8 cm, significant differences between H/A versus H/SE and H/A versus H/TM (p=0.000) but not between H/A versus H/KH (p>0.05).

Conclusions: In school children of a public school in Bogotá, Colombia, the estimated size by H/SE and H/TM are approximate and alternatives, when you can not take a H/A by standing, especially in patients who can not ambulate, regardless of classification indicator H/A.

Key words: Nutrition assessment, height, children

PO2347

INCREASING DIETARY CALCIUM IN THE FACE OF CALORIC RESTRICTIONS IN HUMANS

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Background and objectives: Increasing 1,25-hydroxide vitamin D in response to low-calcium diets stimulates adipocyte Ca2+ influx and, as a consequence, stimulates lipogenesis, suppresses lipolysis, and increases lipid accumulation, whereas increasing dietary calcium inhibits these effects and markedly accelerates fat loss in mice subjected to caloric restriction. Our objective was to determine the effects of increasing dietary calcium in the face of caloric restriction in humans.

Methods: We performed a randomized controlled trial in 32 obese adults. Patients were maintained for 24 weeks on balanced deficit diets (500 kcal/d deficit) and randomized to a standard diet (400 to 500 mg of dietary calcium/d supplemented with placebo), a high-calcium diet (standard diet supplemented with 800 mg of calcium/d), or high-dairy diet (1200 to 1300 mg of dietary calcium/d supplemented with placebo).

Results: Patients assigned to the standard diet lost 6.4 ± 2.5% of their body weight, which was increased by 26% (to 8.6±1.1%) on the high-calcium diet and 70% (to 10.9 ± 1.6% of body weight) on the high-dairy diet (p<0.01). Fat loss was similarly augmented by the high-calcium and high-dairy diets, by 38% and 64%, respectively (p<0.01). Moreover, fat loss from the trunk region represented 19.0 ± 7.9% of total fat loss on the low-calcium diet, and this fraction was increased to 50.1 ± 6.4% and 66.2 ± 3.0% on the high-calcium and high-dairy diets, respectively (p<0.001).

Conclusions: Increasing dietary calcium significantly augmented weight and fat loss secondary to caloric restriction and increased the percentage of fat lost from the trunk region, whereas dairy products exerted a substantially greater effect.

Key words: Lipogenesis, suppresses lipolysis, augmented weight, substantially,randomized

PO2348

NEED FOR TRACE ELEMENTS IN THE PARENTERAL NUTRITION AFTER ABDOMINAL SURGERY IN CHILDREN

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Background and objectives: The need to administer trace elements (TE) during the short period after surgery has not yet been fully studied in children receiving parenteral nutrition (PN). Therefore, we tried to clarify whether pediatric patients require the administration of TE, including zinc (Zn) and copper (Cu), while receiving PN during the short period after abdominal surgery.

Methods: Sixteen children were prospectively studied and divided into two groups; one group received PN without TE after surgery (n=8), while the other group received PN with TE after surgery (n=9). In both groups, both Zn and Cu concentrations in the blood were measured on the preoperative day and the changes of the Zn and Cu concentrations over time were measured during the starvation period from the first to the 5th postoperative day.

Results: The preoperative Zn and Cu concentrations in the blood were within normal range in both groups. In the group receiving PN without TE, the Zn concentration continued to be below the normal range during the starvation period after the operation, while the Zn concentration decreased to be below the normal range on the 1st postoperative day and thereafter increased to be the normal range during the period in the group receiving PN with TE. Regarding the Cu concentration in the blood, the concentration continued to be within the normal range in both groups after the operation.

Conclusions: During the short starvation period after abdominal surgery, the Zn concentration in the blood decreased, if the pediatric patients received PN without TE. Therefore, clinicians treating pediatric patients should add TE to the PN solution during the short starvation period after abdominal surgery.

Key words: Abdominal surgery, children, parenteral nutrition, zinc, copper

PO2349

ROLE OF SUB-CLINICAL INFLAMMATION ON IRON SUPPLEMENTATION

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Background and objectives: Anaemia is one of major nutritional problems in Myanmar and poor vitamin A status is common in SE Asia. Nutritional status of iron and vitamin A is influenced by sub-clinical inflammation (SCI). There is lack of information on the influence of SCI on the effectiveness of iron supplementation to reduce anaemia. The study was conducted to determine whether SCI influenced the impact of iron supplementation on anaemia.

Methods: A randomized, double-blinded, placebo-controlled experimental study (ClinicalTrials.gov: NCT01198574) was conducted in the Ayeyarwady region of Myanmar among post-menarcheal, anaemic adolescent schoolgirls (Hb<120 g/L). A total of 402 schoolgirls were recruited from 6 schools after screening among 1269 subjects. Subjects were assigned into one of four groups: control (FA, 2.5 mg of folate), vitamin A (VA, 15,000 IU), iron-folic-acid (IFA, 60 mg elemental iron and folate) and IFA+vitamin A (IFA+VA, iron, vitamin A and folate). Supplementation was done once a week for 12 weeks. Iron, vitamin A and inflammation status were measured at baseline, middle and endline.

Results: Iron status of the subjects was improved by the intervention. Odds ratios of iron deficiency reduced significantly in IFA and IFA+VA (by 71% and 64% respectively) as compared to FA group. The prevalence of SCI was low but had an influence on iron supplementation. Among those with SCI, there was VA*SCI interaction in which the groups receiving VA showed higher mean Hb (112.5 vs 105.7 g/L) and lower sTfR (5.8 vs 9.6 mg/L) as compared to the other groups.

Conclusions: Weekly iron supplementation combined with vitamin A for 12-week significantly reduced the prevalence of anemia and iron deficiency. SCI has negative impact on iron supplementation. Vitamin A positively contributes to iron supplementation when there is SCI.

Key words: Anemia, iron deficiency, sub-clinical inflammation

PO2350

EFFECT OF ZINC ON IMMUNE FUNCTIONS IN PATIENTS WITH PULMONARY TUBERCULOSIS

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Background and objectives: The tuberculosis infection triggers in the host a complex immune response and the involvement of CD4 and interferon–gamma (INF-gamma) of lymphocytes in these processes has been reported. Since nutritional status e.g. regarding zinc may have potent effects on the immune response, we hypothesized that an increased supply of zinc can affect the immune function in pulmonary tuberculosis.

Methods: We conducted a zinc supplementation study in twenty-one patients randomized to be given zinc or placebo

for 3 months during concomitant drug therapy. The plasma concentration of immunoglobulins, the in vitro proliferation of peripheral blood mononuclear cells (PBMC), the production of INF-gamma and the magnitude of the CD4/CD8/CD3 lymphocyte subpopulations after stimulation with Concanavalin A were measured.

Results: The results showed that the immune system of the patients was activated compared to matched healthy control subjects as reflected in the increased concentration of immunoglobulins and in the ability of the PBMC to proliferate and produce INF-gamma in response to stimuli and also by the increased proportion of PBMC expressing the CD4 marker. There was no difference in these variables between the zinc-supplemented and placebo groups and the magnitude of the findings were not related to the clinical recovery. The addition of zinc sulphate in vitro to PBMC inhibited the expression of CD4, but the reasons for this inhibition are not clear.

Conclusions: It is concluded that the immune system of the Bolivian tuberculosis patients was activated and in response to therapy the immune response seemed to take a Th1-orientation to a higher degree. It was not possible establish a clear role of zinc supplementation on the immune response using this study design.

Key words: Zinc addition, immune response, Th1 orientation

PO2351

FOOD DIVERSITY IN RELATION TO SCHOOLCHILDREN'S GROWTH IN MOROCCO

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Background and objectives: About 20% Moroccan children under the age of 15 years are stunted or delayed in growth. Dietary quality is much associated with dietary diversity. The purpose of the study was to assess dietary diversity by comparing a dietary diversity score (DDS) and a weekly food frequency score (WFFS) and study their relationship to stunting in school-age children in the province of Kenitra (Morocco).

Methods: A stratified random sample of 263 pupils including one-third from rural schools were administered a weekly food frequency questionnaire. A health team assessed the anthropometric status. Dietary diversity was appraised with two types of indices: a dietary diversity score (DDS) based on the number of food categories consumed over a week, and a weekly food frequency score (WFFS) which also takes into account the frequency of food intake.

Results: the average age was 12.9 ± 0.9 years. The DDS was significantly higher in rural than in urban children, whereas the WFFS was lower, in rural children owing primarily to less frequent intake of fruits and vegetables than in the urban children. Maternal level of instruction was also positively associated with a higher consumption of fruits and vegetables and milk, and with a higher WFFS. Both indices were significantly associated with stunting.

Conclusions: The study suggested that diet quality is associated with height status and food diversity indices that take food frequency into account which may provide a better reflection of diet quality.

Key words: Diet, schoolchildren, Morocco

PO2352

NUTRITIONAL STATUS IN COLOMBIAN CHILDREN WITH LIVER ABSCESS

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Background and objectives: The detection of in-hospital malnutrition in children with liver abscess (LA) is required to initiate a prompt and proper nutritional recovery plan. The objective was to determine the nutritional status (NE) of 14 children with LA from Hospital Universitario del Valle "Evaristo Garcia" in Cali, Colombia.

Methods: A descriptive, observational, cross sectional study in 14 children with 8.7 ± 3.8 years of age, 50% female, with first diagnosed by clinical and ultrasound for LA. It was evaluated NE by anthropometric, and other variables.

Results: The mean ± standard deviation (X ± SD) for body mass index, weight, height, and height/age, was 29.2 ± 11.6 kg, 128.3 ± 23.0 cm, -0.1 ± 0.9 SD and -0.3 ± 1.1 SD, respectively, with malnutrition in 42.9% and failure to thrive in 7.1%. The X ± SD for hemoglobin and albumin was 9.9 ± 1.2 g/dl and 3.0 ± 0.3 g/dl, respectively, with anemia and hypoalbuminemia in 92.3% and 83.3%, respectively. Most came from Cali and Valle, Colombia. The X ± SD for evolution time and hospital stay was 12.0 ± 9.4 days and 22.3 ± 20.9 days, respectively. Besides the triad fever, hepatomegaly and right upper quadrant pain occurred vomiting in 57.1%, anorexia and diarrhea in 21.4%, respectively, and cough in 14.2%. Predominated the LA in right location and unique. The positive cultures was 64.2% and amoebae in stool in 14.2%. All received antibiotics and 35.7% surgical drainage.

Conclusion: Nearly one third of children with LA presented risk of undernutrition with anemia and hypoalbuminemia in 92.3% and 83.3%, respectively.

Key words: Nutritional status, liver abscess, children

PO2353

NUTRITIONAL STATUS OF COLOMBIAN GIRLS CHILDREN WITH HELICOBACTER PYLORI GASTRITIS

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Background and objectives: Helicobacter pylori gastritis (Hp) in children can compromise their nutritional status (NS). The objective was to determine the NS in children from Rozo, Colombia with Hp gastritis and possible associations.

Methods: Case (n = 11) and controls (n = 19) study in a group of children from Rozo, Colombia with Hp gastritis diagnosed by IgG in who was considered the age, weight and height. Statistical analysis included estimation of the prevalence of malnutrition (MNT) and failure to thrive (FT), confidence interval corresponding to 95%, the estimate of other descriptive measures of interest and association analysis by multiple logistic regression.

Results: In this group of girls children with a mean age of 10.2 ± 3.0 years (range 6 to 18) found a prevalence of 26.7% for MNT and (FT) of 23.3%. The mean ± standard deviation (X ± SD) for weight, height, body mass index and height/age was 31.6 ± 8.5 kg, 136.8 ± 13.6 cm, -0.3 ± 0.8 and -0.3 ± 1.2. Association analysis found > FT opportunity to > age (OR 1.2 95%CI 2.4-6.2, p=0.000), and was eventually associated factor (OR 2.7 95%CI 1.2-5.8, p=0.011).

Conclusions: Nearly one third of the girls children had malnutrition and > FT, and it was found with age.

Key words: Nutritional status, Helicobacter pylori gastritis, malnutrition, failure to thrive, children

PO2354

THE EFFECT OF AGE AND SEX DIFFERENCES ON MAGNESIUM ABSORPTION IN RATS

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Background and objectives: Decrease in magnesium (Mg) absorption in aged male rats is well documented in the literature. However, few studies have reported the effect of age and sex on Mg absorption. This study was designed to simultaneously evaluate the effect of age and sex on Mg absorption and balance in rats.

Methods: Thirty-six male and female Fischer 344 rats at three different ages (1, 6, and 18 months) were fed the AIN-76 diet (0.05% Mg) for 2 weeks. The animals were fed fresh food and ion-exchanged water ad libitum. The Mg balance test was performed for the last 5 consecutive days.

Results: The results clearly demonstrated that apparent Mg absorption (per-cent) was significantly lower in aged rats (6 and 18 months) than that in young (1 month) rats. High Mg absorption was seen in 1-month-old male rats and in 6- and 18-month-old, female rats. Apparent Mg retention (per-cent) was significantly lower in aged rats (6 and 18 months) than that in young (1 month) rats. However, it was not significantly altered with sex. Between 6 and 18 months, no significant difference was observed in apparent Mg absorption and retention in rats. Apparent urinary Mg excretion (per-cent) was significantly altered with age in female rats (18 > 6 > 1 month) but not in male rats. Apparent urinary Mg excretion (per-cent) was significantly altered with sex and was higher in 6- and 18-month-old female rats.

Conclusions: Age and sex differences affect apparent intestinal magnesium absorption in rats.

Key words: Magnesium, absorption, sex difference, aging

PO2355

THE DOUBLE BURDEN OF MALNUTRITION AMONG UNDERGRADUATE STUDENTS IN SOUTH WESTERN NIGERIA

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Background and objectives: The co-existence of under-nutrition and over-nutrition in the same population has its implications and has been associated with the incidence of various diseases. There are few data to support the prevalence of both conditions among the entire populations in Nigeria. Therefore the aim of this study is to assess the double burden of malnutrition among undergraduate students in south Western Nigeria.

Methods: A cross-sectional study of 2950 apparently healthy and non- pregnant undergraduate students of Tai Solarin University of Education Ijebu-ode Ogun State Nigeria was conducted. Anthropometric assessment was done. Body mass index (BMI) was calculated and the students were grouped under the various categories. Excess abdominal fat was determined measuring the Waist Circumference (WC). Statistical Package for Social Science (SPSS) version 15 was used for data analysis.

Results: Female respondents were 1835 (62.2%) and 1115 (37.8%) were males. Mean age, height, weight and BMI were 23

± 2.98 years, 1.63 ± 0.09 m, 60.99 ± 12.22 kg and 22.80 ± 4.59 kg/m2 respectively. Mean WC was 80.55 ± 20.80 cm among the females and 82.21 ± 10.56 cm among the males. The prevalence of underweight was 13.4%; 16.9% were overweight, 7.5% were obese out of which 0.6% were morbidly obese. Age and sex of the respondent did not significantly affect BMI (p=0.464 and 0.115, respectively). About half (50.64%) of the overweight and obese respondents also had excess abdominal fat among the female students. A similar trend was observed among the male respondents. There was a significant relationship between BMI and WC (p<0.05) with both sexes.

Conclusions: Both under-nutrition and over-nutrition are existing among the respondents from this study. Obesity seems to be more common among the female students. Nutrition education is suggested as a means of intervention to curb the increasing trend of overweight and obesity.

Key words: Malnutrition, undergraduates, burden, disease, double

PO2356

FACTORS AFFECTING THE NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN IJEBU-ODE, OGUN STATE, NIGERIA

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Background and objectives: Under-five (U5) children are vulnerable to malnutrition especially in the developing countries. In Nigeria, more than 50% of all childhood deaths have under-nutrition as an underlying factor. At the dawn of the 21st century, it is tragic that one in seven Nigerian children die before his or her fifth birthday. The underlying causes of malnutrition have been identified by the UNICEF conceptual framework. This study therefore aims at assessing the factors that contribute to malnutrition among U5Cross-sectional study of 400 U5 was conducted.

Methods: Validated semi-structured questionnaire were administered to obtain information on socio-economic characteristics of household. Anthropometric assessment of height and weight were done and analyzed using the WHO Anthro Software. A 24-hr recall was done to assess nutrient intakes and analyzed using the adapted Total Dietary Assessment (TDA) software. Statistical Package for Social Science (SPSS) version 15 was used for data analysis. One hundred and eighty-four (46.0%) male and 216 (54.0%) female children participated in the study.

Results: The total prevalence of stunting (HAZ) was 18.5%. Wasting (WHZ) was 6% and underweight (WAZ) was 4.5%. The nutritional status of male and female children were not significantly different (p>0.05). Children from larger household size had a higher risk of becoming malnourished. Educational level of the household-head and of the mother significantly affected all the malnutrition indices (p=0.002). Income of the household-head also had a significant relationship (p<0.05) with all the malnutrition indices. Occupation of the household-head and religion of parents had no significant relationship (p>0.05) with the indices of malnutrition among the children.

Conclusions: Family planning and education of the female child should be encouraged. The problem of poverty also needs to be addressed as interventions to reduce the level of malnutrition among U5 children.

Key words: Assessment, education, poverty, malnutrition

PO2357

NATIONAL NUTRITION SURVEY IN THE STATE OF KUWAIT

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Background and objectives: The National Nutrition Survey of the State of Kuwait (NNSSK) used a stratified probability cluster sampling to obtain a representative national sample of Kuwaiti households, based on 82 clusters from the six governorates of Kuwait.

Methods: 545 households (1830 individuals representing six age groups; <5, 6-9, 10-19, 20-49 and >50 years, participated in the survey (July 2008 to November 2009). The survey collected anthropometric, health, dietary and socio-economic data and biological samples.

Results: The prevalence of overweight or obesity among children and young adults (≤19 year) was 35% for males and 28% for females. For adults, the prevalence was 70% for males and 75% for females. Approximately 15% fasting blood glucose values were indicative of diabetes and another 33% at increased risk of diabetes. The prevalence increased with age to more than 50% of men and women age ≥ 50 years. The prevalence of hypertension was 26% with more than 60% of men and women ≥50 years of age being hypertensive.

Conclusions: Overweight and obesity, and related non communicable diseases, are major public health problems in Kuwait. Urgent action is needed to address these problems, in particular to combat overweight and obesity during childhood.

Key words: Nutrition survey, anthropometric, biological.

PO2358

UNDERREPORTING OF ENERGY INTAKE FROM 24-HOUR DIETARY RECALL IN KOREAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY

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Background and objectives: Chronic degenerative diseases are closely associated with dietary habits, nutritional status and particularly energy balance. To study the relationship, it is very important for the dietary surveys to report energy intake accurately. This study attempted to identify the frequency of underreporting and its related characteristics based on the Korean National Health and Nutrition Examination Surveys conducted in the years 2007-2009.

Methods: This study analyzed dietary intake data from 15,133 men and women aged 19 and older using 24-hour dietary recalls. The basal metabolic rate(BMR) was calculated from the age- and gender-specific equations of Schofield, and underreporting was defined by computing a ratio of energy intake(EI) to estimated basal metabolic rate(BMRest).

Results: Under reporters(URs) included 14.4 % of the men and 23.0 % of the women. Underreporting of energy intake was low in men and women who had high school or higher education, or lower income. Older respondents in the group of URs were found to comprise a large portion of single-person households. The health-related characteristics of URs showed that low self-rated health was reported at a higher frequency in all age groups of 30 years than from non-URs(non-Under reporters). The proportion of respondents who reported severe physical activity was relatively high in the group of women aged 19-29 being URs, whereas small portions of respondents reported in the group of URs (both men and women) aged 65 and over compared to non-URs. The proportion of overweight people among URs, compared to non-URs, was higher in all age groups of women and in the groups of men aged 19-29 and 30-49.

Conclusions: In conclusion, underreporting was correlated to age, gender, education level, income level, household status, self-rated health, physical activity and overweight.

Key words: Underreporting, 24-hour recall, Korean National Health and Nutrition Examination Survey

PO2359

ASSESSMENT OF THE DIETARY INTAKE OF WOMEN OF REPRODUCTIVE AGE IN THE GA EAST DISTRICT, ACCRA-GHANA

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Background and objectives: Strategies to improve maternal nutrition and health remains an important component of the national agenda. One way to improve maternal nutrition before and during pregnancy is to provide Ready to Use Supplementary Food (RUSF). The objective of this study was to assess nutrient and energy intake and compare with Recommended Dietary Allowances (RDA) among women of reproductive age who enrolled in an efficacy study on a peanut base RUSF.

Methods: This was a cross sectional study conducted in 5 peri-urban communities involving 134 women. Data on sociodemographics and usual dietary intake were collected. Sociodemographic data were analysed using SPSS version 16.00 and ESHA FPRO (version 10.0.1.) was used to convert dietary data into nutrients. The RDA cut-offs were used to assess the prevalence of inadequate dietary intakes of energy, protein, fat, iron, vitamin A, vitamin B12, folate and iodine. Statistical significance was set at $p < 0.05$.

Results: Participants' age range was 18-45 years and majority (61.2%) was in formal employment. All women met the RDA for total energy (2314.95 ± 915.07), protein (66.72 ± 27.19), fat (68.00 ± 29.76) and iron (23.68 ± 11.91). However, none of the participants met the RDAs for folate, vitamin B12 and iodine. More than a half did not meet their RDAs for calcium (54.5%) and vitamin A (74.6%). A weak correlation was found between total energy intake and all micronutrients except for iron ($p<0.001$).

Conclusions: Micronutrient under-nutrition still remains an issue of public health concern in Ghana and predisposes women to high risk of adverse pregnancy outcome, reduced quality of health and contribution to labour force and productivity. Interventions to improve dietary intakes of women are imperative.

Key words: RUSF, women, dietary assessment, micronutrients.

PO2360

NEW TRENDS IN NUTRITIONAL STATUS ASSESSMENT IN A GROUP OF CHILDREN WITH CANCER FROM ROMANIA

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Background and objectives: Nutritional status is an important considerant in the treatment of pediatric cancer patients because it is linked to poor outcomes. There are still controversies regarding the criteria used to assess nutritional status in children with cancer. We proposed to define the best modalities to assess nutritional status in children with cancer using anthropometric and biochemical parameters.

Methods: A prospective study was performed on 64 children hospitalized and diagnosed with cancer in the Pediatric Clinic Targu-Mures, Romania, between 2009- 2012. We evaluated anthropometric and biochemical parameters: weight, height, body mass index (BMI), middle-upper arm circumference (MUAC), triceps skin fold thickness (TSF), total protein, albumin and Insulin-like growth factor-1 (IGF-1). The values of anthropometric parameters were converted in Standard Deviation (SD) for age and sex using Switzerland Growth Chart 1989.

Results: Of the 64 children with cancer, 40,6% were diagnosed with leukemias, 28,1% with lymphomas and 31,2% with solid tumors. Medium values of weight, height and BMI were -0.26 SD, -0.19 SD, respectively -0.36 SD. Assesssing arms anthropometry, we found lower values of MUAC (-0.56 SD) and TSF (-0.77 SD) than weight and height indicators. At the onset of malignant disease, 28.1% of patients had low serum protein values and 25% had low levels of serum albumin. IGF-1 was decreased in 65,6% of patients. We found a good correlation, statistically significant between MUAC and serum proteins (r=0.30; p=0.01), MUAC and albumins (r=0.27; p=0.02) and MUAC and IGF-1 (r=0.40; p=0.001) and between TSF and albumins (r=0.28; p=0.02), TSF and IGF-1 (r=0.38 ; p=0.002).

Conclusions: The arms anthropometry better identify malnutrition in children with cancer than simply assessing weight or height measurements. MUAC and TSF in conjunction with serum protein, albumin and IGF-1 most accurately characterizing the nutritional status.

Key words: Child, cancer, nutritional status

PO2361

ANEMIA, IRON DEFICIENCY AND RELATIONSHIP WITH NUTRITIONAL STATUS IN CHILDREN AGED 2-5 YEARS OLD

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Background and objectives: Anemia is a significant public health problem in many countries in the world including Vietnam. The aim of the study was to determine the prevalence of anemia, iron deficiency and the relationship between anemia and nutritional status in preschool children.

Methods: In 2009, 78 preschool children aged 2-5 years old from Tien Phuong commune, Chuong My district, Hanoi participated in the study. Body weight, height of the subjects were measured, blood samples were taken for analyzing the Hemoglobin level and serum ferritin concentration. The nutritional status was classified according to the WHO 2007 child growth standards.

Results: The prevalence of anemia was 17.9%, iron deficiency was 26.9%. There was no correlation between Hb concentration and weight, height, age, serum Ferritin concentration: r=0.091, 0.143, 0.141, 0.142, respectively (p>0.05). Hb and serum Ferritin concentration of the stunted or underweight children tended to be slightly lower but were not different compared to those of children with normal nutritional status (p>0.05).

Conclusions: In preschool children in a suburban district of Hanoi, anemia is still a mild public health problem, prevalence of iron deficiency is relatively high, no correlation is found between anemia and nutritional status. Anemia can be found in malnourished and normal preschool children.

Key words: Anemia, iron deficiency anemia, stunting, underweight, nutritional status.

PO2362

DIETARY INTAKE AND MAJOR FOOD SOURCES OF FOLATE OF ADULTS LIVING IN REPUBLIC OF KOREA

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Background and objectives: Folate deficiency may be a risk factor for several pathologies, such as neural tube birth defects, dementia, and cardiovascular disease. The objective of this study was to estimate folate intakes and major food sources of Korean adults.

Methods: Three consecutive 24-hour recalls were collected from 167 healthy adults, aged 20-64y, living in Seoul and metropolitan area, Gumi, and Kwangju, Republic of Korea, during November, 2011 - March, 2012. A computer-aided nutritional analysis program developed by the Korean Nutrition Society was used in determining the dietary intakes and major food sources of folate.

Results: The mean folate intake was 527.29/177.09 ug DFE/day (mean/SD). Foods from animal and plant sources provided 19% and 81%, respectively, of the total folate intake. There was no significant difference in folate intakes by gender. The top 10 major dietary sources of folate in these Korean adults were Korean Chinese cabbage kimchi, rice, spinach, eggs, laver, mandarin, soybean sprout, beer, sweet potato, and radish. The number one major source, Korean Chinese cabbage kimchi, contributed 23% of total folate intake. As for major dietary sources of folate, the top 30 foods provided 76% of folate intake. Approximately 11% of the subjects consumed less than Korean Estimated Average Requirements and 23% had folate intakes less than Recommended Nutrient Intakes for folate.

Conclusions: Folate intakes of the Korean adults in the current study were generally adequate. (Supported by 2012 research fund of National Research Foundation of Korea: 2012R1A1A2A04669745).

Key words: Folate, dietary intake, food source, Korean adults

PO2363

A SYSTEMATIC REVIEW ON THE EFFECTS OF MULTI-MICRONUTRIENT FORTIFIED BEVERAGES ON NUTRITIONAL STATUS OF CHILDREN IN LOWER-INCOME COUNTRIES

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Background and objectives: Fortification is a widely adopted intervention strategy globally to increase micronutrient intakes in the diet. In the context of lower-income countries, fortification has mostly focused on centrally processed foods and condiments. Other vehicles such as beverages may be viable; however, less information is available about the overall impacts of this approach.

Methods: A systematic review and meta-analysis was undertaken on the nutritional impacts of multi-micronutrient fortified beverages on children in lower-income countries. Multiple PubMed searches were conducted and subject matter experts were contactedto identify relevant studies for inclusion. All co-authors independently reviewed studies to determine those for inclusion in the review.

Results: A total of 911 citations were screened, of which 9 randomized controlled trials were included in the meta-analysis (n = 2759 children at end line). Preliminary findings show that compared with controls who received non-fortified beverages children who received multi-micronutrient fortified beverages for a duration of 8 weeks to 6 months demonstrated significantly greater improvements in serum ferritin (+20.2 pmol/L, 95% CI [16.0,24.5]; 8 studies), hemoglobin (+2.07 g/L [1.53,2.63], 8 studies), retinol (+0.35 mol/L [0.26,0.43]; 5 studies), zinc (+4.76 mol/L [3.62,5.88]; 3 studies), and vitamin B12 (+91.3 pmol/L [78.8,103.8]; 3 studies); p<0.0001 for all. Weight and height gains were modestly but significantly greater in the intervention compared with the control groups (+0.39 kg [0.29,0.50]; 6 studies and +0.19 cm [0.09,0.28]; 5 studies, p ? 0.0001 for both) while change in weight-for-age Z-score did not differ significantly between groups. Consumption of fortified beverages significantly reduced the risk of iron deficiency (RR 0.38 [0.25,0.57]) and iron deficiency anemia (RR 0.17 [0.06,0.53]) but did not significantly alter the risk of vitamin A or zinc deficiency.

Conclusion: Multi-micronutrient fortified beverage interventionsare effective in improving the nutritional status of children in lower-income countries.

Key words: Fortification, Micronutrients, Beverages, Lower-income countries, Children

PO2364

CHINESE CHILD DIET QUALITY INDEX

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Background and objectives: To overview the current diet quality indexes published and used in Europe, USA and China, and to create a diet quality index for Chinese Children.

Methods: Papers published from 1976 to 2012 were collected. According to all diet quality indexes in the world and Chinese Dietary Guidelines issued by Chinese Nutrition Society, Chinese Child Diet Quality Index (CCDQI) was created.

Results: To date, the indexes using for adults included: Diet Quality Index-International, Diet Quality Index Revised and Healthy Eating Index. Revised Children's Diet Quality Index, Youth Healthy Eating Index and Nutritional Quality Index were used among children. Diet Balance Index and Desirable dietary Pattern were created for Chinese adults. Refer to Chinese Children's recommend foods and nutrient intakes, four parts of factors were took into account by proper weigh coefficient. These components were: 10 food groups (cereals, meat and meat products, vegetables, fruits, dairy and its products, beans and its products, fried foods, soft drinks, water and foods diversification), 10 nutrients (intakes of protein, fat, saturated fatty acid, dietary fiber, Ca, Fe, Zn, VA, VD and VC), the information of physical activities (inactive pursuits) and eating behaviors. This Index contained 23 items, each scored 0~5 or 0~10The total scores ranged from 0 to 200, a higher score indicated better diet quality.

Conclusions: To date, the diet quality indexes were available for both adults and children, however, there was few for Chinese children. Therefore, CCDQI created in this study could be used in the further study investigating potential association between diet quality in childhood and overweight/obesity and other related diseases.

Key words: Chinese, diet quality index, children.

PO2365

VERY YOUNG NIGERIAN INFANTS FIT INTO THE WHO CHILD GROWTH STANDARDS WELL, AS LONG AS THEY ARE HEALTHY

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Background and objectives: The WHO child growth standards are already widely adopted but it is important to establish how well individual population fit to them. We aimed to assess the growth of very young infants compared to the WHO standards at the University of Nigeria Teaching Hospital, Enugu, Nigeria from February to July 2012.

Methods: Weight, length, mid-upper-arm-circumference (MUAC) and skinfolds (Triceps and subscapular) of infants 0 – 6 months old admitted to hospital were compared to the retrospective weights of their healthy peers seen at the well baby clinic. These were expressed as z-scores compared to the WHO standards.

Results: Well baby clinic weights were recorded for 382 infants at birth, 400 at 6 weeks, 391 at 3 months and 307 at 6 months. Their mean (SD) weight z-scores were close to the expected values of 0 (1) at all ages (Birth -0.0 (1.1); 6 weeks -0.3 (1.1); 3 months -0.3 (1.2); 6 months -0.4 (1.2). Of the 210 hospitalized infants, 87 (41.4%) were under 2 weeks old and 68 (32.4%) were aged 3-6 months. Sepsis (28.6%) and respiratory tract disorders (27.1%) were the commonest diagnoses. For these infants, weight z-scores tended to be low (-1.1 < 1m; -1.2 1 – 3m; -1.2 3 – 6m) but length z-scores were less so as age increased (-1.2 for < 1m; -0.8 for 1 - 3m; -0.4 for 3 - 6m). The mean skinfold z-scores (mean of triceps and subscapular SDS) also tended to be low (-1.6 for > 3 month-olds) as were MUAC SDS (-1.0 for > 3 month-olds).

Conclusions: The weight and length z-scores of healthy young Nigerian infants fit the WHO standards well. The poor weight gain observed in the hospitalized group is likely to be the effect of their medical conditions.

Key words: Malnutrition, skinfolds, growth standards

PO2366

SCHOLASTIC ACHIEVEMENT LEVEL OF THE EDUCATIONAL ESTABLISHMENT AND ITS ASSOCIATION WITH POSTNATAL GROWTH AND DEVELOPMENT OF SCHOOL-AGE CHILDREN

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Background and objectives: Scholastic achievement (SA) is a multifactorial process conditioned by multiple variables dependent on the child, his/her family and the influence of the educational system. This is the first study carried out in Chile, using the results of the educational establishment in the SIMCE tests, administered by the Ministry of Education, and its association with nutritional status of school-age children. The objective of this study was to describe the postnatal growth and development by SA levels of the educational establishments. The purpose was to confirm the hypothesis that school-age children attending to educational establishments with similar SA have similar postnatal growth and development parameters by socioeconomic status (SES).

Methods: A representative sample of 33 schools was randomly chosen in 2010 in the Metropolitan Region of Chile. The sample consisted of 1,353 school-age children of both sexes, from the fifth grade of elementary school and first grade of high school who at the end of 2009 took the SIMCE tests. Postnatal growth and development was assessed through anthropometric parameters as head circumference-for-age Z score (Z-HC), height-for-age Z score (Z-T) and body mass index-for-age Z score (Z-BMI).

Results: Schools with high SIMCE results grouped children with significantly higher values of Z-HC >2SD and lower values of growth failure compared with schools with low SA ($p< 0.0001$). In schools with similar SIMCE results, postnatal nutritional parameters did not differ by SES.

Conclusions: We confirm the hypotheses that school-age children attending to educational establishments with similar SA have similar postnatal growth and development parameters by socioeconomic status.

Key words: Nutritional assessment; head circumference; growth failure; socioeconomic status; learning

PO2367

THE ANALYSIS OF IMBALANCES WITHIN LIPID COMPONENT OF STUDENTS' DIET

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Background and objectives: This study aimed to assess and analyze the fat content of students' diet at weekend. The participants were students of Moscow medical university.

Methods: In investigation the diets of representative group of students were studied: 9 men and 26 women aged 20-22. The method of 24-hour recall was used and the nutrient content was further estimated using standard data base.

Results: The average energy value was estimated as 2559.7±463,5 kcal in men and 1711.7±80,1 kcal in women. The percentage of energy from total fat was higher than RDA: 42.9% (122.1±22.1 g) and 38.3% (72.8±5.6 g) in men and women respectively. Particular attention was paid to the absolute amount and ratio of fatty acids. While the linoleic acid/α-linolenic acid ratio was equal (12.9/1) both in men and women, there has been shown significant difference in their quantity: linoleic acid/α-linolenic acid in men was estimated as 22.1 g/1.69 g and 11.95 g/0.93 g in women. The sum of essential fatty acids composed 8.4% and 6.8% of total energy. The consumption of n-3 longer chain polyunsaturated fatty acids was extremely low: 49.1±32.7 mg and 200.4±122.4 mg of EPA and DHA respectively for males; 29.1±11.2 mg and 85.3±24.7 mg for females. Cholesterol and plant sterols intake as well as their ratio have been found as fairly optimal in women 1.1/1 (223.2±17.6 mg/209.9±27.2 mg) and rather negative in men 1.85/1 (540.9±155.6 mg/291.7±74.6 mg).

Conclusions: The results have shown that there is significant imbalance within fat component of students' diet. It is essential to decrease the proportion of total fat as well as to optimize the ratio of different food sources of fatty acids by taking some measures including functional products use.

Key words: linoleic acid, α-linolenic acid, EPA, DHA.

PO2368

CACO-2 CELL AND ANIMAL MODEL (GALLUS–GALLUS) STUDIES ARE EFFECTIVE AT SCREENING AND DEVELOPING STAPLE FOOD CROPS WITH IMPROVED FE-BIOAVAILABILITY

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Background and objectives: Iron (Fe) biofortification is a strategy that alleviates Fe deficiency by improving Fe bioavailability and/ or concentrations in staple crops. In order to develop improved lines of staple food crops, breeders need a high throughput screening approach that accurately ranks bioavailability relative to standard reference controls. Molar ratios of known food factors such as phytic acid, polyphenols, and ascorbic acid are often highly linked to environmental and processing effects and thus not reflective of the genetics of Fe bioavailability.

Methods: A bioassay such as the in vitro digestion/Caco-2 cell model is therefore necessary for measurement of Fe bioavailability during the crop development stage. This should follow by a subsequent animal studies that are useful and cost-effective to confirm the in vitro observations and advance select lines for human efficacy studies.

Results: Our research team has conducted several studies aimed to screen Fe bioavailability in different crops using our in vitro (Caco-2) and in vivo (Gallus gallus) models. In these studies, we implement physiological, cellular and molecular parameters in order to accurately measure the dietary Fe bioavailability in the tested crops. This approach has been particularly effective when coupled with QTL (quantitative trait loci) mapping at developing high bioavailable Fe maize. Furthermore, this strategy has identified possible Fe bioavailability QTL in bean cotyledons, and has found seed coat polyphenols to be major inhibitors of bean Fe absorption.

Conclusions: Differences identified by this model in crops such as maize, lentils and beans indicate that plant breeding can significantly improve Fe bioavailability in these crops.

Key words: Biofortification, iron bioavailability, in vitro digestion/Caco-2 cell model

PO2369

MELATONIN TREATMENT ENHANCES PLASMA VANADIUM LEVELS IN YOUNG MALE ZUCKER DIABETIC FATTY (ZDF) RATS

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Background and objectives: Vanadium (V) and its complexes mimic the action of insulin by increasing glucose uptake and augmenting insulin-receptor tyrosine kinase activity. Our group previously reported that melatonin administration ameliorates glucose homeostasis in young Zucker Diabetic Fatty (ZDF) rats by enhancing insulin action and β-cell function. The purpose of the present study was to study the activity of melatonin in diabetes in relation to the levels and regulation of plasma V in ZDF and Zucker lean (ZL) rats.

Methods: At 6 weeks of age, ZDF (n= 30) and ZL (n= 30) groups were each subdivided into three subgroups (n= 10 each one): control (C-ZDF, C-ZL), vehicle-treated (V-ZDF, V-ZL) and melatonin-treated (M-ZDF, M-ZL; 10 mg/kg/day) groups for a 6-weeks period. At the end of the treatment, plasma V levels were measured by an electrothermal atomic absorption spectrometry technique by using a previously optimised time-temperature program.

Results: No significant differences were found between C-ZDF and V-ZDF groups ($p>0.05$). Plasma V levels were significantly higher in M-ZDF versus C-ZDF rats.

Conclusions: Melatonin administration ameliorates the diabetic status of ZDF rats by enhancing plasma V levels. This finding supports the potential therapeutic value of melatonin against insulin resistance by enhancing plasma levels of V, which is directly involved in regulating glucose-insulin homeostasis in obese and/or diabetic individuals.

Key words: Melatonin, plasma vanadium, Zucker diabetic fatty rats

PO2370

PLASMA SELENIUM, ZINC AND COPPER LEVELS IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE: RELATIONSHIP WITH DISEASE SEVERITY AND BIOCHEMICAL BIOMARKERS

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Background and objectives: Inflammatory bowel diseases (IBD) such as ulcerative colitis (UC) and Crhön's disease (CD) are associated to enhanced biochemical inflammatory and oxidative stress biomarkers. The purpose of the present study was to study if enhanced oxidative stress characteristic of these diseases is also associated to an alteration in the regulation and plasma levels of antioxidant minerals (Se, Zn and Cu). The influence that on these plasma mineral levels exerts the clinical activity (disease severity) of the UC and CD diseases has also been performed.

Methods: IBD patients included in this study were 115 (57 with UC and 58 with CD). A healthy control group (n= 30) was also studied. Plasma samples were analyzed by hydride generation atomic absorption spectrometry (HG-AAS) for Se and by flame-AAS for Zn and Cu. Biochemical indexes (n= 18) were determined with an automated analyzer.

Results: Mean serum Se levels were significantly lower in both groups of IBD patients (UC and CD) than in the controls ($p<0.001$). Contrarily mean plasma Cu levels measured in controls were significantly lower than those for UC and CD group ($p<0.01$). For Zn, mean plasma level in UC patients was significantly higher than those for CD patients and controls ($p< 0.05$). Plasma Se and Zn levels decreased significantly with the disease severity. Contrarily, biochemical biomarkers of inflammation such as alpha-1-antitrypsin, alpha-1-globulin, alpha-2-globulin, orosomucoid and C-reactive protein (CRP) significantly enhanced with the disease severity.

Conclusions: The IBD influences plasma levels of antioxidant minerals diminishing those for Se and enhancing those for Cu. Plasma Se and Zn levels in both groups of IBD patients decreased with the enhancement of the disease severity.

Key words: Inflammatory bowel disease, plasma Se, Zn and Cu levels

PO2371

OPTIMAL CUTOFFS OF BMI, PERCENTAGE BODY FAT, AND WAIST CIRCUMFERENCE FOR PREDICTING METABOLIC SYNDROME AMONG LEBANESE ADULTS

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Background and objectives: Obesity is a main predictor for metabolic abnormalities. Body mass index (BMI), percentage body fat (%BF) and waist circumference (WC) have been proposed as indices to assess obesity. Various cut-off values were developed, however, ethnic differences have been shown to affect the sensitivity and specificity of these indices. The objective of the study was to determine population specific cut-off points for BMI, %BF and WC associated with an increased risk of metabolic syndrome (MetS) among Lebanese adults.

Methods: This is a secondary analysis of data drawn from the National Nutrition and Non-Communicable Disease Risk Factor Survey conducted in Lebanon between 2008 and 2009Survey participants older than 18 years and with no chronic diseases were included in this analysis (n=314; 146 males and 168 females). MetS was diagnosed using the 'Harmonizing criteria of A Joint Interim Statement of IDF/NHLBI/AHA/WHF/IAS/IASO 2009'. Receiver Operating Characteristic curves analysis was employed to derive cut-off points for BMI, %BF and WC associated with increased risk of MetS.

Results: Prevalence of MetS in the study sample was 23.9% (33.6% males, 15.5% females). The cut-off points for BMIs for males and females respectively were 27.26 and 28.35 kg m-2 with AUC of 0.743 and 0.830. As for %BF, cut-off values were 25.2 and 35.9% with AUC of 0.713 and 0.820. Regarding WC, cut-offs were 94.7 and 90.1 cm with AUC of 0.74 and 0.85.

Conclusions: The optimal cut-off values to predict MetS of BMI, %BF and WC were derived. Our findings indicated that Lebanese adults are obese at lower BMI values as compared to the internationally recommended (WHO) standards. To prevent development of metabolic syndrome among Lebanese, it might be useful to lower the cut-off for obesity as defined by BMI.

Key words: BMI, body fat, waist circumference, metabolyc syndrome

PO2372

BODY COMPOSITION AND FAT DISTRIBUTION IN RELATION TO BALANCED CALORIC DIET AND PHYSICAL ACTIVITY AMONG OBESE EGYPTIAN ADOLESCENT GIRLS

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Objectives and background: Obese adolescents are at risk for developing many co-morbidities, so, the need for evidence-based treatment recommendations is a critical health care issue. Objective: to evaluate effect of 6 months of balanced caloric moderately deficit diet program combined with individualized moderate Physical exercise on body weight, composition and fat distribution of adolescent girls.

Methods: It was a longitudinal study; comprised 111 obese girls (BMI > 95th percentile for age and gender, with mean age 15.82 ± 0.75 years. They were undergoing nutritional intervention (specific dietary program, nutritional education and exercise) for 6 months. At the start of this program, they were assessed for their anthropometric measures: body weight, height, waist and hip circumferences, skin folds thickness at 5 sites (triceps, biceps, sub scapular, suprailiac and abdominal) and, according to BIA, their body composition. Then, BMI and waist/hip ratio were calculated. This assessment was repeated after 6 months. Only thirty eight girls completely finished the program till the end.

Results: The current study showed that after following the dietary program and physical activity, there were highly significant reduction in waist circumference, the skin fold thickness at the 5 sites , peripheral and central adiposity, and fat mass, and significant reduction in body weight, hip circumference and fat%. The change in BMI was insignificant. On the other hand, there was a highly significant increase of the total body water and Basal metabolic rate after following the dietary program and physical activity.

Conclusions: Nutritional intervention program was succeeded in 38 obese adolescent girls. These girls show highly significant reduction in body composition and body fat distribution. This revealed that combined program of diet restriction and exercise is necessary.

Acknowledgements: All obese girls; without their help, this study couldn't be completed and National Research Centre for funding.

Key words: Obese, adolescents, nutritional program, anthropometry.

PO2373

VALIDATION OF FOOD FREQUENCY QUESTIONNAIRE FOR LOCAL SOY BASED PRODUCTS AND ISOFLAVONES INTAKES WITH THREE-DAY FOOD RECORD

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Background and objectives: Food Frequency Questionnaire (FFQ) is a suitable tool to be used in order to determine the common intake of food or nutrient among the population. FFQ for local soy products and isoflavones intakes has not been developed in Malaysia. Thus, the validation for this type of FFQ containing 24 food items is important in order to determine the accuracy of soy products and isoflavone intakes among the Malaysian. The objective of this study was to validate the FFQ of the local soy products and isoflavones with three-day food record (3DR) which were administered among the Malay subjects at Kuala Lumpur campus of Universiti Kebangsaan Malaysia (UKM).

Methods: It was a cross sectional study involving 100 Malay subjects aged 20 to 59 years. The FFQ was administered after interviewing the subjects by using 3DR. The data obtained from 3DR was analysed using Nutritionist Pro software while the isoflavone content in foods was derived from the isoflavone database.

Results: The mean intakes of soy products (206.64 g) and isoflavones (64.47 g) measured using FFQ were significantly higher ($p<0.05$) than the ones measured using 3DR (134.71 g soy products and 60.69 g isoflavones). However, there was a relatively good correlation between these two methods for both total intakes of soy products ($r=0.46$) and isoflavones ($r=0.29$). Analysis of Bland Altman plot also showed an agreement between the FFQ and 3DR by the distribution of the data between ± 2 standard deviation lines.

Conclusions: This FFQ was acceptable in determining the local soy products and isoflavones intakes among the Malaysian adults. Further modifications should be made on this FFQ in order to make it more precise and accurate.

Key words: Three-day food record, FFQ, isoflavones, soy products, validation.

PO2374

COMPARISON OF THE IDEAL DIET IN JAPAN AND IN THE KINGDOM OF SAUDI ARABIA BASED UPON THE DRAWING METHOD

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Background and objectives: Saudi Arabia has enjoyed good bilateral relations with Japan since 1955 and is also regarded as the most friendly country in the Middle East region. Economically, the two countries are of great significance to each other with Saudi Arabia being the principal country which exports to Japan (crude oil and petroleum products), and Japan is Saudi Arabia's main partner in trade and investment. Socially, from the viewpoint of dietary culture, an average Saudi Arabian meal is quite different from a standard Japanese meal. For the understanding, maintaining and promoting of good relations with Saudi Arabia, it is very important to compare the Japanese dietary habits with Saudi Arabian dietary habits. Based upon the aspects above, the objective of this research is to compare the dietary habits of a select sample of participants in the two countries of Japan and the Kingdom of Saudi Arabia.

Methods: The subjects of this research are female students at University A in Japan and University B in Saudi Arabia. The research was conducted by using the Drawing Method and the statistical analysis was performed using IBM SPSS Ver. 16.0.

Results: The results show that there are significant differences in dietary knowledge, dietary behavior, dietary habits and the dietary environment between Japan and Saudi Arabia. Japanese students participating in this study preferred Japanese traditional cuisine much more than foreign cuisine, while the Saudi Arabian student participants favored foreign foods over their traditional foods.

Conclusions: The differences between dietary knowledge, behavior and habits, and the dietary environment between Japan and Saudi Arabia. Japanese students were due to factors such as culture, religion and climate.

Key words: Drawing method, ideal diet, Saudi Arabia, Japan

PO2375

ROTATION CRITERIA FOR EXPLORATORY FACTOR ANALYSIS: IMPLICATIONS FOR INTERPRETABILITY AND VALIDITY OF EMPIRICALLY DERIVED DIETARY PATTERNS

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Background and objectives: Exploratory factor analysis has been used in nutritional epidemiology to empirically derive dietary patterns. However, remain unclear the effects of rotation criteria on interpretability and validity of the dietary patterns. The present study aims to investigate the effects of rotation criteria on composition, interpretability and validity of empirically derived dietary patterns.

Methods: A total of 1102 adults participating in a population-based survey "Health Survey of São Paulo (HS-SP)", Brazil, between 2008-2011, with complete food consumption data (24-hour recalls) were evaluated. Two dietary patterns were derived from exploratory factor analysis after adjustment for the within-person variation of the food group intakes. The rotation criteria evaluated were Varimax (orthogonal) and Promax and Direct Oblimin (both oblique). Confirmatory factor analysis was performed to assess the validity of dietary patterns. Two factor loading cut-offs were used to select food groups for confirmatory analysis: ≥|0.20| and ≥ |0.25|. Goodness-of-fit indexes were used to assess model fit.

Results: Differences in composition and interpretability of the first dietary pattern were observed between Varimax and Promax/Oblimin at low factor loading cut-off (≥;|0.20|). At high cut-off ≥|0.25|), these differences were no longer observed. None of the dietary patterns derived at factor loading cut-off ≥|0.20| showed acceptable model fit. The Promax rotation, however, showed better model fit than either Varimax or Oblimin at factor loading cut-off ≥|0.25|.

Conclusions: The effects of rotation criteria on composition, interpretability and validity of dietary patterns differed according to factor loading cut-off. Researchers should perform at least one orthogonal and one oblique rotation criteria, apply the factor loading cut-off and then compare the factor solutions. The confirmatory factor analysis should also be conducted to test the validity of dietary patterns and the adequacy of the factor loading cut-off chosen during exploratory factor analysis.

Key words: Nutritional assessment, dietary patterns, factor analysis; rotation criteria

PO2376

EVALUATION OF THE IMPACT OF VITAMIN A AND ZINC SUPPLEMENTATION ON MALARIAL MORBIDITY IN GHANA.

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Background and objectives: Malaria is a leading cause of morbidity and mortality among young children and is estimated to cause at least 1 million deaths each year especially among pregnant women and young children under the age of five. Vitamin A supplementation is known to reduce morbidity and mortality in young children. Zinc is also required for growth and immunity. The study sought to replicate the study by Zeba et al which showed 30% lower cases of malaria in infants on a combination of zinc and a large dose of vitamin compared to infants on vitamin A alone. The primary objective was to determine the effect of vitamin A alone vs. vitamin A and zinc supplements on the incidence of clinical malaria. It also sought to assess the effects on the incidence of anaemia, diarrhoea and pneumonia.

Methods: The study was community-based and 200 infants between the ages of 6-24 months were randomised to receive either vitamin A and 10 mg daily zinc or Vitamin A and zinc placebo for 6 months.

Results: The number of children who were diagnosed with uncomplicated malaria in the intervention group were 27% significantly lower compared to the children in the control group (p=0.03). There were however no effects on severe malaria, pneumonia, anaemia and diarrhea.

Conclusions: Our study confirms a significant role of vitamin A and zinc in reducing malaria morbidity.

Key words: Vitamin A, zinc, malaria

PO2377

ASSESSMENT OF FOLATE STATUS USING BIOMARKERS AND NUTRIENT INTAKE DATA AMONG AUSTRIAN SCHOOL CHILDREN AGED 7—14 YEARS

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Background and objectives: Biomarkers deserve special attention in nutritional epidemiology and give an objective measurement when assessing the nutritional status. Analysis of plasma folate and homocystein concentrations are important tools to determine early functional and metabolic changes of a folate deficiency.

Methods: 387 Austrian school children aged 7 to 14 years have been recruited through quota sampling stratified for gender, age and geographical region. Blood and urin samples in addition to two 24h-recalls (via interview) have been collected from October 2010 through February 2012. Plasma concentrations were analysed for folate (using RIA) and homocystein (using HPLC). All results are presented as median values (IQR).

Results: Plasma concentrations for folate were 14.7 (9.9-19.5) nmol/l and for homocystein 8.8 (7.8-10.1) µmol/l with an average folate intake of 153 (117-194) µg/d. Folate concentrations correlated negatively with age (r=-.352, p<0.01), homocystein concentrations however positively (r=0.198, p<0.001). Plasma homocystein was higher among boys (8.9 (8.0-10.4) µmol/l) when compared to girls [8.5 (7.5-9.7) µmol/l (p<0.05)]. No significant difference was observed for plasma folate [boys: 14.2 (10.0-18.8) nmol/l, girls: 14.7 (10.0-14.7) nmol/l]. Folate intake was a little higher in boys [160 (129-200) µg/d)] compared to girls (146 (111-190) µg/d (p<0.05)], but both were below the recommended reference values of 180-300 µg/d.

Conclusions: The determination of plasma folate and homocystein seems to be adequate to describe the folate status. The folate status among Austrian school children (7-14 years) is in 75 % of the population optimal, however the average folate intake of approximately 150 µg/d should be improved to meet the recommendations.

Key words: Folate, homocystein, status, biomarker

PO2378

ASSOCIATION BETWEEN CONSUMPTION OF FORTIFIED FIRST GRADE FLOUR AND IRON AND FOLATE STATUS OF WOMEN OF REPRODUCTIVE AGE IN UZBEKISTAN

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Background and objectives: The Uzbekistan Demographic Health Survey (1996) reported 60.4% of women of reproductive age (WRA) had low concentrations of hemoglobin (<120 g/L), hence anemia was an important public health problem. Bread is consumed with most meals, so to address the anemia a National Flour Fortification Program (NFFP) was implemented. The objective of the study was to assess the coverage of fortified first grade UzDonMakhsulot (UDM) flour/grey loaf, its association with the iron and folate status of WRA, and the knowledge of women of dietary and health concepts after 5 years of the NFFP.

Methods: A national survey using large country-lot quality assurance sampling.

Results: Confidence intervals (CIs) were set at 95%. UDM first grade flour was reported in 58.2% (CI: 55.2, 61.2) and the grey loaf in 11.5% (CI: 9.7, 13.3) of households. The qualitative iron spot test identified 41.6% (CI: 39.2, 43.9) of flour tested was fortified. Consumption of heme iron-containing food (91%), iron absorption enhancers (97%) and iron inhibitors (95%) were high. Anemia prevalence was 34.4% (CI: 32.0, 36.7), iron depletion (ferritin <15µg/L) 47.5% (CI: 45.1, 49.9) and low folate (<10nmol/L) 28.8% (CI: 26.8, 30.8); the effect of inflammation was minimal. Knowledge that first grade UDM flour and the grey loaf are fortified was reported by 32.1% (CI: 29.9, 34.3) of women, but only 3.7% (CI: 2.8, 4.6) mentioned the benefits. Knowledge about anemia was low; 12.5% (CI: 11.0, 14.0) were able to identify causes.

Conclusions: The NFFP coincided with a substantial decline in the prevalence of anemia. However, the high prevalence of depleted iron stores suggests that women are still not eating enough iron or iron absorption is inhibited. Knowledge about the NFFP and anemia was low; therefore consumer education should be prioritized. UDM flour must be fortified appropriately and monitored regularly.

Key words: Fortified flour, iron, folate.

PO2379

THE EFFECTS OF VITAMIN E ANALOGS AND METABOLITES ON RAT FATTY LIVER

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Background and objectives: Vitamin E is the term for a group of tocopherols and tocotrienols that has four analogs differing in the number and position of methyl groups on the chroman ring. 2,7,8-trimethyl-2-(2'-carboxyethyl)-hydroxychroman (gammma-CEHC), gamma-tocopherol (-Toc) or gannma-tocotrienol (-T3) metabolite, is known to have a role similar to natriuretic hormone. Therefore, it considers that vitamin E may have a pro-drug action. The aim of this study is to find the novel function of carboxyethyl-hydroxychroman(CEHC). Especially, we investigated the effects of vitamin E analogs and metabolites on fatty liver in vitro.

Methods: Male Sprague-Dawley strain rat (three weeks old) was fed the high fat diet (20% w/w corn oil). After 4 weeks, the hepatocytes were perfused from fatty liver of the rat. The hepatocytes were sown in 60mm dishes or 12 well plates and grown at 37°C in a humidified atmosphere containing 5% CO2After 24h, each vitamin E analogs(alpha-Toc, gamma-Toc, alpha-T3, gamma-T3) and CEHCs (alpha- and gamma-CEHC) was added to the fatty hepatocytes (final concentration; 2 micro M) , and the medium was changed at 6h. After 8h from the medium change, we measured mRNA expression of microsomal triacylglycerol transfer protein (MTP) and apolipoprotein B (ApoB) in fatty hepatocytes. Furthermore, we determined triacylglycerol (TG) content in fatty hepatocytes after 18h from the medium change.

Results: There were no significant differences in the MTP mRNA expression between all the group. On the other hands, each of ApoB mRNA expressions of gamma-T3 or gamma-CEHC group was remarkably higher than that of control group. However, there were no significant differences in TG content among all groups.

Conclusions: According to these results, we suggested that gammma-T3 and its metabolite (gamma-CEHC) may improve

fatty liver because of up-regulating ApoB mRNA expression in fatty hepatocyte.

Key words: Vitamin E, CEHC, ApoB, primary culture, fatty liver

PO2380

LONG TERM FOLLOW-UP STUDY OF REFINED SUGAR CONSUMPTION FOR CHILDREN AGED 2 TO 5 YEARS IN TAIWAN

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Objectives: The purpose of this study is to examine the consumption of sugar-sweetened beverages (SSB), snacks and desserts among pre-school children and estimate the intake of refined sugar among children aged 2 to 5 by a prospective cohort.

Methods: Total 301 infants were followed up annually to the age of 5 (n=132). The intake of refined sugar is calculated by using 24-hour recalls. Estimated percentages of refined sugar in various food products are used in order to obtain the average daily intakes.

Results: The consumption of SSB among reported children increases with age. Among the SSBs, "flavored and fermented milk" contributes to the highest percentage among children aged 2-5, while the "whole grains drinks" and "tea drinks" showed increased trend in years. For snacks and desserts, "biscuits" contributes to the highest percentage among children aged 2 to 4, with "Chinese sweet soup" showing an upward trend by years while having the highest increasing percentage among children aged 5. The refined sugar intake at age 4 is significantly associated with dietary intakes at 2, 3 and 5, respectively, and weight and height at age 5 ($p<0.05$), but not associated with BMI at age 5 after controlling for gender and birth weight ($p>0.05$).

Conclusions: The energy intakes from refined sugar are 5%, 6%, 9% and 8% (p for trend<0.01) respectively for children aged 2 to 5. Over one-third of 5-year-old children have over 10% calories intakes from refined sugar.

Key words: preschoolers, sugar sweetened beverages, snacks and desserts, refined sugar, prospective cohort study

PO2381

EFFECTIVENESS OF COMMUNITY MALNUTRITION SCREENING FOR CHILDREN AGED 6 TO 59 MONTHS IN THE HEALTH DISTRICT OF DIAPAGA (BURKINA FASO)

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Background and objectives: Community screening program at health district of Diapaga consists of a systematic screening of malnutrition in order to identify and refer moderated and severely malnourished children to health center (CSPS). The objective of this program is evaluation of the effectiveness of the community malnutrition screening by providing coverage statistics of children by community screening compare to total of children and estimate the referred cases admitted or not at different health center clusters. It's determine the shortcomings of this community screening and provide hypotheses in order to improve the quality and effectiveness of community screening

Methods: It consists of three steps which are: i) Systematic screening by volunteers of all children aged 6 to 59 months in each cluster every 2 months; ii) The listing of all malnourished children screened and referred to CSPS for confirmation; iii) Admission of confirmed cases in the management program. The evaluation was performed using screening available data from August 2010 to March 2011 and from August 2011 to March 2012.

Results: Regarding coverage rate from August 2010 to March 2011 all clusters have targeted 70% of children. For the presence at CSPS, at the same period 90% of clusters are below the limit of 50%. For admission rate 8 clusters (for a total of 10) are below the recommended value which is at 60% to the recommended value. However, from August 2011 to March 2012, 90% of clusters have all indicators placed at the minimum of recommended value.

Conclusions: Community screening help to a better coverage of children of the age group but there are difficulties between the reference and confirmation to CSPS which complicate the rapid management of child malnutrition and limit the results of the community screening.

Key words: Malnutrition, community screening, efficiency

PO2382

MICRONUTRIENT DEFICIENCIES AMONG OVERWEIGHT/OBESE VIETNAMESE WOMEN: AN ISSUE NOT TO UNDERESTIMATE

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Background and objectives: There is a growing concern about obesity worldwide. In Vietnam, the prevalence of overweight (BMI > 25 kg/m2) in Vietnamese adults doubled between 1992 and 2002, from 2% to 5.5%, respectively and the double burden of malnutrition is present at national level. The objectives of this study were to assess micronutrient deficiencies among Vietnamese women according to their Body Mass Index.

Methods: A transversal study was conducted in 2010 among 1530 women of reproductive age from 19 provinces of Vietnam. Anthropometry and iron, vitamin A, folate, vitamin B12 and zinc status were assessed.

Results: There was no significant association between BMI category and anemia, iron deficiency (ID), iron deficiency anemia (IDA), deficiencies of vitamin A, zinc and vitamin B12, and marginal/deficient folate status, with similar prevalence of these deficiencies across BMI categories. The prevalence of anemia among overweight/obese women (OW/OB) was 10.0%, and 3.4% had IDA. The prevalence of ID and vitamin B12 deficiency were ≤ 12% among OW/OB women whereas the prevalence of zinc deficiency, and marginal/deficient folate status affected respectively 61.1% and 25.8% of these women, respectively. In contrast, a significant association was observed between BMI category and marginal vitamin A status with higher prevalence of vitamin A deficiency in underweight (19%) compared to OW/OB women (7%, p<0.0001). The odds of marginal vitamin A status and anemia prevalence was 31% among OW/OB women and 66% in underweight women (p<0.01).

Conclusions: This cross-sectional survey demonstrated that micronutrient deficiencies were an issue across the weight spectrum of women in Vietnam. It is therefore essential for Vietnam to actively control for micronutrient deficiencies in women in reproductive age while preventing the increase of overweight and obesity.

Key words: Overweight/obesity, micronutrient deficiencies, double burden, women in reproductive age, Vietnam

PO2383

ASSESSMENT OF A DEVICE TO QUANTIFY IRON CONTENT IN FISH AND SOY SAUCE – A TOOL FOR DAILY MONITORING

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Background and objectives: In a number of South-East Asian countries and in China, fish and soy sauces produced at industrial level are fortified with iron. Unfortunately some food industries and regulatory agencies implementing fortification programs do not always have the capacity to monitor the programs on an ongoing basis. The objective of the study was to assess a new portable device for the quantitative measurement of iron content of fortified sauces that could be used to control fortification levels.

Methods: Linearity, detection limits, inter- and intra-assay variability of this device were assessed on fish and soy sauce fortified with Fe sulfate (FS), Fe fumarate (FM) and NaFeEDTA; the accuracy of the results was compared to atomic absorption spectrophotometry (AAS).

Results: Measurements required a minimum incubation time of one hour for FS/FM and 24h for NaFeEDTA. Linearity of results ranged from 2 to 10 mg iron/L for FS/FM and from 1-10 mg iron/L for NaFeEDTA, implying the need for proper dilution as iron contents of fortified sauce are usually in the range [150-1000] mg/l. Depending on incubation time, iron compounds and sauces, the coefficients of variation (CV) of intra-assay precision were between 1.5-7.6% and the CV of inter-assay precision between 2.9-7.4%. Comparison with AAS showed high agreement between both methods with r=0.93 and r=0.94 for 10 and 24h incubation times respectively. The Bland and Altman plots showed limits of agreement between the two methods of ±70 mg/l in the range of fortification levels tested (100-500 mg/l).

Conclusions: This device offers a viable solution for field monitoring of iron fortification of soy and fish sauces after incubation time of 1h for FS/FM and 24h for NaFeEDTA.

Key words: Fish and soy sauce, quality testing, iron, rapid test kit, regulatory monitoring

PO2384

HIGH PREVALENCE OF HYPOVITAMINOSIS D AND MILD HYPOCALCAEMIA CALCIUM AMONG YOUNG VIETNAMESE CHILDREN AND WOMEN

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Background and objectives: In many developing countries including Vietnam, data are lacking on vitamin D (VD) and calcium deficiencies known to play an important role in the development of bone health. The objectives of this study were to determine the overall prevalence of VD and calcium deficiencies in women and young children and their nutritional related risk factors. A transversal study conducted among 595 women of reproductive age and 532 children <5 years from 19 provinces. Food consumption, socio-economical characteristics and anthropometry were assessed as well as plasma concentrations of calcium (Ca) and VD. Socio-economic status was assessed using the DHS Wealth Index while food consumption was recorded through a 24-hours recall. VD status was assessed by measuring the serum concentration of 25-hydroxyvitamin D and Plasma ionized calcium was measured with an ion-sensitive electrode.

Results: The prevalence of hypovitaminosis D status was high, with the prevalence of VD deficiency [25(OH)D < 30 nmol/l] and insufficiency [25(OH)D between 30–49.9 nmol/l] being 17% and 40% in women and 21% and 37% in children respectively. Using a cut-off of 75 nmol/l, approximately 90% of the women and children had hypovitaminosis D. Overweight/obese women had a 2 times lower risk [OR=0.46, (0.24-0.90)] for VD deficiency their non-overweight/non-obese counterparts. No participant had severe calcium deficiency (Ca<0.8 mmol/l) but moderate (0.8<Ca<0.9 mmol/l) and mild hypocalcaemia (0.9<Ca<1.15 mmol/l) affected respectively 14% and 83% of the women and 97% of children. Women and children intakes was 1% of the IOM recommended nutrient intakes (RNI) for VD and less than 43% of the calcium RNI.

Conclusions: calcium and VD deficiencies would represent a major public health concern in Vietnam due in part to low dietary intakes. Thus, actions to improve the VD and calcium status of the Vietnamese population should be considered.

Key words: Calcium, vitamin D deficiency, daily intake, women, children, Vietnam

PO2385

A REVIEW OF VITAMIN D FORTIFICATION- IMPLICATIONS FOR NUTRITION PROGRAMMING IN SOUTH EAST ASIA

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Background and objectives: Vitamin D (VD) is vital for bone health and has important contributions to non-skeletal health and organ function. Most VD is generated in the body by sunlight exposure with limited amounts added by diet. Despite regular sunshine in South East Asia, VD deficiency or insufficiency is being found more commonly, primarily due to lifestyle reductions to sunlight exposure. Some of these lifestyle changes are unlikely to change, and foods naturally containing VD are not widely consumed, so fortification of foods with VD may raise vitamin D status. The aim of this study was to review of VD fortification and therefore its implications for nutrition programming in South East Asia.

Method: Literature database was searched for fortification studies on VD and we estimated the VD intakes through potential fortified vegetable oil.

Results: Almost all of the studies showed that circulating VD (25OHD) increased in a dose dependent manner based on increased intake of fortified foods. However in a number of the studies, the additional intake was insufficient to increase VD levels to 50 nmol/L. Vegetable oil fortified at the level of 10 µg/100 g, in South East Asia, could provide 10-20% of the IOM estimated average requirement of VD for a woman and 5-15% of the IOM EAR for a child under 5 years of age.

Conclusions: Fortification of widely consumed foods such as edible oil with vitamin D could contribute to improved VD status in SE Asian countries. Intake modeling studies should be conducted to calculate additional resulting intakes, and fortification of additional foods should be considered. More nationally representative studies of vitamin D status in the region are urgently needed.

Key words: Fortification, supplementation, vitamin D, nutrition impact, South East Asia

PO2386

VITAMIN D DEFICIT AND METABOLIC SYNDROME

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Background and objectives: To assess the relationship between 25-hydroxyvitamin D levels and prevalence and incidence of metabolic syndrome .

Methods: We undertook a population-based cohort study in Spain. At baseline (1996-1998),1226 subjects were evaluated. Follow-up visits were performed in 2002-2004 and 2005-2007. At baseline and follow-up, participants underwent an interview and a standardized clinical examination with an oral glucose tolerance test in those subjects without known diabetes. At the second visit, 25-hydroxyvitamin D levels and iPTH levels were measured.

Results: The prevalence of metabolic syndrome (IDF criteria) at the second and third visit was 29.4% and 42.5 respectively.Mean levels of 25 Hydroxyvitamina D were lower in subjects with metabolic syndrome: 21.7 ± 6.21 ng/ml vs 23,35 ± 6,29 ng/ml, p=0,001.The prevalence of vitamin D deficiency (25 hydroxyvitamin D <20 ng/ml) at the second evaluation was 34.7%, with significant differences between subjects with and without metabolic syndrome(34.6 vs 26.5%, p=0.01). Women with vitamin D deficiency more frequently had hypertension and metabolic syndrome than women with normal levels. Men with vitamin D deficiency had more frequently hyperglycemia, hypertension, increased waist circumference , hypertriglyceridemia and metabolic syndrome. The number of present criteria was related to the prevalence of vitamin D deficiency so that for 1, 2, 3, 4 and 5 criteria the prevalence were: 31.7%, 32%, 33.5%, 55.4% and 100%. In prospective study, 25 hydroxyvitaminD values <20 ng/ml were not significantly associated with an increased risk of developing metabolic syndrome in the next 4 years (OR=0.99, 95% CI 0,57-1,7, p=0.97) after adjusting by sex and age.

Conclusions: Vitamin D deficiency is associated with an increased prevalence but not with increased incidence of metabolic syndrome.

Key words: Vitamin D, metabolic syndrome

PO2387

WEIGHT-FOR-AGE CHARTS AND Z-SCORES DEVELOPED FOR 10-15 YEAR OLD ADOLESCENTS IN NORTH-WEST PROVINCE SOUTH AFRICA

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Background and objectives: Monitoring adolescent weight from routine weight measurements at health centres can be an effective screening way to detect overweight or underweight for appropriate and timely referrals. Currently there is no weight monitoring tool for this age group for use in under-resourced health centres in many developing countries where body mass index (BMI) determination is not practical. The objective was to develop a weight-for-age monitoring chart, determine z-scores for adolescents 10-15 years old and make a comparison with the CDC 2000 and WHO 2007 references at 10 years.

Methods: We used age, sex and weight data from a sample of 1114 black North-West province adolescents from a large cross-sectional study. LMSchartmaker® Light was used to develop the charts and determine z-scores. Boys and girls charts were developed with 3rd, 10th, 25th, 50th, 75th, 90thand 97th percentiles.

Results: Our charts had lower weight-for-age at 3rd percentile for 10 year-old boys and girls than the CDC 2000 and WHO 2007 growth charts. We observed lower weight-for-age at the 97th percentile for 10-year old boys than the CDC 2000 and WHO 2007 growth charts. For 10-year old girls, our charts had a similar 97th percentile weight-for-age as the WHO 2007 chart, but lower than the CDC 2000 growth chart. A one-sample mean comparison test showed a statistical significant difference between means on our chart and both the CDC 2000 and WHO 2007 charts ($p<0.05$).

Conclusions: The new growth charts developed from the data may be more context specific and useful to monitor weight-for-age in 10-15 year old adolescents for this group and may detect weight-for-age greater than the 97th percentile at lower weights than the CDC 2000 growth charts. The charts could be used in under-resourced settings where BMI assessment is not practical.

Key words: LMSchartmaker®-Light, weight-monitoring, underweight, overweight, cross-sectional study

PO2388

BODY IMAGE OF ADOLESCENTS AND ITS CORRELATION WITH BODY MASS INDEX

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Background and objectives: There may ocur a disposition of losing/gaining weight in the subjects who are in the growth process. The aim of this study is to identify the adolescents' body image and its correlation with body mass index.

Methods: The sample of the study consisted of 815 high school students (male: 287, female: 528). Data collection were made by face to face interviews using a questionnaire and SPSS program has used to evaluate data. WHO data has used to classify percentile values of BMI and chi square test had ran to analyse data.

Results: The mean age of students was 15.70 ± 0.74 years and mean BMI was 20.61 ± 2.60 kg/m2. According BMI 68.4% of students were in normal range, 15.7% of them pre-obese, 3.7% of them were obese. Difference between BMI percentile values of age and gender is statistically significant ($p<0.05$). 87% of the students didn't smoke and 89.1% of them didn't consume alcohol. Female students tended to see themselves fat (17.2%) more than male students did (7.7%). 47.8% of the subjects who consider themselves fat had a normal body weight. Correlation between body image and gender is statistically significant ($p<0.01$). 43.5% of the subjects who weren't content with their weight (n=131) had normal weight. Correlation between being content with weight and gender is statistically significant ($p<0.05$). 58.8% of the subjects who had a change of weight in the last 6 months stated they gained weight (n=600). 33% of them had weight change willingly.

Conclusions: Body weight changes in adolescents may get be affected from social pressure, media or body image issues. Body weight should depend on age and gender in healthy individuals and there has to be cooperation between media and education institutions on this matter.

Key words: Turkey, adolescent, BMI, body image

PO2389

VITAMIN D DEFICIT AND DYSLIPIDEMIA

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Background and objectives: Several studies have investigated a possible action of vitamin D metabolites on different lipid fractions but the possible mechanism by which they could act remain unknown,with varying results in observational and intervention studies. The objetive was to study the relation between vitamin D levels and lipids levels.

Methods: We undertook a population-based cohort study in Spain. At baseline (1996-1998), 1226 subjects were evaluated. Follow-up visits were performed in 2002-2004 and 2005-2007. At baseline and follow-up, participants underwent an interview and a standardized clinical examination. At the second visit, 25-hydroxyvitamin D levels and iPTH levels were measured.

Results: The mean levels of total cholesterol (TC) in second study were: 249.73 ± 53.05; triglycerides: 111.18 ± 73.21; HDL: 66.35 ± 16.38; and LDL: 161.6 ± 46.71 mg/dl. In the third study, levels were 201.61 ± 38.11; 116.61 ± 78.60; 54.78 ± 12.98; and 123.58 ± 33.12 mg/dl, respectively. Mean levels of different lipid fractions in the second study depending on the presence or absence of vitamin D deficiency were: TC: 256.68 ± 51.91 vs 246.07 ± 53.37 ($p=0.006$); triglycerides: 87.53 ± 119.94 vs 106.34 ± 63.82 ($p=0.01$); HDL: 68.47 ± 17.50 vs 65.24 ± 15.67 ($p=0.007$); LDL: 120.91 ± 30.76 vs 108.45 ± 25.05 ($p=0.001$); ratio TC/HDL: 3.90 ± 0.96 vs 3.90 ± 0.98 ($p=0.9$); ratio LDL/HDL: 1.69 ± 0.51 vs 1.67 ± 0.53 ($p=0.7$).Mean levels of 25-hydroxyvitaminD were significantly lower in subjects with high TC (22.5 vs. 24.2 ng/ml), high HDL (22.1 vs 23.2 ng/ml) and triglycerides (21.1 vs 23.2ng/ml).No correlation was found between CT and 25-hydroxyvitamin D ($r=-0.06$, $p=0.08$),but there was a negative correlation with HDL and TG ($r=-0.07$, $p=0.03$ and $r=-0.09$, $p=0.01$) adjusted for age,sex and weight.In the cross-sectional study in the multivariate model we didn't obtained relationship between vitamin D deficiency (<20ng/ml) and elevated total cholesterol (OR=0.85,95% CI 0.57 to 1.28) or low HDL (OR=1.42,95% CI 0.75 to 2.71) after adjustment for age,sex and obesity,but the relationship between vitamin D deficiency and hypertriglyceridemia persisted,so that subjects with deficit of vitamin D were more likely to have high triglycerides (OR=0.68, 95% CI 0.47-0.98, $p=0.03$).In the prospective study,after four years of follow up, patients with or without vitamin D deficit,had similar risk of hypertriglyceridemia adjusted by age,sex and obesity (OR:1.01, $p=0.95$).No relationship was found with other lipid fractions in prospective study.

Conclusions: Vitamin D deficiency is associated with increased prevalence of hypertriglyceridemia but is not related to the incidence of dyslipidemia.

Key words: Vitamin D,dyslipidemia

PO2390

VITAMIN D AND OBESITY

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Background and objectives: To assess the relationship between obesity and the incidence of hypovitaminosis D and investigate the relationship between 25-hydroxyvitaminD levels and incidence of obesity.

Methods: We undertook a population-based cohort study in Spain. At baseline (1996-1998), 1226 subjects were evaluated. Follow-up visits were performed in 2002-2004 and 2005-2007. At baseline and follow-up, participants underwent an interview and a standardized clinical examination with an oral glucose tolerance test in those subjects without known diabetes. At the second visit, 25-hydroxyvitamin D levels and iPTH levels were measured.

Results: The prevalence of obesity (BMI >30 kg/m2) at the three visits was 28.1%, 36.2%, and 39.5%, respectively. The prevalence of vitamin D deficiency (25 hydroxyvitamin D <20 ng/ml) at the second evaluation was 34.7%. Neither obesity at baseline (OR=0.98, 95% CI 0.69-1.40, p=0.93) nor the development of obesity between baseline and the second evaluation (OR=0.80, 95% CI 0.48-1.33, p=0.39) were significantly associated with vitamin D deficiency at the second evaluation.

Conclusions: Vitamin D deficiency is associated with an increased risk of developing obesity.

Key words: Obesity,vitamin D, prospective study

PO2391

VITAMIN D DEFICIENCY IN MORBID OBESITY BEFORE AND AFTER BARIATRIC SURGERY

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Background and objectives: Patients with morbid obesity may have vitamin D deficiency and -bariatric surgery may exacerbate it due to various factors such as lack of dietary compliance, reduced intake, malabsorption, etc. The objective was to study the prevalence of vitamin D deficiency in patients with morbid obesity before and after bariatric surgery and its relationship with other laboratory parameters.

Methods: A retrospective study of 72 morbidly obese patients before and 1 year after surgery (bypass or sleeve). We collected data about : age, sex, previous comorbidities , physical examination, impedance testing and laboratory parameters (25Hidroxivit D, iPTH , Ca, HbA1c, total cholesterol, LDL, HDL, triglycerides, uric acid and leptin).

Results: The mean age of patients was 45.84 ± 10.39 years, 78.4% women. Pre-and postoperatively BMI: 51.51 ± 8.11 and 33.36 ± 5.21 (p=0.00). One year after surgery there were significant decreases in HbA1c, TC, LDL, triglycerides, uric acid, leptin and HDL increase. Mean serum 25-OH vit D pre and post were: 16.96 ± 7.87 vs 22.53 ± 12.44 (p=0.013) and iPTH: 16.9 ± 43.97 vs. 41.79 ± 1 , 89 (NS). The percentage of vitamin D deficiency (less than 20 ng / ml) were pre and post: 71.8% vs. 44.9% (p=0.04) and hyperparathyroidism 19.4% vs 14.6% (NS .). Vitamin D levels negatively correlated with preoperative age, body fat percentage and iPTH. Vitamin D levels negatively correlated with postoperative BMI, leptin, total cholesterol and HbA1c.

Conclusions: Patients with morbid obesity have Vitamin D deficiency in 71.8% of cases preoperatively, which should lead us to measure 25-OH vitamin D levels routinely in patients with morbid obesity. After the surgical procedure, despite supplementation with vitamin D , patients maintain a high percentage of vitamin D deficiency (44.9%) and elevated iPTH.

Key words: Morbid obesity, vitamin D

PO2392

ACHIEVING ADEQUATE VITAMIN D STATUS IN GUATEMALAN PRESCHOOL CHILDREN

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Background and objectives: Vitamin D status for inhabitants of tropical countries has been largely ignored. However, recent evidence illustrates the prevalence of sub-adequate vitamin D status in Latin American countries is widespread. For instance, a recent survey revealed 77% of preschool aged children in rural and urban Guatemala had sub-adequate levels of 25-hydroxyvitamin D [25(OH)D]. Here we present data on the response of these children to 12 weeks of supervised oral vitamin D3 supplementation.

Methods: The reported results are part of a larger survey conducted in 2011 documenting concentrations of iron and vitamins D and B12 in children attending one of three daycare centers in the central highlands of the Republic of Guatemala.

Children with sub-adequate vitamin D concentrations (n=67) received supervised supplementation of 2000 IU (50 μg) of vitamin D3 daily with a target of 60 cumulative doses (120,000 IU). Following supplementation 5 mL of venous blood was taken for analysis of 25(OH)D at the Osteoporosis Research Center of the Endocrine Division of Creighton University. Blood values < 30 ng/ml 25(OH)D were considered sub-adequate.

Results: All of the 67 participants received the prescribed 60 doses. Baseline mean 25(OH)D was 23.3 ± 4.4 ng/ml (median 24.0 ng/ml; range 7.9 - 29.9 ng/ml). Participants increased their mean 25 (OH)D levels to 43.3 ± 10.6 ng/ml (median: 41.8 ng/ml; range 26.9 - 85.5 ng/ml). The median increase was 18.4 ng/ ml (p=0.0001). Following supplementation 98.5% of children achieved adequate levels.

Conclusions: Twelve weekly cumulative doses of 10,000 IU of vitamin D3 was sufficient to achieve adequate 25(OH)D levels in nearly all preschool aged children in Guatemala. Future research should focus on achieving adequate 25(OH)D within a shorter time-frame and in additional population settings.

Key words: Vitamin D, 25-hydroxyvitamin D [25(OH)D], preschool, supplementation, Guatemala

PO2393

QUALITY ASSURANCE OF IODISED SALT AT PRODUCTION END IN INDIA AND PARTNERSHIP OF PRIVATE, NGOS AND GOVERNMENT AGENCIES

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Background and objectives: Quality Assurance (QA) of iodine monitoring laboratories at production end is critical for ensuring adequately iodised salt for target population. Partnership of the private stakeholders (salt producers), non-governmental organizations and government agencies can be used to establish QA Systems. The objective was the: operationalisation of partnership model for establishing QA system in laboratories at salt production end in India.

Methods: Regional iodine monitoring laboratory (RIML) of International Council for Control of Iodine Deficiency Disorders (ICCIDD), South Asia Office developed partnerships to establish QA system in laboratories of small, medium and large scale salt producers and Salt Commissioner's Office, Government of India. The QA protocols included induction training of laboratory personnel, monthly exchange of salt samples for internal and external QA, visits by experts to the filed laboratories and refresher training and feedback on QA system.

Results: The QA protocols were successfully established with nineteen medium and large scale salt producers (who contribute to about 30 percent of total iodised salt production in India) in staggered manner from 1997 to 2005. The 600 small scale producers were enrolled for QA program through a network of Micronutrient Initiative established 17 laboratories in year 2007The 26 laboratories of Salt Commissioner Office, Government of India monitoring production end salt iodisation and analysing more than one lakh samples annually were enrolled for QA with support of Global Alliance for Improved Nutrition (GAIN) in year 2008. The successful operationalisation of the QA system with diverse range of stakeholders contributed to strengthening of monitoring of salt iodisation and led to increase in adequately iodised salt consumption in India to current level of 71%.

Conclusions: Our study documents successful operationalisation of QA system in laboratory of government regulator, small, medium and large scale salt producers in India.

Key words: Salt iodization, quality assurance, partnership

PO2394

SEASONAL DIFFERENCES OF VITAMIN D STATUS IN AUSTRIAN CHILDREN (7–14 YEARS)

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Background and objectives: Vitamin D plays an important role in bone and mineral homeostasis. The prevalence of vitamin D deficiency is high in different populations across the world. Body content of vitamin D originates from dietary sources and from the endogenous synthesis initiated by ultraviolet (UV) irradiation of the skin. The endogenous, cutaneous production, which is responsible for 80–90 % of vitamin D in the body, depends on sun exposure, season, skin pigmentation, age and health state. This study should show the importance of the synthesis of vitamin D in the skin and the influence of the season.

Methods: Plasma concentrations of vitamin D (25-OH-vitamin D2 and D3) were measured in 387 children using a HPLC.

Results: The mean 25-OH-vitamin D concentration in spring (March, April, May) was 52.6 nmol/l, in summer (June, July, August) 64.8 nmol/l, in fall (September, October, November) 45.5 nmol/l and in winter (December, January, February) 37.9 nmol/l. The plasma concentration was significantly higher in summer than in spring ($p<0.01$), fall ($p<0.001$) and winter ($p<0.001$). During winter 48 % had deficient (<25 nmol/l), 22 % insufficient (25–50 nmol/L) and 30 % sufficient vitamin D status. During summer 9 % had deficient, 20 % insufficient and 71 % sufficient vitamin D status.

Conclusions: The analysis shows that the endogenous, cutaneous production of vitamin D has a dominant impact on plasma vitamin D level. Therefor it is important to pay attention to sufficient sun light exposure, especially in spring, fall and winter.

Key words: Vitamin D deficiency, season, children

PO2395

DIETARY PATTERNS AND ANTHROPOMETRIC INDICES AMONG IRANIAN WOMEN WITH MAJOR DEPRESSIVE DISORDER

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Background and objectives: Major depression is a common mental disorder among women. A number of studies have demonstrated the association between some nutrients and food items with depression, but the studies on the association of dietary patterns with depression, especially in the Middle East, are rare. Further, the literature examining the relationship between anthropometric status and depression are inconsistent.

Methods: In this case-control study, 45 women with major depression and 90 patients with no mental disorder participated. We collected dietary intakes by a semi-quantitative food frequency questionnaire, and measured anthropometrics indices (weight, height, waist and hip circumferences). Using factor analysis, two major dietary patterns were extracted: Healthy and Unhealthy.

Results: After adjusting for confounders, individuals who gained higher scores in healthy dietary pattern, had 84% lower odds of major depression; while the odds of major depression in participants who gained higher scores in unhealthy dietary pattern showed no significant association. No significant association was found between anthropometric indices and major depression.

Conclusions: These results suggest that the healthy dietary pattern is significantly associated with lower odds of major depression in adult women. Further researches are needed to confirm these findings.

Key words: Nutrition, factor analysis, weight, body mass index.

PO2396

ASSOCIATION BETWEEN DIET AND CVD AND MORTALITY RISK IN FRANCE AND NORTHERN IRELAND: THE PRIME STUDY

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Background and objectives: Assessment of overall diet via dietary patterns is considered a complementary approach to examining nutrients or foods in isolation, accounting for synergistic effects of food consumption. The aim of this study was to determine the association between a priori and a posteriori dietary patterns and CVD incidence and mortality in the PRIME prospective cohort study, which included 10600 men aged 50-59 years from Belfast, Northern Ireland and France.

Methods: Four a priori and four a posteriori dietary scores were calculated, based on the 16-item FFQ. A priori scores were: Fruit and Vegetable (FV) Variety Score, Overall Variety Score, Adapted Mediterranean Diet Score (aMDS), and Daily FV Score. Two French and two Northern Irish a posteriori dietary patterns were calculated; "Healthy" and "Unhealthy", "Vegetables and Nuts", and "Fruit, Vegetables and Fish" respectively. Cox's Proportional Hazard Regression was used to determine if all-cause mortality or CVD incidence was associated with dietary patterns.

Results: After full adjustment for country, age, and other biological and lifestyle variables four scores were significantly associated with overall mortality. In the highest fourth, showing

greatest adherence to diet pattern: the "Fruit, Vegetable and Fish" Score and "Healthy" Score were associated with reduced overall mortality [HR 0.74 (95% CI: 0.57-0.96), ptrend=0.049 and HR 0.74 (95% CI 0.57-0.96), ptrend=0.02, respectively]. Daily FV Score and MDS were also associated with reduced overall mortality [HR 0.75 (95% CI: 0.57-0.99), ptrend=0.03 and HR 0.73 (95% CI: 0.50-1.05), ptrend=0.049 respectively]. The other scores were not associated with overall mortality. No dietary patterns were associated with CVD incidence after adjustment.

Conclusions: Adherence to healthy dietary patterns is associated with a reduction in all-cause mortality risk of around 25%. Higher intakes of fruit, vegetables and fish may have a protective effect on all-cause mortality in middle-aged men.

Key words: Dietary patterns, CVD, mortality risk

PO2397

CHANGES IN BODY COMPOSITION IN RELATION TO THE STAGE OF DEMENTIA IN A GROUP OF INSTITUTIONALIZED ELDERLY

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Background and objectives: Changes that occur in body composition during ageing can promote malnutrition, but there is no much information about relationship between body composition and the evolutionary stages of dementia. Objetive. To assess the nutritional status in a group of institutionalized elderly with dementia, analyzing changes in body composition according to their stage of dementia.

Methods: A cross-sectional study was conduced from May 2010 to September 2010. The study included 63 institutionalized elderly with dementia, at evolutionary stages of 5, 6, and 7 of GDS (Global Deterioration Scale) and FAST (Functional Assessment Stating) scales. We utilized the MNA (Mini Nutritional Assessment), anthropometry, and hand-to-food bioelectrical impedance (50 kHz) to assess the nutritional status. The results were analized by ANOVA or Kruskal-Wallis tests, and the Scheffé's posteriori contrasts. Significance was considered at $p < 0.05$.

Results: The mean age of the patients was 80.6 (95%CI: 78.3-83.0; Range: 51-95) years. The MNA assessment categorized 38.1% of the group as malnourished, 60.3% as at risk, and 1,6% as well nourished. The mean BMI was 23.06 (22.01–24.10) kg/m2, without significant differences between GDS/FAST stages of dementia, except in palliatives patients (mean: 19.85; CI95%: 78.3-83.0 kg/m2). Subjects in GDS/FAST stages 5, 6 y 7a-b showed a Fat Mass Index (FMI) Z-Score next to 0 DS, and a Fat Free Mass Index (FFMI) Z-Score next to -1 DS. This results are consistent with a condition of sarcopenic obesity. Both indexes were significantly lower in patients at GDS/FAST ≥ 7c (palliative patients).

Conclusion: Analysis of body composition should be included in the Geriatric Nutritional Assessment always. Otherwise it wouldn't be possible to identify sarcopenic obesity conditions, which are highly prevalent in the elderly with these features.

Key words: Nutritional Assessment. Body Composition. Malnutrition. Dementia. Mini Nutritional Assessment.

PO2399

TRENDS IN PERCENT CONTRIBUTION OF CARBOHYDRATES, PROTEINS AND FATS TO ENERGY INTAKES AND ITS ASSOCIATION WITH BODY MASS INDEX CATEGORIES

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Background and Objectives: Prevalence of underweight in rural India is decreasing and overweight /obesity was increasing as per National Nutrition Monitoring Bureau (NNMB) surveys. The aim of the study was to deduce a trend with regard to percent contribution of macronutrients such as carbohydrate, fats and proteins to energy intake and association with BMI among rural population over the periods.

Methods: Data represents adults aged ≥18 years from 9 NNMB states of Rural India. A sample of 11884 in 2001, 14384 in 2006 and 25543 in 2012 was covered. BMI has been graded as underweight (<18.5), normal (18.5-25) and overweight/obese (>25). Intakes of carbohydrate, fat and protein were generated from 24 hour recall method. Adjustment for confounders has been made by regression analyses.

Results: Increase in prevalence of obesity from 5.3 to 10.2% in men and 8.9 to 14.5% in women was observed over a period of time. The percentage of energy contribution from carbohydrates, decreased from 77 to 75%, and for protein it was more or less similar at 11%. In case of fat, there was an increase from 12% to 14%. Percent contribution of carbohydrates and proteins to energy in underweight and normal groups was found to be similar and a notable decrease in overweight/obese group

was observed at each time point. In case of fats, the increase was significant ($p<0.05$) across the groups. Energy intake decreased over a time across BMI groups. Percent contribution of energy from proteins was inversely related to percent contribution from carbohydrates (-0.596 to -0.867) and fats (-.273 to -.683) at different times after adjusting confounders.

Conclusions: A significant decline of energy intake in various BMI categories and increase in prevalence of overweight/obesity over the periods. Percent energy from fat increased significantly across BMI categories.

Key words: Energy intake, body mass index

PO2400

COMPILATION OF A PROVISIONAL TABLE ON COPPER AND MANGANESE CONTENT OF FOODS FOR USE IN EPIDEMIOLOGICAL STUDIES IN SPAIN

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Background and objectives: There is a serious lack of data on copper (Cu) and manganese (Mn) content of foods in Spanish food composition tables, and very often these values are borrowed from foreign tables. Consequently, estimations of Cu and Mn dietary intake performed in Spanish population using these limited data are unreliable. The objectives of this study were to collect documented data on copper and manganese content of Spanish foods, and to evaluate the need of further information. With this aim, a search in scientific literature was performed.

Methods: Values and metadata were extracted from selected papers and documents, scrutinized and aggregated. The resulting data matrix was completed with data from European and USDA food composition data bases. This final database was used to estimate the copper and manganese intake of a sample (n=334) of adults (18-80 years) from Barcelona from which food consumption data was obtained using a 24 hours food recall.

Results: The food composition database finally compiled contained data for 579 foods. Values coming from published papers and monographs that included chemical analysis of Spanish foods constitute a 34% (Cu) and 21% (Mn) of total values. Values estimated or calculated using recipes were 10% and 11%, respectively. Assumed zero values were 3,4% and 6,7%, respectively. Values coming from foreign databases were 53% and 60%, respectively. Estimation of Cu and Mn intake in the Barcelona adult sample gave values of 1,81 mg/day (SD: 1,116) and 3,01 mg/day (SD: 1,472) respectively.

Conclusions: Cereals, ready-to-serve foods and vegetables accounted for 50% of the Cu intake. In the case of Mn, cereals and fruits were the main contributors. Reliable data for these food groups are essential to improve the precision and accuracy of dietary intakes for these two minerals.

Key words: Copper, manganese, food composition data bases, nutrient intake

PO2401

ON THE ACCUMULATION PROCESSES OF IRON, MAGNESIUM, MANGANESE AND ZINC DURING THE GROWTH OF HIJIKI PLANTS

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Background and objectives: Hijiki (Sargassum fusiforme) is a seaweed, rich in nutritionally beneficial minerals, such as iron (Fe), magnesium (Mg), manganese (Mn) and zinc (Zn). The authors intended to know their accumulation processes to explain the variation of their concentrations in different samples. Hijiki plants begin to germinate in autumn, grow until the following summer, and eventually become floating seaweeds.

Methods: Between November and the following April, sample plants were harvested, and cut into 10 cm sections from the underneath filamentous holdfast to the upper apex. All the sections were separated into stalks and leaves. The samples were washed thoroughly and lyophilized. Portions of the respective samples were ashed with a conc H2SO4-HNO3 mixture on a furnace, and the contents of Fe, Mg, Mn and Zn were determined by atomic absorption spectrophotometry.

Results: The concentration of Mg increased with time gradually first in the leaves, then in the stalks, but it eventually reached similar levels in both tissues. The accumulation of Fe occurred during the earlier period and leveled off thereafter. During the early period of growth, the concentrations of Mn and Zn in the respective sections were not correlated to each other. Later, their concentrations, although greatly varied in their levels, showed a correlation between Mn and Zn with a coefficient of 0.9 in both stalks and leaves.

Conclusions: The accumulation rates and patterns of Fe, Mg, Mn and Zn differed from each other, thus the harvest time should be selected accordingly.

Key words: Hijiki(Sargassum fusiforme), growth; minerals.

PO2402

SEGMENTAL BIOELECTRICAL IMPEDANCE ANALYSIS IN NORTHERN THAI SECONDARY SCHOOL-AGE STUDENTS (PCCCR)

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Background and objectives: Body composition is an important indicator of health and nutritional status of adolescents. Accurate and reliable anthropometric and body composition measurements require the proper equipment and techniques. Through the use of 8 polar electrodes, the Tanita BC-418 segmental body composition analyzer can show separate body mass for the right arm(RA), left arm(LA), trunk(TR), right leg (RL) and left leg (LL). The objectives were to study the mass compositions of each arm, each leg, and trunk of Northern Thai secondary school-age students according to their sex, age, and body weight status. A cross-sectional study.

Methods: At the beginning of each academic year during 2009 – 2010, 391 Princess Chulabhorn's College Chiangrai students : 61.9% female, 38.1% male, aged 12-17 years were assessed segmental body compositions by use of Tanita BC-418.

Results: From 2009-2010, in total subjects there were significant increases of these following parameters: BMI, total fat mass (FM), RL predicted muscle mass (RLPMM), LLPMM, RAPMM, and TRPPM. No significant differences in fat percentage of each segmental body part during 1 year. Throughout the study, there were no significant differences of BMI between female and male subjects, whereas other segmental body composition parts showed significant differences between sex. Mean fat percentage of each part in female subjects were significantly higher than those in male subjects, opposite results were observed in fat-free mass percentage of each part. One year follow-up, prevalences of obesity classified by excess percantage total body fat were significant decrease, 3.6% to 2.3% of total subjects, whereas fat percentage of each part of such subjects increased, especially percentage TRF, 37.3% to 38.9%.

Conclusions: Thus the segmental body composition analysis gave more accurate and reliable body composition assessment which result in higher effective nutritional therapy.

Key words: segmental, body composition, fat, adolescents

PO2403

INSIGHT IN IODINE INTAKE IN THE NETHERLANDS: ESPECIALLY CHILDREN OF LOWER EDUCATED PARENTS AT RISK OF INADEQUATE IODINE INTAKES

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Background and objectives: Low iodine intake is associated with goiter, impaired brain development and reduced mental functioning. The Netherlands has a long history of iodization of bread salt to correct the low natural iodine content of food. Since 2008, other foods may also be fortified with iodine. To prevent excessive intakes, the iodine levels in bread salt were reduced. This study aims to investigate current levels of iodine intake, its main dietary sources and its association with socio-demographic and lifestyle factors.

Methods: Dutch national food consumption survey 2007-2010 (2 non-consecutive 24-hr recalls; n=3,819, age 7-69 yr.) and Dutch food composition database 2011 were combined to estimate total iodine intakes. Contributions of different sources to total observed iodine intake and food groups to natural iodine intake were calculated. Associations between natural iodine intake or bread intake with socio-demographic and lifestyle factors were examined with multiple linear regression models.

Results: The habitual total iodine intake was adequate for the majority of the population (≥ 99%); With 232 μg/d for men and 194 μg/d for women; median intake was 20-25% lower than before 2008. Main source was iodine added by food manufacturers (43%), of which 90% originated from bread. Followed by iodine naturally present in foods (40%), with as main contributors dairy (31%) and non-alcoholic beverages (13%). Iodine intake increased with age. Children of higher educated parents had a 10% higher intake of natural iodine and bread compared to those of lower educated parents.

Conclusions: The iodine intake in the Netherlands is still adequate, but decreased since 2008. Bread is the main source of added iodine. With future successful decrease in (iodized) salt intake, especially children of lower educated parents are at risk of inadequate iodine intakes, due to lower intake of natural iodine and bread.

Key words: Iodine, dietary sources, socio-demographic, salt

PO2404

FOOD CONSUMPTION SURVEY IN A GROUP OF ADULTS AT RISK OF POVERTY IN LITHUANIA: DAILY INTAKE OF ENERGY AND NUTRIENTS

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Background and objectives: Nutritional research in Lithuania is scarce, especially research targeting people with lower income. This study aimed to provide detailed information on daily intake patterns of nutrients in a group of adults at risk of poverty (ROP) in Vilnius, Lithuania, in 2012 (EU funded FP7 project CHANCE).

Methods: The survey was conducted among adults who were aged 25–65 and at ROP (the recruitment criterion was set at 40–60 % of the national equivalised household median income). The study also recruited affluent participants (AFF) who served as a control group (the income ranged from 1 to 1.67 times the national equivalised household median income). The sample size was 150 respondents (92 ROP and 58 AFF persons). The 24-hour dietary recall method was used during the face-to-face interviews.

Results: High intake of fat (40.57 % of energy for ROP and 37.2 % for AFF people), insufficiency of carbohydrates (45.63 % and 47.0 % of daily intake of energy from carbohydrates for ROP and AFF respondents respectively), and excess of sugars in both groups (comprising 14.63 % of energy for ROP and 17.35 % for AFF people) were found. The insufficiency of some dietary vitamins and minerals was found in both groups, with the highest risk of inadequate intake for biotin, folic acid, pantothenate, vitamin D, calcium, iodine and iron.

Conclusions: There is an actual need for a shift between different sources of energy intake, particularly from fat to carbohydrates. Special attention should be brought to the enhancement of adequate micronutrient intake, particularly in the ROP group.

Key words: Nutrients, intake, risk of poverty

PO2405

COULD LEAFY VEGETABLES BE USEFUL TO FIGHT AGAINST IRON DEFICIENCY IN SUB-SAHARAN AFRICA?

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Background and objectives: To help fighting against micronutrient deficiencies, the diversification of the diet towards micronutrient-rich foods should be promoted. In sub-Saharan Africa, cereal-based foods are eaten daily, along with a wide variety of sauces. The potential of leafy vegetable (LV) sauces to cover iron requirements of young children from Burkina Faso is assessed.

Methods: Traditional recipes of LV sauces were reformulated to increase their iron contents and decrease their chelating factor contents. Iron bioaccessibility was then estimated by in vitro dialyzability measurements on blanched leaves, on traditional and improved sauces, and on a typical Burkinabe meal constituted of millet tô, a thick paste, plus sauce. Sauce and tô intakes were measured on 12-17 month-old children (n=12) in Ouagadougou.

Results: Sorrel, amaranth and jute leaves were selected for their high iron content. In blanched leaves, iron dialyzability was much lower for jute than for other leaves, what was attributed to their slimy texture. Cooking into sauces decreased iron dialyzability for sorrel and amaranth. Sauce reformulation increased iron dialyzability only for amaranth sauce but finally, for both sorrel and amaranth sauces, the dialyzable iron content was substantially improved. This positive effect was attenuated by blending the sauces with tô. There were no significant differences between intakes of the different sauces by young children [mean intake per meal: 66 ± 11g of sauce; 84 ± 3g of tô], but improved sauces allowed a higher coverage of iron daily requirements compared to the traditional ones.

Conclusions: Improved amaranth and sorrel sauces contained more dialyzable iron than the traditional ones and consequently allowed a higher potential coverage of iron needs. This must be checked through an absorption study in human before promoting their regular consumption.

Key words: Iron; bioaccessibility; leafy vegetables

PO2406

NUTRITIONAL ASSESSMENT OF UNIVERSITY STUDENTS OF UNIVERSITY OF MURCIA (LORCA, SPAIN)

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Background and objectives: It is necessary to collect information to planning actions for a positive impact on human nutritional health. The objective of this study was to know the nutritional status of the university students of the University of Murcia.

Methods: Population: 161 students (37 males, 124 females) of the School of Health Science of University of Murcia (Lorca). Mean males corporal composition data were 22,70 yrs (SD: 4.90), 75,32 kg (SD: 9.48), 177.89 cm (SD: 7,34) and BMI of 23.77 kg/m2 (SD: 2,27). Mean females corporal composition data were 26.20 yrs (SD: 9.99), 60.20 kg (SD: 11.11), 164.62 cm (SD: 5.40) and BMI of 22.20 kg/m2 (SD: 3.83). Data Collection: Semiquantitative questionnaire of food frequency consumption (FFQ). R24 hours (R24h) and lifestyle questions. Interviews were conducted by personnel trained. All study people signed informed consent. This study was approved by the Ethics Committee of the University of Murcia. Software's: Diet source and SPSS 19.0 (SPSS Inc , Chicago, IL, USA).

Results: Mean estimated energy was 2003 kcal/day (SD: 235.01). 47.01% of carbohydrates, 35.15% of lipids and 17% of proteins. Fatty acids were distributed as 16.07% MUFA, 10.32% SFA and 3.91% PUFA.

Conclusions: According to BMI, both males and females classify as normal weight. There is an imbalance of energy profile with a high protein intake at the expense of carbohydrates, so it is recommended to increase the % of energy from carbohydrates. There is an imbalance of lipid profile with a high % of SFA derived PUFAs detrimental, so it is recommended to increase the % of energy from PUFAs.

Key words: Nutritional assessment, diet, university students

PO2407

EVALUATION OF MEDITERRANEAN DIET QUALITY INDEX (KIDMED) IN STUDENTS OF UNIVERSITY OF MURCIA (LORCA) AND THEIR ADHERENCE TO MEDITERRANEAN DIET PATTERN

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Background and objectives: The pattern of the Mediterranean diet is considered the best for the countries of southern Europe. Besides the Murcia region produces some of the staples of this pattern as vegetables, fish and olive oil. The objective of this study was to determine the adherence to Mediterranean pattern of students from the University of Murcia using KIDMED diet quality index.

Methods: Population: 161 students (37 males, 124 females) of the School of Health Science of University of Murcia(Lorca). Mean males corporal composition data were 22,70 yrs (SD: 4,90), 75,32 kg (SD: 9.48), 177,89 cm (SD: 7.34) and BMI of 23.77 kg/m2 (SD: 2.27). Mean females corporal composition data were 26,20 yrs (SD: 9.99), 60,20 kg (SD: 11.11), 164.62 cm (SD: 5.40) and BMI of 22.20 kg/m2 (SD: 3.83). Semiquantitative questionnaire of food frequency consumption (FFQ) and lifestyle questions. Comparison of the data with the Mediterranean pattern by KIDMED(Trichopoulou 1995, Serra 2004, Tur 2005, Mariscal-Arcas 2007). Interviews were conducted by personnel trained. All study people signed informed consent. This study was approved by the Ethics Committee of the University of Murcia. Software: SPSS 19.0 (SPSS Inc,Chicago,IL,USA).

Results: The KIDMED index classification was 'good' in 27.5% of the population, 'average' in 61.8% and 'poor' in 10.8%. Males showed a mean index of 6.2 (SD: 2.2), females showed a mean index of 5.9 (SD: 2.3) with no significant difference between gender.

Conclusions: The nutritional behaviour of the present population of university students is similar to that found in others KIDMED studies (Mariscal-Arcas 2007). Adherence to the Mediterranean Diet pattern of students from School of Health Science (University of Murcia,Lorca) is decreasing, spite of being health science students.

Key words: Mediterranean diet, KIDMED, diet quality index

PO2408

CHANGES IN BODY COMPOSITION IN ONCOLOGY PATIENTS AFTER ABDOMINAL SURGERY

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Background and objectives: Rationale body composition after surgery is usually altered and total body protein during the two postoperative weeks is diminished. The aim of the study was to compare pre-operative (PR-OP) with post-operative (PO-OP) changes in body composition, phase angle (PA) and illness marker (IM) in oncology patients undergoing major abdominal surgery using bioelectrical impedance analysis (BIA).

Methods: 85 patients with colon cancer (61 % men, 24 % women) were included in the study in year 2012. According to an established PR-OP clinical pathway all patients received enteral or in case of severe malnutrition parenteral nutrition support. Patients' nutritional status was assessed two times, PR-OP in the month before surgery and in the second PO-OP week. At both visits BIA was performed and venous C-reactive protein (CRP) was measured.

Results: Average involuntary weight loss in last 6 months PR-OP was 6.7% ± 6.5PR-OP average weight was 79.6 ± 14.1 kg, average PO-OP weight was 80.2 ± 13.2 kg (p=0.137). PO-OP there was some dry lean mass (DLM) gain from 12.5 ± 4.7 kg to 12.7 ± 5.5 kg (p=0.077) and an increase in fat free mass index (FFMI) from 12.5 ± 4.7 kg/m2 to 12.7 ± 4.5 kg/m2 (p=0.215). The changes in total body water (TBW), extracellular water (ECW) and intracellular water (ICW) weren't statistically relevant, but TBW, ECW and ICW compared to reference value were decreased (p=000). PO-OP illness marker (IM) increased from 0.815 ± 0.044 to 0.828 ± 0.036 (p=0.004) and PA decreased from 5.2 ± 1.6° to 4.8 ± 1,1° (p=0.009). PO-OP CRP increased form 15 ± 31 mg/l to 54 ± 35 mg/l (p=000).

Conclusions: With early PR-OP nutrition intervention patients were able to maintain or increase their DLM and FFMI, although PO-OP acute phase protein response occured (increased CRP), PA diminished and IM rose.

Key words: Body composition, oncology patients, abdominal surgery

PO2409

A RELIABLE METHOD OF EVALUATING NUTRITIONAL INTAKE OF MALE MINEWORKERS RESIDING IN MINE ACCOMMODATION ON A PLATINUM MINE (SOUTH AFRICA)

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Background and objectives: The Mining Charter stated that measures must be established for improving nutrition of mineworkers yet no nutritional indicators are defined. The aim was to develop of a simple, cost effective method to monitor food and nutritional intake of mineworkers.

Methods: A cross-sectional, observational study with an analytical component was conducted over five days (including one weekend day) on male mineworkers (n=700) that primarily perform underground tasks and reside in mining accommodation. Census sampling was used to recruit study participants. Food inventory data was recorded as food quantities used for food preparation. The yield of the prepared food and expected meal participation was used to calculate mean intake according to the household record method. Meal as well as food item participation was recorded while production and plate wastage was determined to assess actual food intake (individual data). Food and nutritional intake between group and individual data was compared.

Results: The study recorded a 96% meal participation measured against the planned participation figures with 74% participating in all menu items. Plate wastage represents 9% of the food served. A t-distribution test showed that the values for selected nutrients fell within the 95% confidence interval demonstrating that the planned values were within those values observed during the study. The following equation can be adopted to calculate food intake: Food consumed/ mineworker = {(Raw issue x cooking/preparation factor) x participation factor)} – (edible + inedible wastage).

Conclusions: Household data can be used as a tool to monitor average individual food and nutritional intake of mineworkers if identified indicators are considered. This tool can be adapted to be used in industrial catering units to monitor food and nutritional intake, which will enable identification of food or nutrient deficiencies and timeous implementation of intervention strategies.

Key words: Mineworkers, nutritional intake, food wastage

PO2411

A SCREENING TOOL FOR EARLY DETECTION OF MALNUTRITION IN INDIVIDUALS WITH INTELLECTUAL DISABILITY IN A PSYCHIATRIC HOSPITAL (SOUTH AFRICA)

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Background and objectives: Early detection and diagnosis of malnutrition is essential in individuals with intellectual disability (ID), considering the risk factors, prevalence of malnutrition and feeding problems. Objectives were to determine the degree of malnutrition, which degree of ID was more prone to malnutrition, to investigate different risk factors for malnutrition, and to adapt a screening tool for easier identification of malnutrition.

Methods: A descriptive, cross-sectional study, with an analytical component, was conducted. Prevalence of malnutrition was determined by taking anthropometric measurements of all adults with ID who complied with the inclusion criteria. These results combined with other possible factors such as medication and co-morbidities were used to adapt an existing malnutrition screening tool.

Results: Anthropometric measurements of 244 individuals with ID indicated that 38,1% (n=93) was at risk of or undernourished and 10.0% (n=24) was at risk of or over nourished. Men were more prone to be or become undernourished (48.0%, n=73). Individuals with mild ID were more likely to become obese (19.4%, n=6), while individuals with profound ID were more prone to being underweight (57.1%, n=8). A significant difference was found between increased waist circumference (WC) and the severity of ID [Pearson Chi-square test (p=0.00)]. Other risk factors that influence nutritional status in this population included hypertension (13.0%, n=32), epilepsy (46.0%, n=112), and polypharmacy (71.7%, n=175). An existing screening tool was adapted by addition of prevalent factors (WC, epilepsy and medications) as well as through adaptation of the scoring system. The adapted screening tool was more sensitive than the original tool in identifying individuals who were at risk of malnutrition, or who were already malnourished in this study population.

Conclusions: This research can help health care professionals to be more aware of the interaction between the severity of ID and malnutrition.

Key words: Intellectual disability, screening tool, malnutrition

PO2412

ABSENCE OF GEOGRAPHIC-SETTING CONTRASTS IN BODY COMPOSITION ACROSS STUNTED AND LOW-STATURE GUATEMALAN PRESCHOOLERS OFFERED COMMON DIETARY FARE

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Background and objectives: Guatemala has the highest rate of stunting in the hemisphere, and a recent CeSSIAM experience documented comparable degrees of short-stature in both an urban and rural setting among preschool children offered largely similar dietary fare. We sought to explore in more detail the nature of any body-proportion differences that might exist.

Methods: Heights and weights were measured and birthdates obtained in 20 participating preschoolers (aged 2-7 years) at one urban government-supported day-care center in Quetzaltenango in the Western Highlands (U1), 24 in a second urban center (U2), and 43 in a rural center (RC). At all locations, two meals and two snacks from a common 40-day rotating menu were offered daily over 8-week periods over the 10-month annual operation. Data were evaluated using Z-scores and other references to the WHO growth curves (2008) for this age band.

Results: Respective prevalence of stunting (<-2SD HAZ) were: 35%; 63%; and 81%. Analyses then focused exclusively on U2 vs RC. Respective M/F ratios were 1.40 and 0.87, and median ages, 50 and 49 months. Median WHZ were, respectively, -0.16 and -0.07, with median statures of 95 and 92 cm. The only suggestion of intergroup indicator variance was with the WAZ, showing "underweight" in 17% of U2 and 37% of RC. Nevertheless, BMIs averaged 15.6±1.1 and 15.8±1.1 kg/m2 in the respective sites (p=0.54). BMIs beyond the 75th percentile, adjusted for age and sex, constituted 21% in U2 and 28% in RC; respective rates below the 25th percentile were 12% and 9%.

Conclusions: Two groups of urban and rural Guatemalan-highland preschoolers had comparable and elevated rates of stunting, common to the region. Detailed comparison of measurements and adjusted indicators failed to uncover any differences reflected at the level of body composition.

Key words: Children, stunting, Guatemala

PO2413

THE INFLUENCE OF VITAMIN A STATUS ON IRON-DEFICIENCY ANAEMIA IN ANAEMIC ADOLESCENT SCHOOLGIRLS IN MYANMAR

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Background and objective: Recent studies showed anemia is a major nutritional problem among adolescent schoolgirls in the Ayeyarwady Division of Myanmar however there is a lack of information available to explain the high prevalence. The study was conducted to investigate reasons for high prevalence of anaemia. In addition, we explored the role of vitamin A in contributing iron deficiency anaemia among the girls.

Methods: We screened for anemia (haemoglobin (Hb)<120 g/L) among 1269 subjects. All the anaemic subjects (n= 391) were further assessed for their iron, vitamin A and sub-clinical inflammation status. Iron and vitamin A status were compared between iron deficient and non-deficient groups as well as between those girls with and without inflammation (Student 't' tests). Logistic regression was done to determine whether vitamin A status and SCI were the risk factors for iron deficiency. The differences in iron status among tertiles of vitamin A were assessed with ANOVA.

Results: One third of the anaemia (30.4%) was due to iron deficiency (IDA). Low vitamin A status (serum retinol<1.05 μmol/L) was 31.5%. Iron and vitamin A status were significantly different between the IDA and non-IDA groups and also based on their inflammation status. Logistic regression showed low vitamin A status was a significant predictor for being iron deficient (OR [95%CI] were 1.9 [1.09-3.13] and 2.3 [1.32-4.02] in the middle (1.056-1.298) and low (≤1.056 μmol/L) vitamin A tertiles respectively). ANOVA showed better iron status was associated with higher concentration of serum retinol but only in those with IDA.

Conclusions: Iron deficiency is not the main cause of anaemia among the girls .The role of other micronutrients should be taken into account in addressing the problem of anaemia.

Key words: Anemia, iron deficiency, vitamin A, Myanmar

PO2414

INTRODUCING INFANT AND YOUNG CHILD FEEDING INDICATORS INTO NATIONAL NUTRITION SURVEILLANCE SYSTEMS- LESSONS FROM VIETNAM

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Background and objectives: A comprehensive set of infant and young child feeding (IYCF) indicators exists but is not widely used hampering collection of comparable data on IYCF practices. Vietnam incorporated the WHO-IYCF indicators into the National Nutrition Surveillance system (NNSS) since 2010. We describe the process and lessons learned.

Methods: The Vietnam NNSS was established in the 1980s. While anthropometric indicators based on international standards were shared with stakeholders in a timely and systematic manner, data on IYCF did not enjoy this level of rigor and dissemination. In 2009, Alive and Thrive and UNICEF supported the National Institute of Nutrition to incorporate the WHO-IYCF indicators into the NNSS. The process included a review of the existing tool, preparation of an additional questionnaire that was piloted in 10 provinces, revision of the tool based on the pilot experience, and nationwide roll-out of the revised tool.

Results: The current surveillance tool comprises a four-page questionnaire that enables collection and generation of valid comprehensive data on nutrition and IYCF. The tool has the flexibility to generate data on other relevant activities (e.g mass media interventions, food security) as the last page is adapted yearly on request from planners. Data from 2010 are available in attractive provincial profiles and a national report with maps illustrating IYCF practices across Vietnam. Importantly, the data have been used in the development of provincial plans for nutrition, policy advocacy (e.g. maternity leave legislation, advertisement law) and monitoring of trends.

Conclusions: Adoption of the WHO-IYCF indicators was a successful experience. Strategic timing, buy-in from stakeholders and capacity building at all levels was critical to ensure high quality and use of data. Further revisions to the existing surveillance system (e.g sampling methodology) will be important to ensure validity and reliability of indicators.

Key words: Infant feeding practices, child nutrition, surveillance, Vietnam

PO2415

INTERACTION OF PARASITE PREVALENCE AND LINEAR GROWTH IN PRESCHOOL CHIDREN ATTENDING DAY-CARE CENTERS IN THE WESTERN HIGHLANDS OF GUATEMALA?

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Background and objectives: Infections, including gastrointestinal infections, can negatively affect growth. As Guatemala has the highest rate of stunting in Latin America, we aimed to determine rates of stunting and parasitic infection among children attending government-sponsored day-care centers and receiving a common diet from a pre-established, rotating menu, subsidized by the Secretariat of Beneficial Works of the First Lady of Guatemala (SOSEP).

Methods: Fecal samples were collected and heights measured in 85 preschoolers (aged 2-7 years) at three participating SOSEP centers in Quetzaltenango, a province in the Western Highlands of Guatemala. Two fecal samples were collected from 7th-8th week, respectively, of the 8-week rotating-menu from 20 children at one urban center (U1), 24 in a second urban center (U2), and 41 in a rural center (RC). Fecal samples were analyzed at local laboratory for protozoal cysts and helminthic ova. Anthropometric data were evaluated using HAZ-scores (WHO, 2008).

Results: The prevalence of stunting (<-2SD HAZ) in the day-care centers was respectively: 35%; 63%; and 81%. Eight different parasite species, including Ascaris lumbricoides and Hymenolepis nana (worm), and Entamoeba histolytica, Entamoeba coli, Endolimax nana, Blastocistis hominis, Chilomastix mesnili and Giardia intestinalis (protozoa), were observed in single or multi-organism infections. In the RC, only 20 (49%) were found to have fecal parasites, whereas frequencies were 11 (55%) in U1 and 20 (83%) in U2In RC and U1, with their balance of parasitized and non-parasitized subjects, we used Chi-square to explore for stunted vs. parasitized interactions. We found no evidence of interaction (p=0.13 and p=0.28, respectively).

Conclusions: A wide range of elevated stunting frequencies were found across geographical settings in the Western Highlands, somewhat matching parasite infection in almost half or more, but without any significant mutual association.

Key words: children, stunting, parasites, Guatemala

PO2416

ASSOCIATION OF A POTENTIAL BIOMARKER OF INTESTINAL GIARDIAL-INFESTATION INTENSITY AND GROWTH AMONG INFECTED PRESCHOOLERS IN THE WESTERN HIGHLANDS OF GUATEMALA

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Background and objectives: Guatemala has the highest rate of under-five stunting in the hemisphere, and the contributing factors are considered to go beyond dietary deficiencies to environmental exposures that produce immunological or oxidative stress. Infection with the protozoa, Giardia intestinalis, has been documented by CeSSIAM to be pervasive in day-care centers in Guatemala. We sought to explore any association of body-composition with prevalence or intensity of Giardia infection.

Methods: Heights and weights were measured and birthdates obtained in 20 participants (3-7 years) at one urban government-supported day-care center in Quetzaltenango in the Western Highlands (U1), 24 in a second urban center (U2), and 43 in a rural center (RC). At all locations, two meals and two snacks from a common 40-day rotating menu were offered daily over 8-week periods. Data were evaluated using Z-scores derived from to the WHO growth curves (2008). Faecal samples were twice collected and assessed by an ELISA method (ProSpecT®, Lenexa, KS, USA). For positive samples, the absorbance values were regarded as a scaling-proxy for the faecal intensity of the protozoal organisms, using the higher of the two samples.

Results: Global (n=87) rates of stunting (<-2SD HAZ), underweight (<-2SD WAZ) and wasting (<-2SD WHZ) were, respectively: 66%; 23%; and 2%. 2x2 contingency-table analyses, based on positive or negative stool Giardia versus above or below median Z-score values, were across indices. The respective probability values for Chi-square were: HAZ (p=0.48); WAZ (p=0.04); and WHZ (p=0.20). The respective Spearman correlation coefficients for the association of Z-score values and faecal absorbance levels among Giardia-positive children (n=48), were HAZ (r=-0.28, p=0.05); WAZ (r=-0.28, p=0.05); and WHZ (r=-0.08, p=0.59).

Conclusions: Both Giardia prevalence and Giardia intensity (gauged by absorbance scaling-proxy) were negatively associated with specific growth variables.

Key words: Giardia intestinalis, stunting, preschoolers, Guatemala

PO2417

RELATIONSHIP OF RBC MEMBRANE OMEGA-3 AND OMEGA-6 FATTY ACIDS TO INFLAMMATORY BIOMARKERS IN A GUATEMALAN POPULATION ON THE PACIFIC COAST

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Background and objectives: Studies suggest that polyunsaturated fatty acids (PUFA) modulate inflammation. Omega-6 PUFA are generally considered as pro-inflammatory, with omega-3 PUFA as generally anti-inflammatory. Literature describes competitive interactions where omega-3 mitigate pro-inflammatory effects of omega-6 fatty acids. Having observed relatively low total omega-3 PUFA contribution to total RBC membrane fatty acid profiles in coastal Guatemalans, we sought to describe the association of these PUFAs with inflammatory biomarkers measured concurrently in our sample.

Methods: 271 blood samples were collected from 148 women and 123 schoolchildren. The red cell sediment was BHT-protected and stored at -80°C pending the RBC fatty acid assays (expressed in weight-percentage {wt%}), including calculation of total omega-6 and omega-3 PUFA. We measured C-reactive protein (CPR) and alpha-1-glycoprotein (AGP) in the supernatant plasma.

Results: 20% of the women and 14% of the schoolchildren had elevation of one or another of the inflammatory biomarkers. With respect to PUFA status, total omega-6 values constituted 37.0 ± 1.3 wt% in women and 37.3 ± 1.4 wt% in schoolchildren, whereas the corresponding contribution for total omega-3 were 5.3 ± 0.6 wt% and 5.5 ± 0.6 wt%, respectively. In the remaining population without elevated inflammatory indicators, omega-6 contributions were 37.0 ± 1.5 wt% and 37.4 ± 1.1 wt% in the respective subsamples, with omega-3 values of 5.5% ± 0.8 and 5.3% ± 0.6, respectively. no differences existed between the wt% of interest across inflamed and non-inflamed subjects by subgroup by Student t-test for either class of PUFA. Refined ANOVA analyses also failed to detect difference comparing the non-inflamed subjects to each subgroup with specific biomarker elevations, alone or combined.

Conclusions: Not unexpectedly, observed relationships between the principal classes of omega PUFA provide no indications of any role in protection from inflammation as it occurs in our sample.

Key words: Omega-6, omega-3, inflammation, Guatemala

PO2418

PROTEIN-ENERGY AND MINERAL NUTRITIONAL STATUS OF SOLDIERS SERVING IN THE CAVALRY SQUADRON OF THE POLISH ARMED FORCES REPRESENTATIVE BATTALION

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Background and objectives: Cavalry Squadron is a subunit of the Representative Battalion of the Polish Army, which soldiers participate in all official state, military, religious and patriotic ceremonies during the year. The aim of the work was to assess the protein-energy and mineral nutritional status of soldiers serving in the Cavalry Squadron.

Methods: Total of 25 soldiers, men aged 26.5 ± 4.0 years underwent the examination. Measurements of the following parameters: body height, weight, arm circumference and thickness of 4 selected skin folds: on biceps, triceps, under scapula and over iliac were carried out among examined soldiers. Values of body weight and height were the basis for calculation of the Body Mass Index (BMI). Assessment of the bone mineral density was carried out by the densitometric method on a non-prevailing upper limb forearm bone, using the EXA 3000 apparatus. Bone calcification was evaluated based on the T-score value.

Results: The average height and body mass of examined soldiers amounted to 179.8 ± 5.9 cm and 80.4 ± 12.3 kg respectively. The arm circumference of the subjects amounted to 32.0 ± 3.1 cm. Average BMI was 24.9 ± 3.2 kg/m2. Overweight was found among 36% of men and one person was obese. The skin folds thickness was as follows: on biceps – 2.54 ± 0.45 mm, on triceps - 2.82 ± 0.46 mm, under scapula - 15.3 ± 6,43 mm and over iliac – 23.79 ± 10.2 mm. Calculated total fat content amounted to 16.7 ± 4.4 kg, while lean body mass was 66.6±7.8 kg.

Conclusions: The T-score value characteristic of osteopenia was found among 20.8% of examined men while 4.2% of subjects indicated values characteristic of osteoporosis.

Key words: Military service, nutritional status, obesity, osteoporosis

PO2419

CAN MOBILE PHONES BE USED TO ROUTINELY MONITOR NUTRITION INDICATORS? EXPERIENCE FROM LIBERIA

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Background and objectives: In Liberia, malnutrition is a major public health problem due to inadequate access to food and nutrients and sub-optimal care of mothers and children, with under-five children stunting rate at 39%. Also, according to the 2007 Liberia Demographic and Health Survey (LDHS), 29% of children are exclusively breastfed for the first 6 months, and only 13% of children 6-23 months received minimum acceptable diet (MAD). Most of internationally recognized nutrition indicators typically require data collection through resource-intensive household surveys.

Methods: The Essential Nutrition Actions (ENA) framework was applied by maximizing contacts through multiple program opportunities within existing health systems and community care groups to promote and provide support for key nutrition actions to be taken at crucial contact points in the life cycle. In order to strengthen the frequency and efficiency of tracking progress, an electronic monitoring system was designed to collect information using smart phones. At strategic points, trained staff conduct interviews with pregnant and lactating women and mothers with children under two, using the LDHS "24 hours recall." Data, collected by a mobile phone application, is sent to a cloud-based database, where it is analyzed and made available to managers on a quarterly basis.

Results: Results indicate that exclusive breastfeeding, iron folic acid supplementation, and maternal diet have all improved. The information also allows the project to respond quickly by targeting practices that show little improvement, for example reemphasizing the importance of dietary diversity to improve MAD for children 6-23 months. Conclusions. The use of mobile-based collection combined with an adapted methodology makes nutritional information traditionally available only from household surveys obtainable and compatible for better program management. This innovation represents a breakthrough in allowing nutrition programs to access routine data to measure key nutrition interventions outcomes.

Key words: Smart phones, monitoring, nutrition, Liberia

PO2420

INFLUENCE OF DIET AND BLOOD LOSS ON THE IRON STATUS OF AUSTRALAN PREMENOPAUSAL WOMEN

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Background and objectives: The combined influence of blood loss and iron intake on iron status remains unclear in premenopausal women. The purpose of this study is to investigate whether blood losses (excluding blood donations) and iron intake affect the iron stores of women of childbearing age.

Methods: A total of 150 premenopausal women (who have not donated blood in the past 12 months) will be recruited from Melbourne, Australia. Participants will be asked to complete a validated questionnaire quantifying menstrual losses and history of nosebleeds, complete a food frequency questionnaire estimating dietary and supplemental iron intake, and provide a fasting venous blood sample analysed for serum ferritin, haemoglobin, and ultrasensitive C-reactive protein (CRP). Multivariate linear regression will be used to assess relationships between ferritin, as an indicator of iron stores, and blood loss and iron intake.

Results: In preliminary analysis of 58 participants (mean age 29.7 (SD 9.3) years), three women had elevated CRP (>10 mg/L) and were excluded. Median ferritin was 36 (IQR 23-60) μg/L and mean haemoglobin was 135.5 (SD 8.4) g/L. Eleven percent of women had low ferritin (<15 μg/L); no women were anaemic (haemoglobin<120 g/L). Linear regression with log-transformed ferritin indicated that total iron intake r=-0.0004, p=0.98), menstrual losses (r=-0.012, p=0.10), and nosebleeds (r=0.458, p=0.16) were not associated with iron stores. There were also no associations with ferritin when iron from meat/fish/poultry and supplement use were entered in the regression model in place of total iron intake (iron from meat r=0.040, p=0.36; supplement use r=0.462, p=0.07; menstrual losses r=-0.011, p=0.11; nosebleeds r=0.444, p=0.16).

Conclusions: Iron intake and blood loss did not predict iron status in premenopausal women. Potentially, genetic factors, such as expression of the hormone hepcidin, have more influence than intake and blood loss.

Key words: Iron intake, serum ferritin, blood loss, women

PO2421

ROLE OF NUTRITIONISTS/DIETITIANS FOR SELF-CARE TO PREVENTION OF CHRONIC DISEASES

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Background and objectives: Thailand today is the second most aged country in Southeast Asia (next to Singapore). Over 10 % of the population is now over 60. The propotion of older persons in total population will increase to 14 % in 2015, 19.8% in 2025 and nearly 30% by 2050. However, we still do not have a good caring system for our senior citizen. These people need good healthcare, both in term of medical treatment and nutritional support. Both dietitians and nutritionists have a major role in this regard, otherwise these people will suffer from many kinds of diseases such as infections, autoimmune diseases, CNS abnormalities and even cancer. This research was to determine the prevalence of risk factors for chronic diseases among the dietitians and nutritionists attending the 8th Annual Meeting of the Thai Dietetic Association in 2012.

Methods: The questionnaires were analysed by SPSS programme.

Results: Most of them were female and not smoking. There age were 23-50 years (86%). BMI was over 25 Kg/m2(21.2%); total cholesterol >200 mg/dL was 11.8%; LDLcholesterol >130 mg/dL was 4.8 %;, Triglyceride > 150 mg/dL was 4.7 % and must be warned to take good care of themselves.

Conclusions: These nutritionists/dietitians had to control their body weight and reduce high fat intake including increased exercise.

Key words: Nutritionist, dietitian, cholesterol

PO2422

IODINE DEFICIENCY DISORDER AND IODIZED SALT CONSUMPTION IN THE PHILIPPINES

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Background and objectives: In the Philippines, in response to the increasing goiter rates from 3.5% in 1987 to 6.7% in 1993 among Filipinos 7 years and older, an Act for Salt Iodization Nationwide (ASIN Law) was passed in 1995. This paper presents results of surveys on IDD and salt consumption and salt iodine levels through the years.

Methods: Data on UIE and salt iodine levels were taken from the 1998, 2003 and 2008 NNS. UIE was determined using the acid digestion method of Dunn et al. Presence of iodine in salt was determined using RTK while WYD was used to determine iodine concentration in household salt. All statistical analysis were done using SPSS version 9 and STATA version 7UIE was evaluated using WHO/ICCIDD criteria.

Results: Awareness of iodized salt increased from 67.3% in 1998 to 78.9% in 2008 and consumption of iodized salt based on household salt testing positive to RTK also increased from 24.8% to 81.1% for the same period. Results of WYD indicate that the proportion of households with adequately iodized salt (20-70 ppm), was only 19.5%. On the other hand, median UIE levels among school children increased from 71 ug/L to 132 ug/L also from 1998 to 2008Results on consumption and median UIE levels were not in accordance with actual consumption since sources of iodine, i.e. processed foods, were not accounted for.

Conclusions: Based on UIE levels among school children, iodine status of Filipinos has shifted from mild deficiency in 1998 to optimal nutrition in 2008Improvement of iodine status among Filipinos did not conform with the actual consumption of iodine from household salt.

Key words: Iodine deficiency disorder salt consumption

PO2423

FACTORS ASSOCIATED WITH DETERIORATION OF MINI NUTRITIONAL ASSESSMENT-SHORT FORM STATUS OF NURSING HOME RESIDENTS DURING A 2-YEAR PERIOD

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Background and objectives: A number of other studies have been conducted to verify the Mini Nutritional Assessment (MNA) or the MNA short form (MNA-SF) as a nutritional assessment/screening tool in various clinical settings or communities. However, there are few longitudinal studies using these tools to analyze which factors affect the incidence of deterio-

rating nutritional status. We tried to identify the factors associated with deterioration of MNA-SF status of nursing home residents during a 2-year period.

Methods: Participants were 392 people with a mean age of 84.3 in 12 nursing homes in Japan. The factors associated with deterioration in MNA-SF categories during the study period compared to stable/improved MNA-SF categories were identified.

Results: At baseline, 19.9% of the participants were malnourished and 60.2% were at risk of malnutrition, according to the MNA-SF classification. After 2 years, 66.3% participants maintained and 6.1% participants improved their nutritional status according to the MNA-SF classification, while 27.6% showed deterioration in MNA-SF status. Multivariate analysis indicated that basic activities of daily living (basic ADL)impairment, poor chewing ability, and hospitalization during the follow-up period were associated with declining MNA-SF status.

Conclusions: Poor basic ADL status, poor chewing ability and hospitalization during the follow-up period were associated with malnutrition and risk of malnutrition as assessed by MNA-SF of nursing homes residents during a 2-year period.

Key words: The factors associated with deterioration of Mini Nutritional Assessment-Short Form stage, frail elderly, nursing home

PO2424

CORRELATION BETWEEN MACRONUTRIENT INTAKES BASED ON FOOD FREQUENCY QUESTIONNAIRES AND 24-HOUR RECALLS: RESULTS FROM A BREAST CANCER SURVIVORS INTERVENTION STUDY.

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Background and objectives: The use of food frequency questionnaires (FFQ) to assess dietary intake has been omnipresent in epidemiology for decades, nevertheless, studies based on 24-hour recalls (24HR) or biomarkers have shown discrepancies between these tools. The aim of the present study was to assess the correlation between macronutrient intakes derived from the 136-item validated FFQ used in the Seguimiento Universidad de Navarra (SUN) project and the mean of three 24HRs.

Methods: This analysis was performed on baseline data from 42 women, aged 33 to 70, who participated in a lifestyle intervention designed to induce weight loss in breast cancer survivors. Macronutrient intakes derived from a FFQ and three 24HRs obtained at recruitment were calculated as a function of energy density (g/day per 2000kcal). Intraclass correlation coefficients (ICC) and deattenuated (corrected for within-person variability) Pearson correlation coefficients (r) were respectively used to assess the reliability of the 24HRs and the magnitude of the correlation between the FFQ and the mean of the 24HRs.

Results: Macronutrient intakes based on FFQ information were on average 65% higher than those obtained from 24HRs. The ICC between 24HRs was rather low and ranged from 0.14 for lipids to 0.22 for proteins. While the deattenuated correlation coefficients for carbohydrates, lipids and proteins showed very high correlations (r ranging from 0.61 to 0.82), the deattenuated correlation coefficient for saturated fat was much lower (r=0.13).

Conclusions: In general, the present study showed high correlation levels between macronutrient intakes obtained from the SUN FFQ and from three 24HRs. Nevertheless, results based on saturated fat intakes need to be interpreted cautiously as the FFQ and the 24HRs showed poor agreement for this macronutrient.

Key words: Dietary assessment, FFQ, 24HR, reliability

PO2425

GROWTH MONITORING AND PROMOTION PRACTICES IN PRIMARY HEALTH CARE FACILITIES IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA

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Background and objectives: The South African Department of Health incorporated the WHO growth standards into a new screening and monitoring tool (SMT) for young children. This provided an ideal opportunity to adapt the growth monitoring and promotion (GMP) practices in primary health care (PHC) facilities to include a more comprehensive array of measurements. The objectives were to assess the knowledge and practices of health care workers (HCWs) on anthropometric measurements in PHC facilities.

Methods: A proportional stratified sample of 80 PHC facilities was selected. HCWs completed a self-administered questionnaire and their consultations with caregivers of children (0-12months) were observed. Standard weights were used to assess scale accuracy.

Results: Data was collected from 1019 infant-caregiver pairs and 145 HCWs from 69 facilities. Seventy-seven per-

cent (112/145) of HCWs received official training on the new SMT and the majority could correctly identify criteria for underweight (71.7%; 99/138), but not for stunting (51.6%; 65/126) or wasting (31.7%; 40/126). The majority (90%; 914/1011) of children were weighed during consultations and weight measurements were correctly plotted (73.8%; 639/866). Head circumference measurements were only performed in 13.8% (11/80) of children. Height and mid-upper arm circumference (MUAC) measurements were performed in 6.5% (22/337) and 10.7% (36/338) of children respectively. Most of the HCWs positioned the measuring tape correctly for a MUAC measurement (78.5%, 106/135), but struggled to interpret the correct cut-off value for classification of malnutrition (43.7%, 60/137). A significant difference was demonstrated between the 5 kg standard weight and weight measurements taken at 68 facilities (P=0.02).

Conclusions: Optimal GMP practices should be emphasized at PHC facilities. Attention should not only be focused on performing the measurements, but also on correct documentation and interpretation of findings, as well as appropriate action. Renewed training of HCWs should lead to more accurate and early identification of malnourished children in SA.

Key words: Growth monitoring

PO2426

INNOVATION ON DEVELOPMENT, RELIABILITY AND VALIDITY TEST OF DIGITAL INFANT LENGTH MEASURER WITH SONAR SENSOR PRECISION

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Background and objectives: Length measurement was usually conducted using instrument that was not very accurate, bulky, and impractical. There is a need to develop an instrument to measure length more accurate and more precise to minimize measurement error. This study was aimed at developing digital length measurer employing sonar sensor (P2B2D Version 1.0) by considering accuracy and precision of length measurement, portability, and comfort of infant during measurement. Other aim of the study was to conduct reliability and validity test of the instrument.

Methods: Three sonar sensors were applied to detect if crown of the head, calf, and heel have been positioned properly. Those sensors will activate led light on the digital display panel of the instrument when touched. Thus, measurement could only be made after all lights were on. Intra-method reliability test was conducted through inter-examiner reliability test involving three examiners. Inter-method reliability was tested by comparing result of P2B2D to results of other instruments (wood and mica lengthboards). This study involved 53 infants measured by three examiners. Reliability and validity coefficients were produced using Pearson correlation method. Analyses were also conducted to measure examiner's precision and accuracy and error variability or error margin in anthropometry by calculating Technical Error of Measurement (TEM).

Results: The reliability coefficients of P2B2D calculated by different methods ranged from 0.747 (inter-method reliability against mica length-board using TEM analysis) to 0.966 (inter-method reliability against wood length-board using Pearson correlation analysis). The corresponding validity coefficients were 0.864 and 0.963, respectively.

Conclusions: Those coefficients indicated that P2B2D Version 1.0 reliability and validity could be considered as substantial to excellent. It is recommended to improve this instrument by minimizing possible source of error related to decreasing accuracy due to Doppler effect, for example by experimenting different types of sensor.

Key words: Length measurement, validity, reliability

PO2427

GLUTEN INTAKE IN SPANISH INFANTS AS ASSED BY SPECIFIC DEVELOPED FOOD FREQUENCY QUESTIONNAIRES

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Background and objectives: To develop adequate tools for the assessment of gluten consumption (FFQ-gluten) in Spanish children aged 7-36 months.

Methods: 2 different FFQ´s including all the gluten containing products identified in a preliminary survey were elaborated: one for 7-12–month-old infants and another for children aged between 12-36 months. For validation, the results from the FFQs were compared with results of a 2-day and 7-day food record (DR).

Results: The sample was composed by 342 healthy children. No gluten consumption was referred below the age of 6 months, and at the age of 9 months all of them had introduced gluten in their diet. Eighty-three parents filled in the 2DR and the FFQ, and Forty-five parents filled in the 7DR and the FFQ. The mean gluten consumption between both DR and the FFQs in the two age range groups was compared by a paired t-test. For the first age group there are no significant differences between DR and FFQs (p-value>0.05 in both cases). Results for the second age group reflect significant differences between the FFQs and the

2DR (p-value of 0.007) but not for the 7DR (p-value of 0.47). The Bland-Altman plot, with limits of agreement between 2DR and FFQs and between 7DR and FFQs, reinforces the results obtained by paired t-test.

Conclusions: Reliable and precise information on gluten consumption is crucial to conduct epidemiological studies in the field of coeliac disease and specifically to study the impact of gluten introduction and intake in disease development. Our new gluten-FFQs are the only validated specifically developed questionnaires to determine the amount of gluten consumed by Spanish children. They are easy to use and offer excellent instruments to assess gluten intake for children up to 36 months of age, thus allowing comparison of gluten consumption in different countries.

Key words: Food-frequency-questionnaires, gluten, coeliac.

PO2428

IS THE BMI A GOOD PREDICTOR OF ADIPOSITY IN HEALTHY PEOPLE?

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Background and objectives: BMI is the mainly used nutritional status indicator, but this is not a body composition index. The aim of this study was to compare different methods to assess the adiposity in a group of healthy subjects.

Methods: Fifty five healthy volunteers (BMI<25 kg/m2, 20-50 y.) participate in this cross-sectional study. BMI, circumferences measurements, and hand-to-food BIA (50 kHz) were employed to assess nutritional status and body composition. We compared three different index to assess adiposity: BMI, waist circumference (WC) and % fat mass (Deurenber's formula, based on BIA). Results are expressed as mean (SD) or n and %.

Results: The mean age of the subjects was 33.4 (8.6) years. The mean BMI showed healthy weight in our sample (22.11 Kg/m2; SD: 1,85). According to the new IDF cut-off points values for WC, only five women are abdominal overweighted. According to SEEDO cut-off points values for % fat mass (FM), 13 men (50%) are overweighted and 5 men (19.2%) are obese, and 6 women (20.7%) are overweighted and 18 women (62.1%) are obese. WC does not classified correctly at 6 (20.7%) and 13 (50%) overweighted women and men, respectively, and at 14 (48.3%) and 5 (19.2%) obese women and men, respectively.

Conclusions: The BMI is not an accurate index to determine adiposity. The use of different specific index for evaluate adiposity is mandatory for an adequate assessment of nutritional status, as adiposity is a major risk factor for several diet-related chronic diseases.

Key words: BMI, adiposity, nutritional status, waist circumference, fat mass.

PO2429

IMPLICATION OF THE APICAL SODIUM-DEPENDENT BILE ACID TRANSPORTER IN THE UPTAKE OF FAT-SOLUBLE VITAMINS

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Background and objectives: Since 2005, we have demonstrated that the absorption mechanisms of fat-soluble vitamins are more complex than previously assumed. Indeed, intestinal cholesterol transporters have been recognized as involved in vitamin D and E absorption. Our aim is now to identify other possible fat-soluble vitamin transporters. A new promising candidate is the apical sodium-dependant bile acid transporter (ASBT), responsible for bile acid reabsorption, since it represents a potential drug target to reduce plasma cholesterol levels. The objective of this study is thus to determine if ASBT is involved in the intestinal absorption of vitamin A, D, E and K.

Methods: The uptake of vitamins A, D, E and K was measured using differentiated Caco-2 cells grown on filters. Cells were incubated for 1 hour with mixed micelles containing each of the vitamins, with or without an ASBT inhibitor, such as statins (simvastatin and fluvastatin) or thioridazin hydrochloride.
Results: ASBT expression was previously confirmed in differentiated cell monolayers by qPCR. Statins significantly decreased vitamin D, E, K uptake (up to -38%) but did not affect vitamin A uptake. Thioridazin hydrochloride had a significant similar effect (up to 59% inhibition of vitamin D, E and K uptake). To conclude, the inhibition of ASBT led to a decrease in the uptake of some fat-soluble vitamins.

Conclusion: These data suggest that ASBT is involved in the intestinal transport of vitamin D, E and K, but not in vitamin A transport. Further studies are in progress on transiently transfected cells overexpressing ASBT, mice intestinal explants and in vivo experiments to confirm the results.

Key words: Apical sodium-dependent bile acid transporter, caco-2 TC-7 cells, intestinal absorption, fat-soluble vitamins

PO2430

IMPACT OF NUTRITION EDUCATION PROGRAMME ON NUTRITIONAL STATUS OF CHILDREN AGED 3 TO 5 YEARS IN OF LIMPOPO PROVINCE

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Background and objectives: Globally, the prevalence of acute malnutrition and micronutrient deficiency is high in young children, especially in developing countries. The objective of the study was to determine the nutritional status of children aged 3 to 5 years at baseline and post intervention.

Methods: A pre-test–post-test control group design was chosen. Data was collected from eight villages (four villages in from each group (experimental (E) and control group (C). Dietary intake was determined using 24-hour recall. Anthropometric measurements were taken on the same day of interview while blood samples were taken on the following week.

Results: At baseline, 15% (E) to 22.4% (C) of children were stunted baseline. Very few children were underweight in both groups (E = 2.5%; C = 8.2%) at baseline. Only 2.5% of children wasted in the experimental group at baseline. The nutritional status of children did not improve significantly at post intervention in both groups. At baseline, a few children in both groups (E = 38.5%; C = 30.8%) had marginal vitamin A status (100 to 199.9 μg/L), while a few children in the experimental group (E = 7.7%) had vitamin A deficiency (< 100 μg/L). According to the categories for iron status indicators, the number of children that were in the adequate categories for serum iron, serum ferritin, serum transferrin and % transferrin saturation did not change in both groups at post-intervention. The median carbohydrate and protein intake was adequate when compared to EAR/RDA in both groups at pre- and post-intervention. The intake of iron and folate had increased significantly in both groups, while zinc intake increased significantly in the control group.

Conclusions: The nutritional status of children did not significantly changes after intervention in both groups especially weight and height.

Key words: Nutritional status, micronutrient status, children

PO2431

PREVENTING ACUTE MALNUTRITION THROUGHT VOLUNTEERS COMMUNITY HEALTH WORKER IN CONAKRY, GUINEA 2008-2011

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Background and objectives: For long time nutrition services at Health Centres (HC) in the Community of Matoto in Conakry were little visited. ACF-E decided to put in place Community Health Worker (CHW) in order to increase screening in the community and to refer all children with acute malnutrition detected to the Health Centres.

Methods: CHW were selected in coordination with community leaders and the chiefs of HC. CHW were trained to search for malnutrition children aged between 6 and 59 months by measuring the middle upper circumference through a MUAC tape and detection of bilateral pitting oedemas. Children identified as acutely malnourished were automatically transferred with a « reference card »to the nearest CS for adequate care. Data was recorded and analysed at monthly basis by the head of project.

Results: Between september 2008 and may 2011, the CHW monitored 305.948 infants. 3.8% of them (10637) were transferred to HCs, and 6.307 were admitted into acute malnutrition programmes. In the last phase of the nutrition program (from Sep 2010 to March 2011), 87% (1029/1189) of children admitted into the Moderate Malnutrition program, and 73% (318/435) of children admitted into Severe Malnutrition program were transferred by the CHW. It shows a great improvement because without the support from the CHW only 13% (160/1189) and 27% (117/435) would have been arrived to the moderate and severe malnutrition programmes respectively.

Conclusions: The established community health agents enrolled in health issues are a key factor in the detection and monitoring of malnutrition, and cooperation with health and community authorities is needed for the sustainability of these activities.

Key words: CHW, screening, MUAC, acute malnutrition

PO2432

IODINE INTAKE IN SCHOOLCHILDREN IN POLAND

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Background and objectives: Polish territory has been classified as an iodine-deficient area. In 1997 the national programme of obligatory iodisation of household salt was implemented. Household salt should contain 2.3± 0.77 mg iodine in 100 g of salt. The aim of the study was to assess iodine content in daily diets of schoolchildren from North and South of Poland

Methods: The study was carried out in 2006, 2008, 2009 and 2010 among 708 boys and girls aged 9-13 years with the use single 24 hour recall. The data on iodine content in food products were based on the National Food Composition Tables. The mean dietary intake of iodine as well as 5th and 95th percentiles (P5, P95) were calculated including iodised salt. The mean intake was compared to the Estimated Average Requirements (EAR), and the P95 intake to the Tolerable Upper Levels (UL).

Results: The mean daily iodine intake in the group of schoolchildren was 104 μg (134% EAR) and ranged from 100 μg (girls) to 108 μg (boys). Household salt was the main source of iodine (67%) in boys and girls diets. The mean iodine content in daily diets excluding the iodised salt ranged from 33 μg (girls) to 36 μg (boys). The P95 intake of iodine ranged from 209 μg in girls to 214 μg in boys and was below the UL.

Conclusions: The average daily iodine intake in studied groups of schoolchildren living in Poland covers 134% of EAR. Household salt is the main source of iodine in daily diets. Model of iodine deficiency prophylaxis based on obligatory iodisation of household salt is effective. However, iodisation of the household salt is still needed in Poland.

Key words: Iodine, intake, iodised salt, schoolchildren

PO2433

SEVENTH NATIONAL NUTRITION SURVEY, PHILIPPINES 2008: ZINC STATUS OF FILIPINOS BY SERUM ZINC LEVEL

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Background and objectives: Zinc is an essential nutrient for humans and deficiency in this nutrient is an important and widespread risk to human health. To date, global prevalence remains unknown as zinc status data using serum zinc level are still very limited. This study aims to determine serum zinc levels and magnitude of deficiency among all Filipino age/physiologic groups.

Methods: Serum zinc was determined by atomic absorption spectrometry (AAS) and prevalence and magnitude of zinc deficiency was evaluated using IZiNCG's suggested lower cut-offs and guidelines for public health concern, respectively.

Results: The national estimate of zinc deficiency in the Philippines was 30.0%, with a mean serum zinc level of 84.0 ± 0.5 μg/dl. Zinc deficiency was observed in 21.6% of preschool children, 30.8% in school children, 28.9% in adolescents, 31.0% in adults, 28.4% in elderly, 21.5% in pregnant women and 39.7% in lactating women, with a mean serum zinc level (± SE) of 94.5 ± 0.9 μg/dl, 79.9 ± 0.8 μg/dl, 85.2 ± 0.9μg/dl , 84.2 ± 0.6 μg/dl, 91.4 ± 1.1 μg/dl, 75.1 ± 1.7 μg/dl and 72.7 ± 1.1μg/dl, respectively. Zinc deficiency was considered of high magnitude (>20%) in all Filipino population groups. The highest prevalence was noted among lactating women, the extent of deficiency was highest among those in the 1st 6 months of lactation. Males predominantly presented higher deficiency rates than females, except in adults, 20 – 29 and 30 – 39 y-old groups.

Conclusions: Zinc deficiency was generally of significant public health concern (>20%) in the Philippines, both in the national level and in different age/physiologic groups. Lactating women was the most at-risk group to zinc deficiency. Males were generally more at-risk than females. With funding assistance from the World Health Organization (WHO)

Key words: Zinc deficiency, zinc status, IZiNCG

PO2434

IRON BIOAVALABILITY FROM NUTRITION ENTERAL THERAPY MEASURED IN ADULTS THROUGH SERUM IRON LEVELS

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Background and objectives: It is of importance to measure in clinical nutrition the intestinal absorption of nutrients from food, diets and from formulated enteral therapies. The interaction of nutrients may increase, decrease or block their absorption. The aim was to evaluate the influence of extra iron and vitamin C on the iron absorption from nutritional formulations through serum iron levels measurements.

Methods: Iron absorption from enteral formula containing multiple nutrients was evaluated in 13 healthy adults: Group EN 4 volunteers received oral enteral nutrition formula; Group EN+FeSO4 – 4 volunteers received the enteral formula plus 120mg of ferrous sulphate (120mg) and Group EN+Vit C 5 volunteers received the enteral formula plus a capsule of vitamin C (60mg). After 8 hours fast, basal (T0) blood samples were collected: basal (T0), 1 hour (T1) and 3 hours (T2) after oral administration of formulas for analysis of serum iron levels. Iron was determined by inductively coupled plasma mass spectrometry. The results was analyzed with statistic program, applying the Kolmogorov-Smirnov test for normality, variance analyze and Dunnet`s test applied to compare the treatment means ($p<0.05$).

Results: The means of iron absorption of EN Group (T0=1.15 mg/l, T1 =0.92mg/l and T2=1.97mg/l) compared with the other two groups did not differ statistically, the means of EN-VitC Group (T0=1.52 mg/l, T1 =1.86mg/l and T2=2.5 mg/l) was different from EN+FeSO4 Group(T0=0.90 mg/l, T1 =0.72mg/l and T3h=1.10 mg/l) in T1 and T2.

Conclusions: The extra ferrous sulfate added of the nutritional formula had a negative effect on iron absorption and Vitamin C had a positive effect on iron absorption from the nutritional formula.

Key words: Iron, nutritional formulation, biological availability

PO2435

IMPACT OF BODY COMPOSITION METHODOLOGY ON THE COMPOSITION OF WEIGHT LOSS AND WEIGHT GAIN

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Background and objectives: We intended to (i) to compare the composition of weight loss and weight gain using densitometry, deuterium dilution, D2O, Dual X-ray absorptiometry, DXA, Magnetic resonance imaging, MRI and the 4C model and (ii) to compare regional changes in fat mass (FM), fat free mass (FFM) and skeletal muscle mass as assessed by DXA and MRI.

Methods: 83 study participants aged between 21 and 58 years with a BMI range of 20.2-46.8 kg/m2 had been assessed at two different occasions with a mean follow up between 23.5 and 43.5 months. Body weight changes within <3 % were considered as weight stable, a gain or a loss of > 3 % of initial weight was considered as a significant weight change.

Results: There was a considerable bias between the body composition data obtained by the individual methods. When compared with the 4C model, mean bias of D2O and densitometry was explained by the erroneous assumption of a constant hydration of FFM, thus, changes in FM were underestimated by D2O but overestimated by densitometry. Because hydration does not normalize after weight loss all 2 component models have a systematic error in weight reduced subjects. The bias between 4C-model and DXA was mainly explained by FM% at baseline whereas FFM hydration contributed to additional 5%. As to the regional changes in body composition, DXA data had a considerable bias and, thus, cannot replace MRI.

Conclusions: To assess changes in body composition associated with weight changes, only the 4C model and MRI can be used with confidence.

Key words: B,ody composition, weight change, regional body composition, four compartment model

PO2436

EFFECT OF TERMAL PROCESSING ON FAT SOLUBLE VITAMIN CONTENTS IN BLACK SEA SHAD (ALOSA PONTICA)

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Background and objectives: Fishes are regarded as important natural food sources of fat soluble vitamins, which are necessary for healthy diet. Temperature processing of fish tissue enhances its taste, inactivates pathogenic microorganisms and increases its shelf life. The fat soluble vitamins (vitamins A, D3 and E) are considered to be especially susceptible to oxidation during heating (cooking) process - steaming, boiling, grilling, baking and frying before consumption. The aim of the present study was to evaluate the effect of steaming (10 min at 90oC) and grilling (7 min on each side) on retinol (vitamin A), cholecalciferol (vitamin D3) and alpha-tocopherol (vitamin E) contents in Shad fillets.

Methods: The sample preparation procedure includes saponification and extraction of fat soluble vitamins with n-hexane. The extract was dried under nitrogen flow and redissolved in methanol. HPLC analysis was performed on ODS2 Hypersil (250 x 4.6, 5um) column with a mobile phase of methanol:water = 97:3.

Results: The retinol, cholecalciferol and alpha-tocopherol content in fresh fish fillets are 4.4 ± 0.1 μg/100 g, 45.1± 1.5 μg/100 g and 1971.0 ± 62.9 μg/100 g, respectively. The amount of vitamin A in steamed fillets decreases significantly (~ 40%), when compared to its content in the raw samples. In contrast vitamin D3 and vitamin E remain almost unchanged. Among three fat soluble vitamins, the grilling process affects significantly only vitamin A (~ 70%) and vitamin E (~ 12%) content.

Conclusions: Black Sea Shad tissue is a good source of vitamin D3 and vitamin E. After steaming and grilling process there were almost no losses in the contents of cholecalciferol and alpha-tocopherol, while retinol was reduced nearly a half.

Key words: Alosa pontica, alpha-tocopherol, cholecalciferol, HPLC, retinol

PO2437

FATTY ACID COMPOSITION OF BLACK SEA SHAD (ALOSA PONTICA) UNDER DIFFERENT COOKING PROCESSES

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Background and objectives: In Bulgarian cuisine the fish traditionally is steamed or grilled before consumption. Temperature processing of fish tissue enhances its taste, inactivates pathogenic microorganisms and increases its shelf life. The way of cooking may influence the content of fatty acids in fish tissue. The aim of this study was evaluate the effect of different cooking methods (steaming, grilling) on lipid content and fatty acid profile of edible part of commercially important Black Sea shad (Alosa pontica).

Methods: Sample treatment procedure: steaming (over boiling water,10 min, 90Â°C) and grilling (7 min, 220Â°C). Total lipid content in fish tissue was gravimetrically determinated after extraction, according to Bligh and Dyer procedure. Fatty acid methyl esters were determined by GC/MS.

Results: The thermal processing of raw fish tissue results in reduction of total lipid content: by 21.28% after steaming and 36.17% after grilling. The steaming tends to increase the saturated fatty acid levels (by 12%), compared to raw samples. In case of grilling there was increase in monounsaturated fatty acids (by 10%). The steaming process, results in significant decrease ($p<0.001$) in omega- 3 (by 18%) and omega- 6 (by 16%) fatty acids (FA) levels. After grilling the omega â€“ 6 amounts remain almost unchanged, whereas the omega-3 polyunsaturated fatty acids were significantly decrease ($p<0.001$) by 14%.

Conclusions: The process of steaming affects in higher extent the both omega groups of FA, whereas after grilling only omega-3 FA was changed. In general, the fatty acid composition of Black Sea shad tissue did not reveal great losses in biologically important omega-3 FA after heat treatment. Thus we can conclude that both methods of cooking are suitable for preserving the biological active FA components in Black Sea shad.

Key words: Alosa pontica, grilling, omega-3, omega-6, steaming

PO2438

EVALUATION OF HACETTEPE UNIVERSITY DEPARTMENT OF NUTRITION AND DIETETIC FEMALE STUDENTS' EATING ATTITUDES AND HEALTHY LIFESTYLE BEHAVIORS

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Background and objectives: This study is planned and applied with the aim of evaluation of Hacettepe University Department of Nutrition and Dietetics female students' eating attitudes and healthy lifestyle behaviours.

Methods: This study has been carried out on 160 volunteer female students who are studying at Hacettepe University Department of Nutrition and Dietetics. A survey sheet including students' demographic socio-cultural characteristics, dietary habits, anthropometric measurements (body weight, height, waist circumference) and 24-hour physical activity record, Ea-

ting Attitudes Test-40 (EAT-40) and Health Promotion Life-Style Profile Scale (HPLP) have been used and research data have been collected by face-to-face application of survey by a researcher. The analyses have been performed with SPSS 19.

Results: The mean of the EAT-40 and HPLP score of the students was 13.6 ± 7.4, 124.1 ± 16 respectively. The prevalance of abnormal eating behaviours was 2.5% among students and the mean age was 20.5 ± 1.7 years. Students were grouped by some features and compared in terms of their groups in the score averages. EAT-40 scores of students who had a disease, went on diet and dissatisfied with body weight were significantly high ($p<0.05$). Health responsibility scores of students who had a disease, went on diet, nutrition scores of students who didn't skip main meal, whose BMI evaluated as normal were significantly high ($p<0.05$).

Conclusions: The prevalance of abnormal eating behaviours among female students of Hacettepe University Department of Nutrition and Dietetic was found low. The mean HPLP score of the students was found higher than results of most researches which carried out on university students in Turkey.

Key words: Eating attitudes, healthy life style behavior

PO2439

NUTRITION SITUATION IN THE OCCUPIED PALESTINIAN TERRITORY: REVIEW AND NUTRITION ASSESSMENT

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Background and objectives: The current crisis that affected the West Bank and Gaza Strip is affecting the health and nutrition status of the population. This assessment aimed to analyse the current state of nutrition in the Occupied Palestinian territory (oPt) and to make recommendations for Action Against Hunger´s positioning in the country and potential nutritional interventions.

Methods: This assessment was based on a deep search and analysis of relevant secondary information on a national level that was gathered and analysed before and during field visits to the different oPt areas. Qualitative data gathering was carried out using several different techniques, in order to better understand the nutritional situation in potentially selected areas and the factors/causes related to the nutritional status of children under five years of age and PLW.

Results: Micronutrients deficiency is a concern in oPt contributing to the prevalence of stunting found in the country. Iron deficiency, anaemia and vitamin A deficiency constitute a serious public health problem, despite the fact that the MoH has protocols on management and provides supplements free of charge. However, the non-compliance to current supplementation programmes is a critical concern regarding public health. Vitamin D deficiency is also present in some areas in West Bank and iodine deficiency was also a serious public health problem in the oPt. The lack of awareness and the limited access to healthcare lead to insufficient coverage and no compliance with the micronutrients supplementation.

Conclusions: Nutrition protocols, the follow-up and supervision system all need to be strengthened and changes to providing multiple micronutrients should be considered. An integral strategy to combat and control anaemia and other micronutrients deficiencies was recommended. The main recommendations were: dietary enhancement and diversification, food fortification, vitamin and mineral supplementation and global public health and disease control measures.

Key words: Nutrition, occupied Palestinian territories, assessment

PO2440

FOLATE STATUS OF FILIPINO WOMEN OF CHILDBEARING AGE

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Background and objectives: Folic acid (FA) is a B-vitamin required for proper cell growth and development of the embryo to ward off major birth defects of the brain and spine, known as neural tube defects (NTD's). FA is required for the production of DNA, which is necessary for the rapid cell growth needed in the development of fetal tissues and organs in early pregnancy. The Philippine Health Statistics (PHS) listed congenital anomalies as the 5th leading cause of infant mortality which included NTD's, spina bifida, and hydrocephalus among others. The objective of the study was to assess the folate status of Filipino women of childbearing age

Methods: A cross-sectional sample of 2119 Filipino women of reproductive age ranging from 15 to 45 years from the 7th National Nutrition Survey (NNS) were included. Serum and red cell folate were analyzed using radioimmunoassay (RIA)

Results: Based on red cell folate (<175 ng/ml), about 20.9%, were folate deficient while based on serum folate (<3.0 ng/ml), which is a measure of recent intake, the prevalence was 38.7%. On the regional level, the highest prevalence of serum and red cell folate was recorded in National Capital Region with 62.6% and 48% prevalence rates, respectively. On the other hand Northern Mindanao had the lowest prevalence of 10.7% for serum folate, while CAR and Cagayan Region had the lowest prevalence of 1.2% for RBC folate.

Conclusions: The high percentages of subnormal values of serum and red cell folate indicate alarmingly high prevalence of folate deficiencies among Filipino women of childbearing age. The findings strongly suggest the need for awareness and campaign for all women of childbearing age on the importance of taking folic acid every day day to reduce the risk of having a pregnancy affected by neural tube defects.

Key words: Folate deficiency, Philippines childbearing age

PO2441

COMPARISON OF THE DESCRIPTION LEVEL OF FOOD CONSUMPTION DATA COLLECTED FROM 24-HOUR DIETARY RECALLS AND A 7-DAY FOOD RECORD

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Background and objectives: As recommended by the European Food Safety Agency, the food consumption data of the next French national dietary survey (INCA3) will be collected using the computerized-assisted 24-hour dietary recall (24-HDR) program EPIC-Soft. To estimate the benefits in terms of food description generated by the change of dietary assessment method from the previous INCA surveys, we compared the level of detail and the quality of dietary data collected from two non-consecutive 24-HDRs using EPIC-Soft and a 7-day food record (7-dFR) in the French part of the European Food Consumption Validation (EFCOVAL) project and the French INCA2 survey respectively.

Methods: The French EFCOVAL study was conducted in Southern France on 113 volunteers aged 45-65 years in 2008. Each food reported during the 24-HDR interviews was described through a system of "facets/descriptors" representing different characteristics of food (eg. preservation method, production method). The INCA2 survey was performed on 2624 adults aged 18-79 years in 2006-2007. The subjects were asked to describe precisely all food and beverages consumed for one week (eg. brandname, preservation method). We assessed the description level of food data collected from both dietary assessment methods and compared when it was possible, the proportion of "undefined" (or missing) data.

Results: Overall, a higher level of detail concerning food description was collected from the 24-HDRs. Compared to the 7-dFR, additional information on packaging material, skin consumption or cooking method was automatically gathered for relevant foods. Information on some characteristics (eg. fat content, fortification, preservation method) was also more accurately detailed from the 24-HDRs. Nevertheless, overall, the quality of data collected from these both methodologies seemed relatively comparable in terms of proportion of undefined data.

Conclusions: Using 24-HDR interviews with EPIC-Soft in the next INCA3 survey should ensure higher accurate and standardized dietary data collection.

Key words: EPIC-Soft, 24-HDRs, 7-Dfr

PO2442

EFFICACY OF FERROUS GLUCONATE AND FERROUS BISGLYCINATE CHELATE AS FORTIFICANTS IN MAIZE-BASED COMPLEMENTARY FOOD ON IRON STATUS IN CHILDREN 24-59 MONTHS

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Background and objectives: Iron Deficiency (ID) is the most common Micronutrient Deficiency (MND) in the world. Food fortification is an important long-term strategy for addressing MND. The objective of the study was to evaluate the efficacy of two iron fortificants (ferrous gluconate and ferrous bisglycinate chelate) in a maize-based complementary food (Nutricrema®) on iron status in children 24-59 months.

Methods: A prospective, double-blind, cluster-randomized trial conducted in a rural and indigenous area of Panama. The sample was 254 children with age mean 44 ± 10 months (51% male). During a six month period, 36 rural community soup-kitchens were divided into two groups randomly assigned to receive either: Group-A (n=125): 90 g of Nutricrema® with 10 mg of iron as ferrous gluconate; or Group-B (n=129): 90 g of Nutricrema® with 10 mg of iron as ferrous bisglycinate chelate. We measured Hemoglobin (Hb) before and after and ran descriptive and comparative analysis (ANCOVA, Chi2).

Results: Mean ± SD of Hb before and after in group A was 113 ± 10 and 113±8 g/l, respectively; and in group B was 111 ± 10 and 116 ± 7 g/l, respectively; mean ± SD of delta-Hb in group A and B was -0.2 ± 10 and 5±10 g/l, respectively (AN-

COVA, treatment effect p<0.05, after adjusting for Hb baseline, sex and age). The prevalence of anemia before and after in group A was 43(34%) and 40(32%), respectively; and in group B was 61(47%) and 25(19%) (Chi2, p<0.05).

Conclusions: We can conclude that a maize-based complementary food, fortified with 10 mg of iron as ferrous bisglycinate chelate is effective to increase hemoglobin concentration and decrease prevalence of anemia among preschool-age children when compared with ferrous gluconate.

Key words: Indigenous population, child, anemia, malnutrition.

PO2443

MICRONUTRIENT STATUS AND INTAKE IN OMNIVORES, VEGETARIANS AND VEGANS IN SWITZERLAND

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Background and objectives: Following a vegetarian or vegan diet may lead to deficiencies of some micronutrients but information on direct associations in adults living in Switzerland is lacking. The aim of this study was therefore to assess the vitamin and mineral status of vegetarian and vegan adults living in Switzerland.

Methods: Healthy adults between 18 and 50 years consuming an omnivorous (n=100), vegetarian (n=53) or vegan (n=53) diet since at least 1 year were recruited. Weight and height were measured and plasma concentration of the vitamins A, C, E, B1, B2, B6, B12, folic acid, pantothenic acid, niacin, biotin and β-carotene as well as Fe, Mg and Zn was determined. Dietary intake was assessed using 3-day weighed food records and physical activity and lifestyle characteristics by questionnaires.

Results: Omnivores had the lowest intake folic acid, Mg, vitamin C, E and niacin. Vegans reported low intakes of Ca, vitamin D and B12Despite a similar intake of total energy, BMI was significantly lower in vegans as compared to vegetarians and omnivores. Prevalence of folic acid deficiency was highest in omnivores (58%), while vegetarians showed the highest prevalence of vitamin B6 and niacin deficiency (58% and 34% respectively). Among vegans, 47% were Zn deficient. The prevalence of vitamin B12 deficiency was very low in all groups. Fe status indicators were comparable across the diet groups. More vegans (29%) than vegetarians (6%) and omnivores (3%) reported not to drink any alcohol. The groups did not differ regarding tobacco consumption and physical activity.

Conclusions: Even though the groups differed substantially regarding micronutrient status and intake, deficiency prevalences were similar except for Zn, vitamin C, B6, niacin and folic acid. This indicates that vegetarians and vegans living in Switzerland are well informed and consume a diversified, well-balanced diet.

Key words: Micronutrients, vegetarians, vegans, dietary intake

PO2444

THE USUAL DIET IS CAPABLE OF MAINTAINING THE APPROPRIATE LEVEL OF VITAMINS IN THE NORTH AMERICAN POPULATION?

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Background and objectives: Relationship among food nutrient composition and micronutrients biomarkers is an improbable way to associate serum levels of micronutrients and diet. Establishing dietary patterns by multivariate analysis is best to do that and provide a view of diet as a whole, since they characterize the habitual food intake of individuals. The objective of the study was to estimate association among dietary patterns and serum micronutrients.

Methods: Data comes from NHANES 2005-2006We used Principal Component Analysis (PCA) to estimate dietary patterns from Food frequency questionnaire (FFQ) data. We retained PCA components with eigenvalues>1 and chose characterize them by variables with loads ≥ |0.30|. PCA components were interpreted as dietary patterns and their scores were calculated. To associate dietary patterns with serum levels of micronutrients we performed linear regression. Statistical significance was set at p values <0.05. Analysis were done in STATA (version 11).

Results: We identified five dietary patterns characterized as: Pattern 1: milk and milk drinks, cheese, grain mixtures; Pattern 2: eggs and legumes; Pattern 3: eggs, legumes, milk and milk drinks (exclusion of soups/gravies with meat, meat substitutes); Pattern 4: legumes, alcohol (exclusion of meat and non-alcoholic beverages); Pattern 5: fruits and alcoholic beverages (exclusion of soft drinks). All patterns showed a positive association to serum vitamin A. Patterns characterized by legumes and lower consumption of meat were negatively associated to the serum levels of Iron and B vitamins, patterns composed of alcohol were associated negatively to the serum Folic Acid and Vitamin E. Vitamin D is not associated with patterns that showed little variation of food. Beta coefficients of Pattern 1 were similar to all serum micronutrients.

Conclusions: Patterns characterized by larger food diversity were positively and equi-associated with serum micronutrients biomarkres.

Key words: Micronutrients dietary patterns biomarkres

PO2445

VITAMIN D STATUS AMONG FAMILIES IN DENMARK: BASELINE DATA FROM THE VITMAD STUDY

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Background and objectives: The beneficial effect of vitamin D in bone health is acknowledged and the vitamin has also been associated with several chronic diseases. It is therefore relevant to determine the prevalence of vitamin D insufficiency in different groups, and vitamin D statuses within families have not been studied previously. The objective of the present study was to evaluate serum 25-hydroxyvitamin D (25(OH)D) concentrations among families in Denmark (56 °N) after seasonal UVB peak and to ascertain determining factors.

Methods: Cross-sectional study with 755 children and adults (4-60 y) recruited as families in the VitmaD study. Blood samples were collected in September-October 2010, and vitamin D status was measured as serum 25(OH)D concentration by LC-MS/MS. Vitamin D intake and life style factors were assessed in self-administered questionnaires. Determinants of vitamin D status were identified in a linear mixed model with family as a random variable.

Results: Mean (±SD) serum 25(OH)D concentration was 75 ± 20 nmol/l (range 9-162 nmol/l) and only 10 % had 25(OH) D <50 nmol/l. Determinants of serum 25(OH)D were age (p=0.036), BMI class (p=0.001), multi vitamin use (p=0.033), sun behaviour (p=0.005), outdoor stay (p=0.033), sun vacation (p<0.001), and physical activity (p=0.040). Gender (p=0.692) and vitamin D intake (p=0.238) were not associated to serum 25(OH)D.

Conclusions: The prevalence of vitamin D insufficiency among families in Denmark was low after seasonal UVB peak. Sun vacation was the strongest determinant for vitamin D status at this time of the year.

Key words: Vitamin D status, 25(OH)D, families, UVB peak.

PO2446

GROWTH ATTAINMENT AND HEMATOLOGICAL STATUS OF LOW-INCOME PRESCHOOL CHILDREN OF METROPOLITAN GUATEMALA CITY

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Background and objectives: Young children in the rapid-growth period belong to a high-risk group for iron deficiency anemia (IDA), especially in low-income societies. The growth attainment achieved, however, is also a function of the adverse environmental circumstances and exposures in deprived settings. Guatemala has the highest rate of stunting in the Western Hemisphere. We sought here to quantify growth attainment and anemia in preschool children from low-income communities in metropolitan Guatemala City.

Methods: Anthropometric data, hemoglobin (Hb), ferritin, a marker of iron status, and white blood cell count (WBC) and C-reactive protein (CRP) as inflammatory biomarkers were determined in 175 children (age 18.6 ± 0.9 months; range: 6-47 months). Z-scores for common anthropometric indices were calculated using the WHO growth standard (2006).

Results: The mean weight was 10.1 ± 2.5 kg (median: 9.1 kg; range: 4.3-17.7 kg). The range of weight-for-age (WAZ) Z-scores varied from -3.03 to +1.47. The mean length/height range was 78.2 ± 9.2 cm (median: 72.9 cm; range: 62.5-101.0 cm). Height-for-age (HAZ) Z-scores varied from -3.67 to +1.97In total, 29 children (16.7%) were stunted (Z-score: <-2.0), 5 of them (2.9%) severely (z-score: <-3.0). The mean Hb was 12.3 ± 1.3 g/dl (median: 11.0 g/dl; range: 8.7-18.6 g/dl), with 27% showing anemia by an altitude-adjusted criterion (<11.7 g/dl). Ferritin ranged from 1.4 to 115.4 ng/ml, with 27.5% having ferritin <20 ng/ml, after adjusting for elevated CRP in 8 children with values >5 mg/l. WBC exceeded 10,800/mm3 in 68 (40.7%) of subjects.

Conclusions: The rate of stunting in this low-income urban sample from the nation's capital city is less than a third of the national, under-five average of 54% from the 2009-10 survey. Our anemia rate is 19 percentage-points below the 46% average for urban children in the same survey.

Key words: Anthropometry, young children, low-income, Guatemala

PO2447

DEVELOPMENT AND COMPARISON OF AN ONLINE DIETARY ASSESSMENT TOOL FOR USE IN THE FOOD4ME STUDY

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Background and objectives: Online dietary assessment tools have the potential to become invaluable methods of assessing dietary intake for personalised nutrition services. The aim of this study was to develop an online food frequency questionnaire (FFQ) for dietary data collection in the Food4me study and compare this with the validated European Prospective Investigation of Cancer (EPIC) paper FFQ.

Methods: The Food4me-FFQ consists of 157 food items and was developed to include standardised colour photographs to quantify portion size for each food item. Subjects completed the FFQ online and for most food items, subjects were requested to choose their usual serving size among seven possibilities. Subjects were recruited in two centres (Dublin and Reading) and each received the Food4me-FFQ and EPIC-FFQ in random order. Participants with more than 4 weeks between completing both FFQ's were excluded from the analyses.

Results: 113 subjects were recruited with a mean age 30 ± 10 years (41%males,59%females). The Food4me-FFQ estimated significantly higher mean energy intakes than the EPIC-FFQ ($p<0.0001$). After energy adjustment mean total fat intakes remained significantly different, however, there were no significant differences for protein or carbohydrate intakes between the two methods. Crude unadjusted correlations for macronutrients ranged between 0.43 (% energy from polyunsaturated fatty acids) and 0.72 (% energy carbohydrate). For micronutrients, unadjusted correlation coefficients were lowest for thiamin (0.46) and highest for vitamin C (0.69). Bland and Altman plots indicated good agreement between the two methods for assessing macronutrient intakes.

Conclusions: Results demonstrate that the online Food4me-FFQ has good agreement with the EPIC-FFQ, particularly for macronutrients and many of the key micronutrients. The ability of the Food4me-FFQ to categorise nutrient intakes as low, recommended or high makes it a useful tool for personalised nutrition.

Key words: FFQ, online dietary assessment tool, personalised nutrition

PO2448

STUNTING AND WASTING ASSOCIATED WITH MICRONUTRIENT DEFICIENCIES IN NORTHERN ETHIOPIA

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Background and objectives: Macro- and micronutrient deficiencies are public health concerns in most developing countries, including Ethiopia. However, there is little information available on micronutrient status of school-aged Ethiopian children. The present study aims to assess copper, zinc, vitamin A and vitamin D deficiencies and evaluate how they relate to nutritional status measured by anthropometry.

Methods: We conducted a cross-sectional study in Libo Kemkem and Fogera districts in Amhara State, Ethiopia. Sampling was carried out by multistage cluster survey. 886 children aged 4 to 15 years were recruited. Anthropometric data, and blood samples from 330 selected children, were collected. Copper and zinc serum concentrations were measured by atomic absorption spectroscopy, serum vitamin A by high-performance-liquid chromatography, and serum vitamin D by immunoassay. Internationally agreed cut off points were used for assessing micronutrient deficiencies. Stunting and thinness were defined as Height-for-Age and Body-Mass-Index-for-Age Z scores < -2 standard deviations (SD) in relation to the WHO 2007 Reference. Descriptive analyses and a stratified analysis by nutritional status were performed.

Results: Stunting prevalence was 40%(354/886) and wasting prevalence 21.4% (190/886). Overall, copper, zinc, vitamin A and vitamin D deficiencies were seen in 1.5% (5/326), 10.1% (31/305), 32.3% (106/330) and 15.4% (46/296) of the children, respectively. Mean zinc serum levels were significantly lower in stunted children compared to non-stunted (91.5 μg/dl, SD 18.5 versus 85.8 μg/dl, SD 17.2), $p=0.03$. Wasted children had lower vitamin A serum concentration levels than non-wasted children (0.31 μg/ml, SD 0.17 versus 0.27 μg/ml, SD 0.11), $p=0.014$.

No differences were found in the levels of copper or vitamin D between malnourished and not malnourished children.

Conclusions: Stunting, wasting and vitamin A deficiency should be considered severe public health problems in this area. Stunting is associated with low levels of zinc and wasting with low levels of vitamin A.

Key words: Malnutrition, micronutrients, vitamin A, Ethiopia

PO2449

IMPACT OF DIFFERENT SUGARY BEVERAGES ON THIRST

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Background and objectives: To determine the impact of sugary beverages on thirst sensation and in physiological parameters involved in their regulation.

Methods: 32 subjects (15 women), mean age of 22.3 ± 1.97 with BMI between 18.5–25 kg/m2, were included in a crossover clinical trial at the same day of 4 consecutive weeks. Standardized breakfast was served and 1 hour after, 330ml of water(W), non-fat milk(NFM), orange juice(OJ) and iced tea(IT) were ingested. The same lunch was served 2h30 after preload. Thirst, desire to drink and mouth dryness were measured at baseline and every 30 minutes until the end of lunch. Glycaemia, plasmatic sodium and osmolality were measured at the beginning and at the end of protocol. Ad libitum water intake at lunch was measured, and a food diary was taken to participants to record all food and fluid intake until 00.00 that day.

Results: A main effect of time ($p<0.001$) but no effect of beverage ($p>0.05$) were observed for all motivational ratings. Only in men a main effect of beverage was noticed ($p=0.01$) with NFM leading to a non-significant increase in thirst sensation face to W ($p=0.068$) and IT ($p=0.053$). Water ingestion at lunch showed a main effect of beverage ($p=0.018$) with NFM tend to higher ingestion face to W ($p=0.095$) and IT ($p=0.071$). No changes were observed in osmolality but glycaemia decreased – more pronounced with sugary preloads – and plasmatic sodium increased ($p<0.001$). No differences in energy, sugar and sugary beverages intake throughout day were observed between beverages.

Conclusions: Milk revealed a tendency to higher water intake in a subsequent meal and to an increase of thirst sensation in men. Osmolality and sodium did not differ between beverages as well as energy, sugar and sugary beverages intake throughout day.

Key words: Thirst, sugar, milk, orange juice, iced tea

PO2450

IMPACT OF MORNING INGESTION OF SUGARY AND SWEETENED BEVERAGES ON ENERGY AND FLUID INTAKE THROUGHOUT DAY

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Background and objectives: Determine the impact of the morning ingestion of sugary and sweetened beverages on energy and fluid intake throughout the day.

Methods: 24 subjects (11 women), mean age of 21.5 ± 2.33 y with BMI between 18.5–25 kg/m2, were included in a crossover clinical trial at the same day of 3 consecutive weeks. Standardized breakfast was served and 1 hour after 500 ml of water(W), sugar sweetened pineapple soda(PS; 11%sugar) and sucralose sweetened pineapple diet soda(PDS; 1%sugar) were ingested. The same lunch was served 2h30 after preload. After lunch, a food diary was taken to participants to record all food and fluid intake until 00h00 of that day. Energy and nutritional intake were estimated using an adapted Portuguese version of the nutritional analysis software Food Processor 10.0. Data analysis used a general linear model with repeated measures with beverage as within-subjects factor and sex as the between-subjects factor.

Results: No main effects of beverage ($p>0.05$) or beverage*sex interactions were observed for total energy, fluid and sugar intake. An interaction beverage*sex ($p=0.043$) was observed for the amount of sugary beverages ingested and a main effect of beverage ($p=0.049$) was registered in men, with

PS (637 ml ± 408) leading to a higher but non-significant ingestion of sugary beverages than W (406 ml ± 269, p=0.342) and PDS (343 ml ± 201, p=0.115). A main effect of beverage (p=0.047) and an interaction beverage*sex (p=0.023) was also observed for sugar ingested from sugary beverages with PS (65.2 g ± 45.1) leading to higher sugar intake compared to W (32 g ± 23.9, p=0.165) and PDS (29.2 g ± 27.5, p=0.068).

Conclusions: Morning ingestion of sugary and sweetened beverages leads to similar energy, fluid and total sugar intakes throughout the day. A tendency to a higher intake of sugary beverages throughout the day was observed with sugary soda preload.

Key words: Sugar, beverages, energy intake, morning

PO2451

IRON-BIOFORTIFIED PEARL MILLET PROVIDES ADDITIONAL BIOAVAILABLE IRON COMPARED TO REGULAR-IRON MILLET BUT TO A LESSER EXTENT THAN POST-HARVEST IRON-FORTIFIED MILLET

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Background and objectives: Iron biofortification of pearl millet (Pennisetum glaucum) is a promising approach to combat iron deficiency in millet consuming communities in developing countries. In this study, the potential of iron-biofortified millet to provide additional bioavailable iron in comparison to regular-iron and post-harvest iron-fortified millet was evaluated by measuring iron absorption from composite meals based on the three millet types.

Methods: Iron absorption from multiple composite meals was measured as erythrocyte incorporation of stable iron isotopes. The study was conducted in 20 Beninese women with marginal iron status (plasma ferritin < 25 µg/l).

Results: Fractional iron absorption from meals based on regular-iron millet (7.5%) did not differ compared to iron-biofortified millet meals (7.5%; p=1.0) resulting in a higher quantity of total iron absorbed from the iron-biofortified millet meals (527 µg vs. 1125 µg; p<0.0001). Fractional iron absorption from post-harvest iron-fortified millet meals (10.4%) was higher than from regular-iron (P < 0.05) and iron-biofortified millet meals (p<0.01). Total iron absorbed from the post-harvest iron-fortified millet meals (1500 µg) was higher than from the regular-iron (p<0.0001) and iron-biofortified millet meals (p<0.05).

Conclusions: Results indicate that iron-biofortified and post-harvest iron-fortified pearl millets have the potential to provide additional bioavailable iron compared to regular-iron pearl millet and could be effective to combat iron deficiency in millet consuming population.

Key words: Iron biofortification, Iron bioavailability, Iron fortification, pearl millet

PO2452

MICRONUTRIENTS AND PREGNANCY; EFFECT OF SUPPLEMENTATION ON PREGNANCY AND PREGNANCY OUTCOMES: A SYSTEMATIC REVIEW

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Background and objectives: Every year more than 20 million infants are born with low birth weight worldwide. About 3.6 million infants die during the neonatal period. More than one third of child deaths are thought to be attributable to maternal and child under nutrition The objectives of the study were to systematically review the effect of supplementing various combinations and types of micronutrients on the course and outcomes of pregnancy.

Methods: Electronic search of Medline, Pub Med, Health Internetwork access to Research Initiative, and Google Scholar databases was conducted. Outcomes of interest were birth weight, low birth weight, small size for gestational age, prenatal mortality and neonatal mortality. After exclusion of irrelevant / incomplete ones, 17 out of 115 articles were considered for the final analysis.

Results: Majority of the articles reviewed favored the supplementation of micronutrients to pregnant mother. Some studies suggested calcium supplementation is associated with a significant protective benefit in the prevention of pre-eclampsia. The remaining articles reviewed, showed significant benefit of multiple micronutrients supplementation during pregnancy in reducing low birth weight, small for gestational age births as compared to the usual iron-folate supplements.

Conclusions: Supplying micronutrients, mainly multiple micronutrients have beneficial effect in reducing the risk of low birth weight and other complications. Further studies at various combination and doses of micronutrient supplements are recommended.

Key words: Micronutrients, pregnancy outcomes, supplementation

PO2453

REVIEW OF THE STATE OF MICRONUTRIENT FORTIFICATION OF WEANING FOODS IN GHANA AND THE WAY FORWARD

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Background and objectives: Weaning is a critical period during which the nutritional needs of the young child should not be compromised. International organizations and local researchers have made attempts to improve on the complementary foods fed to infants from 6months upwards. This paper review articles on micronutrient fortification of food in Ghana and proposes a way forward.

Methods: Literature search was done on Google Scholar, Sciencedirect and Agora on publications of weaning food formulations and nutritional intervention studies with micronutrients. Both published articles and on-going work in the CSIR-Food Research Institute were reviewed.

Results: Over the years, Ghana has improved its weaning formulations from traditional cereal-based weaning foods from maize, millet or sorghum which had low energy and protein density and contributed to protein-energy malnutrition, to formulations of complementary foods based on cereal –legume blends. This makes the porridge rich in energy and protein but deficient in important micronutrient such as iron and vitamin A and high in phytate which compromises on nutrient bioavailability. In recognition of this drawback, various attempts have been made to fortify weaning foods with micronutrient powders both at community levels through community based milling and fortification, to household fortification of complementary foods with Sprinkles (SP) powder, crushable Nutritabs (NT) tablets, or energy-dense (108 kcal/d), fat-based Nutributter (NB). However, intervention studies with micronutrients dominate weaning food formulations with micronutrient. Micronutrient powder is very expensive and difficult to sustain in developing countries including Ghana. The proposed strategy is the use of different blends of locally available foods that are rich in specific micronutrients.

Conclusions: Food-based strategies for the solution of micronutrient deficiency problems are more sustainable because of availability and low cost.

Key words: Micronutrients, fortification, weaning, foods, Ghana

PO2454

ANTIOXIDANT ACTIVITIES OF DIFFERENTS FRUITS CULTIVATED AND MARKETED IN ANDALUCIA

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Background and objectives: There is mounting evidence of the health-protective role of the consumption of fruits and vegetables, which are the major contributors to dietary polyphenol intake. Some fruits are considered as natural functional foods because are the important sources of exogenous antioxidants. In this context, it has been suggested that an intake of a rich antioxidant diet is inversely associated with a risk to develop some pathologies like cardiovascular diseases, cancer as well as aging. Fruit are also one of the largest contributors to total dietary antioxidant capacity, which is considered a dietary quality indicator. The objective of this work is contributing to the improvement the quality of the food composition tables.

Methods: Fifteen different varieties of fruits cultivated and harvested in different periods of time in the Mediterranean area were fully studied. These fruits included watermelon, mango, medlar, persimmon, pomegranate, sapo melon, cantaluz melon, galia melon, custard apple, quince, red grape, fine lemon, pirmafión lemon, smooth avocado and coarse avocato. Three different assays based on Electron Transfer (ET) and Hydrogen Atom Transfer (HAT) reactions were employed: Trolox Equivalent Antioxidant Capacity (TEAC), Ferric ion Reducing Antioxidant Power (FRAP) and Oxygen Radical Absorbance Capacity (ORAC). Results. The antioxidant activity varies considerably from variety to variety. This variability among the same vegetable can be apparently explained by the influences of location, and harvest season, etc. Lemon, red grape and pomegranate showed the most antioxidant activity while persimmon, quince and melon showed the less antioxidant activity.

Conclusions: A complete set of antioxidant assays was performed in order to do more comprehensive the antioxidant potential of these typical fruits to complete and improve the food composition tables.

Key words: Fruits, antioxidant activity, ORAC, TEAC, FRAP.

PO2455

WATER FROM FLUIDS IS THE MAIN DRIVER OF TOTAL WATER INTAKE IN HEALTHY FRENCH ADULTS

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Background and objectives: Various international organizations have set daily reference values for total water intake (TWI), which includes water from beverages (total fluid intake, or TFI) as well as food moisture. To-date, the relative contributions of various beverage categories and food moisture to TWI are not well-described. The objective of this analysis was to determine the relative contribution of TFI and moisture from food to TWI.

Methods: 190 healthy French adults (age: 25-40 years; BMI: 18.5-29.5 kg/m2) completed online food and fluid diaries over three consecutive weekdays. TWI was determined from fluids in 7 categories (plain water, flavored water, milk products, still sweetened beverages, carbonated sweetened beverages, hot drinks, and alcohol), and water from food was determined using a database of food moisture for over 1300 generic foods.

Results: TWI was 2.80 ± 1.30 l/day, with 1.91 ± 1.19 l coming from TFI. TFI explained 91% of the variance in TWI (Pearson's r=0.95; p<0.001), while water from food was highly variable and only moderately correlated to TWI (r=0.43; p<0.001). On average, 65% ± 15% of TWI came from fluids. Moreover, linear regression demonstrated that the percentage of TWI obtained from fluids increased as a function of TWI (p<0.001), with the lowest deciles of TWI obtaining a lower percentage of water from fluid than the highest deciles.

Conclusions: Water from fluids is the main driver of total water intake, with plain water as the major contributor to water from fluids. Furthermore, water from food moisture is highly variable between individuals and varies as a function of total water intake. This suggests that individuals who consume high fluid volumes also consume more foods that are high in moisture content, such as fruits and vegetables.

Key words: Total water intake, fluids, healthy adult French

PO2456

VALIDATION OF A FOOD FREQUENCY AND PHYSICAL ACTIVITY QUESTIONNAIRE IN KILIMANJARO REGION, TANZANIA

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Background and objectives: Dietary and physical assessment tools depict useful methods to capture lifestyle changes and can provide ideas for prevention of lifestyle-related diseases. Such tools should be validated for each country and region to be culturally sensitive. The current study aimed to validate a semi-quantitative food frequency questionnaire (FFQ) and physical activity questionnaire (PAQ) for the Kilimanjaro Region, Tanzania.

Methods: A cross-sectional study was performed in two urban and three rural areas in Kilimanjaro Region, 2012. The study included 117 participants between the age of 18 and 65 with no diagnosed diseases. A semi-quantitative FFQ, which assessed the food intake of the previous month, was validated against two 24h dietary recalls (DR). A PAQ, which assessed the activity of the previous week, was validated against two 24h physical activity recalls (PA). Data were analyzed with Nutrisurvey and SPSS. Paired sample t-test was used for validation and Krippendorff's alpha to test data compliance.

Results: A total of 98 FFQ and 77 PAQwere included into the validation. Mean energy intake was2864.47 kcal (± 931.01) based on FFQ.Mean PAL, based on PAQ was 1.8 (± 0.34). According to paired sample t-test, mean nutrient intakes significantly differed between FFQ and 24h dietary recall. Same was true for mean physical activity PAQ and 24h physical activity recall. Krippendorff's alpha comparison showed no agreement in both tools (FFQ and 24h DR r=-0.13; PAL and 24h PA r=0.2).

Conclusions: Reported dietary intake and physical activity differed between the assessment tools. Overestimation seemed to be frequent in both FFQ and PAQ, whereas underreporting was in the 24hr-recalls. Further adjustments and possible simplification of the FFQ and PAQ have to be done forimproving the assessment toolswhich are used to monitor dietary intake and lifestyle patterns.

Key words: Validation, Physical activity, Food intake, Tanzania

PO2457

BODY COMPOSITION IN RELATION TO MICRONUTRIENT STATUS IN CAMBODIAN INFANTS: THE WINFOOD PROJECT

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Background and objectives: Malnutrition in infancy and early childhood is responsible for over 3 million child deaths yearly. Moreover, malnutrition in early childhood predisposes to a higher risk for non-communicable diseases such as obesity and cardio-vascular diseases later in life through metabolic alterations which are still not fully understood. Rapid growth during the first 2 years of life and fat mass at 2 yrs of age are strong predictors for later obesity. This paper investigates body composition in early childhood in relation to micronutrient status.

Methods: Anthropometry (weight, height, MUAC, skinfolds), body composition (deuterium dilution) and micronutrient status (iron, zinc, vitamin A) were measured at 6 mo and 15 mo of age. The infants were participating in the WinFood project which studied the effectiveness of fortified complementary foods (FCF) in improving health and growth.

Results: From 269 Cambodian infants data on body composition and micronutrient status were available for both time points. Lean body mass increased with 1.96 ± 0.59 kg, whereas the percentage of body fat decreased from 21.7% to 14.9% over the study period ($p<0.001$). At 6 and 15 mo of age, body fat was strongly correlated to ponderal growth (WHZ, $p<0.01$) but not to length growth (HAZ) or gender. Vitamin A and zinc status were not related to fat mass. Iron status at 6 and 15 months of age significantly correlated with body composition, with infants with no iron stores at endpoint having a higher fat mass (14.0% vs 15.5%, $p=0.02$).

Conclusions: Iron status, but not vitamin A or zinc status, was related to body composition in Cambodian infants. FCF aimed at improving micronutrient status in early childhood may have long term health benefits.

Key words: Body composition, iron, infants, obesity

PO2458

NUTRITIONAL STATUS IN CHILDREN WITH SICKLE CELL DISEASE

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Background and objective: Sickle cell disease (SCD) is the world`s most common hereditary hemoglobinopathy. Poor nutritional status and delayed skeletal development have been recognized in children with SCD. The goal was to evaluate the associations between nutritional status, hematological parameters and bone age.

Methods: Children between 24-70 months old with SCD-SS from Rio de Janeiro participated in the study. Age and gender-specific z scores for BMI, weight, height and weight/height and adequacy for mid-upper arm circumference (MUAC), triceps skinfold and mid arm muscle circumference (MAMC) were determined in all subjects. Blood samples were obtained to determine hemoglobin, hematocrit, reticulocyte count, lactate deydrogenase (LDH), hemosedimentation velocity (HSV) and serum calcium and magnesium. Bone age and relative bone age (difference between bone age and chronological age) were also assessed.

Results: 74 children were evaluated (60.8% male). Mean chronological age and relative bone age were 46.6 ± 14.9 and -8.9 ± 10.7 months, respectively. 9.5% were at risk of overweight, 4.1% presented overweight and 2.7% were undernourished. 9.5% presented low height-for-age and 1.4% had very low height-for-age. Stunting was greater than weight deficit: 4.1% presented low weight-for-age. BMI-for-age and weight-for-age z scores were correlated with hematocrit ($r>0.29$, $p<0.038$). Weight-for-age was also associated with hemoglobin ($r=0.31$, $p<0.022$) and inversely associated with HSV ($r=-0.34$, $p<0.018$). MUAC and MAMC`s adequacy were associated with hemoglobin ($r>0.34$, $p<0.014$) and hematocrit ($r>0.35$, $p<0.010$). Relative bone age was associated with hemoglobin ($r=0.38$, $p<0.011$), serum calcium ($r=0.37$, $p<0.029$), BMI-for-age ($r=0.31$, $p<0.028$), weight-for-age ($r=0.42$, $p<0.002$), height-for-age ($r=0.31$, $p<0.029$) and weight-for-height ($r=0.33$, $p<0.037$) z scores. Bone age was inversely associated with serum magnesium ($r=-0.40$, $p<0.010$). No correlations between LDH and nutritional status were observed.

Conclusions: Our results indicate transition in nutritional status in children with SCD-SS with presence of overweight.

Poor nutritional status was associated with worse hematological parameters that may contribute to higher delayed bone age.

Key words: Sickle-cell-disease, growth, children

PO2459

NUTRITIONAL STATUS AND DIETARY INTAKE IN CHILDREN WITH SICKLE CELL DISEASE

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Background and objectives: Children with sickle cell disease (SCD) homozygous type (SS) usually present poor nutritional status due decreased appetite, inadequate dietary intake and increased energy expenditure. The goal was to evaluate the associations between nutritional status and dietary intake.

Methods: Children (2-5y) with SCD-SS from Rio de Janeiro participated in the study. Age and gender-specific Z-scores for body mass index (BMI), weight, height and weight/height and adequacy for mid-upper arm circumference (MUAC), triceps skinfold and mid arm muscle circumference (MAMC) were determined. Dietary intake was evaluated by two 24-hour recall to assess estimated energy intake (EEI), carbohydrate, protein, total fat, calcium, phosphorus and magnesium.

Results: 40 children were evaluated (65% male), 15% were at risk of overweight and 2.5% presented overweight. Height-for-age and weight-for-age Z-scores were low in 12.5% and 2.5%, respectively. Mean EEI was 1399 ± 414 kcal/d provided from carbohydrate (58%), protein (15%) and total fat (27%). Mean total fat intake was low in 72% children under 3y, according to DRI. EEI was associated with adequacies of MUAC ($r=0.41$, $p<0.008$) and MAMC ($r=0.38$, $p<0.017$), weight-for-age ($r=0.40$, $p<0.011$) and height-for-age ($r=0.32$, $p<0.046$) Z-scores. Carbohydrate, protein and total fat intake were correlated with adequacies of MUAC ($r>0.34$, $p<0.032$) and MAMC ($r>0.33$, $p<0.038$). Carbohydrate intake was also associated with weight-for-age ($r=0.41$, $p<0.009$) and height-for-age ($r=0.37$, $p<0.020$) Z-scores. Protein intake was associated with weight-for-age ($r=0.40$,$p<0.011$) and weight-for-height ($r=0.41$, $p<0.024$) Z-scores. Total fat intake was associated with triceps skinfold`s adequacy ($r=0.37$, $p<0.019$). Calcium intake was below DRI in 78% of the children. Calcium and phosphorus intake were correlated with adequacies of MUAC ($r>0.44$,$p<0.005$) and MAMC ($r>0.54$, $p<0.000$), BMI-for-age ($r>0.49$, $p<0.001$), weight-for-age ($r>0.60$,$p<0.000$), height-for-age ($r>0.42$, $p<0.005$) and weight-for-height ($r>0.51$, $p<0.004$) Z-scores.

Conclusions: Adequate dietary intake was associated with better nutritional status. Nutritional following is necessary to improve nutritional status in SDC-SS children.

Key words: Sickle-cell-disease, dietary intake, nutritional status

PO2460

NUTRITIONAL STATUS AND BODY COMPOSITION OF UGANDAN WOMEN LIVING WITH HIV/AIDS

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Background and objectives: Antiretroviral therapy (ART) increases chances of survival, with concerns regarding fat redistribution; linked to protease inhibitors (PIs), in addition to older age and being female. We assessed physical characteristics using a comprehensive anthropometric protocol and to predict body composition.

Methods: 211 (88 ART-naïve), 15-49 year-old women, through cross-sectional approach, with information on disease and medication status.

Results: 34.1 ± 7.65 years old, 4.63 ± 4.78 years with infection and 2.8 ± 1.9 years on ARVs, 8.1% received PIs and 26% of them had ever changed regimen. Mean nutritional status and predicted percent body fat values was acceptable; different for participants receiving ARVs and the HIV-infected ART-naïve. Fat (%) estimated by BMI and skinfold thickness and BIA was similar to that by deuterium oxide dilution technique. Using BMI, 7.1% of patients were underweight (<18.5 kg/m2) and 46.4% were overweight/obese (≥25.0 kg/m2). Waist circumference characterized 40% as centrally obese. Deuterium dilution technique showed no between-group difference in body composition ($p=0.045$), with a very small effect (0.021). Older age ($r= 0.430$, $se= 0.089$, $p=0.000$), time spent receiving ARVs ($r= 0.972$, $se = 0.089$, $p=0.006$), time with the infection ($r= 0.551$, $se= 0.089$, $p=.000$) and receiving ARVs ($r= 2.940$, $se= 1.441$, $p=.043$) were independently associated with %fat. Older age was the greatest single predictor of body fat. BMI gave better information than weight alone could; in that, mean %fat per unit BMI ($n=192$) was significantly higher in patients receiving treatment (1.11 ± 0.31) vs. the exposed group (0.99 ± 0.38, $p=0.025$).

Conclusions: There were more overweight/obese participants than in the general Ugandan population, associated with ART status.

Key words: Nutritional status, body composition, Ugandan women, HIV/AIDS

PO2461

PLASMA SOLUBLE TRANSFERRIN RECEPTOR CONCENTRATION IS ASSOCIATED WITH ABSOLUTE RETICULOCYTE COUNTS, INFLAMMATION, AND MALARIA INFECTION IN URBAN CAMEROONIAN CHILDREN

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Background and objectives: Several studies have reported greater prevalence of iron deficiency (ID) as measured by plasma soluble transferrin receptor (pTfR) compared with ferritin (pF), even after correcting for inflammation. Because pTfR can reflect both rate of erythropoiesis and tissue iron demand, we examined factors associated with pTfR in a malaria-endemic setting.

Methods: In a representative, cluster survey of 306 pairs of children 12-59 mo and women 15-49 y in urban Cameroon, we collected blood samples to assess absolute reticulocyte counts (ARC, an indicator of erythropoiesis), hemoglobin and malaria infection, and plasma indicators of iron status (pF and pTfR) and inflammation (C-reactive protein and α1-acid glycoprotein).

Results: Anemia and inflammation were present in 48% and 46% of children and 44% and 22% of women, respectively; 8% of children and 5% of women had malaria. The apparent prevalence of ID ranged from 9.1% (inflammation-adjusted pF <12 μg/l) to 24.7% (pTfR >8.3 mg/l) among children and from 8.7% (pTfR >8.3 mg/l) to 16.8% (adjusted pF <15 μg/l) among women. Children with elevated pTfR (n=71) had greater ARC (median: 50.0 vs 36.0 cells/nl), lower hemoglobin (106 vs 112 g/l), and greater risk of malaria (19.7 vs 4.2%), inflammation (60.5 vs 41.7%), and low adjusted pF (27.3 vs 3.2%) than children with low pTfR (P<0.01, controlling for age). Compared to women with low pTfR, women with elevated pTfR (n=26) had lower hemoglobin (106 vs 122 g/l) and were more likely to have low adjusted pF (61.7 vs 12.5%, p<0.001), but ARC and presence of malaria, inflammation, and pregnancy did not differ.

Conclusions: In this setting, elevated pTfR is associated with increased erythropoiesis, inflammation, and malaria among children, so pTfR may overestimate the prevalence of ID. Among women, elevated pTfR represents mainly ID, possibly because infection prevalence was low.

Key words: Iron inflammation malaria

PO2462

APPARENT OBESITY AT A LOWER BODY MASS INDEX IN BANGLADESHI WOMEN

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Background and objectives: It has been observed that South Asians have a higher percent body fat at a given body mass index (BMI) than Western populations. We explored the relationship between percent body fat (%BF), estimated by bioelectrical impedance analysis (BIA) and skinfold measurements, and BMI to establish cutoff levels of BMI for defining obesity based on %BF in rural Bangladeshi women of reproductive age.

Methods: A community-based assessment of nutritional status was conducted at 3 months postpartum, representing a point in time when maternal nutritional status is comparable to periconceptional status, in 1555 women who participated in a placebo-controlled, antenatal, weekly vitamin A or beta-carotene supplementation trial. Anthropometric measurements (height, weight, triceps and subscapular skinfolds) were taken and resistance at 50 kHz was measured using single frequency BIA. Percent body fat was calculated from skinfold thickness' using the Siri equation and from resistance using a previously validated BIA equation for predicting body fat in this population.

Results: Mean (SD) weight was 42.8 (5.9) kg, height was 149.1 (5.3) cm, BMI was 19.2 (2.2) kg/m2, and %BF was 23.7 (4.8) and 23.3 (4.9) by skinfold and BIA methods, respectively. Receiver operating characteristic (ROC) curve analysis showed that a BMI of 21.5 kg/m2, versus a conventional cutoff of 25 kg/m2, optimized sensitivity (82.5%) and specificity (90.8%) and minimized misclassification of subjects with %BF >30, the standard definition of obesity.

Conclusions: In Bangladesh, the conventional BMI cut-off of 25 kg/m2 markedly underestimated the prevalence of obesity (BF>30%). Rather, in this rural Bangladeshi setting, women are obese, in terms %BF, at a lower BMI than in non-South Asian populations.

Key words: Bioelectrical impedance analysis, body mass index, fat percent, Bangladesh, women

PO2463

ADEQUACY TO FIBER INTAKE ACCORDING TO BODY MASS INDEX IN ADULT POPULATION OF ROSARIO (ARGENTINA)

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Background and objectives: The non-communicable chronic diseases are a key public health problem in low-middle- and high-income countries, and incidence and mortality rates are rapidly increasing in many previously low-risk countries. Epidemiological studies suggest that dietary fiber intake help maintain a healthy body weight. The aim of this study was to assess the dietary fiber adequacy of adults from Universidad del Centro EducativoLatinoamericano (UCEL) of Rosario, Argentina, and to describe the adequacy according body mass index.

Methods: A cross-sectional study was carried out and evaluated 88 students and employees of UCEL (34.1 ± 12.8 years). Food intake was assessed through four 24-hour recall along a year. Adequacy of fiber intake was calculated according to Dietary Reference Intakes (FNB-IOM, 2002/2005) by sex and age. Prevalence of overweight and obesity were calculated according to the WHO classification (overweight: BMI >25-<30 kg/m2; obesity: BMI >30 kg/m2).

Results: The mean of dietary fiber adequacy was 62.3 ± 21.6%% (CI 95% 57.7-66.8). The prevalence of overweight and obesity was 44.3%. Significant differences (p<0.001) in dietary fiber adequacy by BMI classification were found, with high adequacy in normal-weight (70.2 ± 22.3%; CI 95% 63.8-76.6) than in overweight/obesity (52.4 ± 16.2%; CI 95% 47.1-57.6) subjects.

Conclusions: It has been suggested that enough fiber in the diet will tend to prevent excessive food intake, so it is necessary to encourage adequate consumption of whole cereals, fruits, vegetables and pulses to increase the contribution of fiber to the diet and prevent weight increase.

Key words: Fiber intake, body mass index, adults

PO2464

MICRONUTRIENT STATUS IN DIABETIC RETINOPATHY

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Background and objectives: Multiple factors are likely to be involved in predisposing diabetic subjects to diabetic retinopathy (DR), as evidenced by the fact that many but not all diabetic patients develop DR. In this study we have evaluated the micronutrients status in DR with an ultimate goal to understand the role of genotype-nutrient interaction in DR.

Methods: A hospital based cross-sectional case-control study was conducted with 300 type-2 diabetic subjects with retinopathy (DR) (n=200) and without retinopathy (DNR) (n=200) along with 100 normal control (CN) subjects based on strict inclusion and exclusion criteria. Diabetic subjects on nutritional supplements and history of nephropathy and other complications were excluded. Based on ophthalmic examination including FFA, patients were classified as DNR or DR. In addition to regular clinical profile, the blood levels of all the vitamins and trace elements were analyzed by HPLC, atomic absorption, spectrophotometric methods.

Results: Among trace elements, an inadequacy in blood levels of manganese, cobalt and zinc was found in DR patients compared to CN and DNR. Excepting vitamins folic acid B6, B12 and D, blood levels of all the vitamins were not different between the groups. While, levels of vitamin B6, folic acid and vitamin D were significantly lower in diabetic groups as compared to controls, there was no difference between DNR and DR groups. This study revealed a significantly lower level of plasma vitamin-B12 in DR patients compared to CN and DNR groups. While plasma homocysteine levels were found to be higher in diabetes patients compared to control subjects, homocysteine was further higher in DR group.

Conclusions: These results suggest an association between vitamin-B12 deficiency and hyperhomocysteinaemia in DR and further indicate that vitamin-B12 deficiency could be an independent risk factor for DR.

Key words: Diabetic retinopathy, micronutrients, vitamin B12, homocysteine

PO2465

EFFECT OF IRON FORTIFIED COWPEA FLOUR ON IRON STATUS STATUS OF SCHOOL CHILDREN IN NORTHERN GHANA

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Background and objectives: Cowpeas, like other legumes, contain high amounts of native iron but are rich in phytic acid and polyphenols inhibiting iron absorption. NaFeEDTA may overcome the combined inhibitory effect of phytic acid and polyphenols. Our objective was to test the efficacy of NaFeEDTA fortified cowpea meal in improving iron status of school children in a malaria endemic area.

Methods: We conducted a double-blind controlled trial with 5 – 12-y-old school children from two rural communities in northern Ghana (n = 241). Eligible children were randomly assigned to two treatment groups to receive either cowpea meal fortified with 10 mg Fe/meal as NaFeEDTA, or an identical but non-fortified cowpea meal. Meals were provided 3 d/wk for a period of about 7-mo under strict supervision. Mass deworming and malaria antigenemia screening and treatment were carried out at baseline and 3.5-mo into the trial.

Results: Consumption of cowpea flour fortified with NaFeEDTA resulted in significant improvement of Hb ($p<0.05$), SF ($p<0.001$) and body iron stores ($p<0.001$) and reduction of TfR ($p<0.001$) compared to non-fortified flour. Fortification resulted in 30% and 47% reduction in the prevalence of iron-deficiency (ID) and iron-deficiency anemia (IDA) ($p<0.05$), respectively.

Conclusions: The results indicate that fortification of cowpea flour with NaFeEDTA overcomes the combined inhibitory effect of phytic acid and polyphenols and, when used for targeted school-based fortification of cowpea flour, is effective in reducing the prevalence of ID and IDA among school children in malaria endemic rural northern Ghana.

Key words: Fortification, iron-deficiency, schoolchildren, Ghana

PO2466

SUB-CLINICAL INFLAMMATION AND EFFECT OF IRON SUPPLEMENTATION IN UNDER-TWO-YEAR-OLD INDONESIAN CHILDREN

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Background and objectives: Sub-clinical inflammation (SCI) influences iron indicators and hemoglobin levels, while studies have reported anti-inflammatory role of long-chain polyunsaturated fatty acids (LCPUFA). However, there is limited information on the influence of SCI and EPA/DHA supplementation on effectiveness of iron supplementation. This study aims to investigate the influence of SCI and EPA/DHA supplementation on effect of iron supplementation to improve hemoglobin and iron status.

Methods: A randomized, double-blinded controlled trial was conducted in Lombok, West Nusa Tenggara Province, Indonesia (ClinicalTrials.gov Identifier: NCT01504633). There were four groups: placebo, Fe (16 mg elemental iron/day), EPA/DHA (20 mg/100mg per day) and Fe+EPA/DHA (n=60/group). Indicators of SCI (CRP, AGP), iron status (serum ferritin/SF, transferin receptor/sTfR, body iron store/BIS) and hemoglobin were assessed at baseline and after 24-week supplementation (endline).

Results: SCI was associated with higher SF and lower BIS at baseline. However in groups who received iron, there was no difference in improvement of hemoglobin, SF, sTfR, BIS between SCI groups (18.7 g/l, 53.6 μg/l, -2.7 mg/l, 6.6 in SCI and14.7 g/l, 41.9 μg/l, -2.6 mg/l, 7.0 in non-SCI respectively). In both stratum with and without SCI, improvement in hemoglobin, SF, sTfR and BIS was significantly better in groups who received iron. The same pattern was observed when stratified by with and without DHA supplementation.

Conclusions: Within the regime of iron dosage used in this study (equivalent to 2 mg/kg.day) iron supplementation improved hemoglobin and iron status regardless of SCI status and EPA/DHA supplementation.

Key words: EPA/DHA, iron status, iron supplementation, sub-clinical inflammation, under-two-year-old children

PO2467

A PROSPECTIVE STUDY OF NUTRITIONAL STATUS OF PATIENTS WITH CHRONIC MALNUTRITION UNDER DIETARY TREATMENT

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Background and objectives: Patients with chronic malnutrition have bad quality of life with diminished capacity of working and deteriorated social status.The aim of our study is to assess the effectiveness of different therapeutic approaches on patients with chronic malnutrition, who were admitted at the Clinic of metabolic diseases and dietetics.

Methods: We analyze the results of 52 malnourished patients with different etiology. They have: 1primary anorexia or/and bulimia nervosa 2secondary anorexia with depressive syndrome 3chronic gastrointestinal diseases 4status after surgery Patients are reviewed two times – at the beginning of the study and after 24 months. We measure the body composition with bioelectrical impedance analyser „Tanita TBF – 401A" and the muscle strength with dynamometer "SAEHAN". We test the cognitive function by Mini Mental State Examination and investigate their usual nutritional habits using standard questionnaire. We build up an individual therapeutic plan with a diverse nutritional support according to the unique metabolic status.

Results: After 24 months we have been established that muscle strength is mostly improved. All the patients show better results by dynamometry and they remark improving quality of life by the questionnaire. We find out that patients with depressive syndrome and patients after surgery show better results after 2 years, compared to those with anorexia nervosa and chronic gastrointestinal diseases. Patients with anorexia nervosa show the worst compliance and those with chronic gastrointestinal diseases don't have adequate food intake in relation to constant gastrointestinal symptoms and impaired nutrient absorption.

Conclusions: The results of our 24 months study confirm the necessity of systematical individual approach of the nutritional therapy of malnourished patients. It is obligatory to monitor the patients' status during the therapy and to adjust if it's necessary.

Key words: Chronic malnutrition, nutritional assessment, therapeutic approach, monitoring

PO2468

FOOD LIMITS THE RESPONSE OF CIRCULATING NON-TRANSFERRIN-BOUND IRON (NTBI) TO ORAL IRON SUPPLEMENTATION IN YOUNG CHILDREN

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Background and objectives: Malaria in children can be more virulent in the context of 12.5-mg oral Fe supplementation, as shown in a trial on the Zanzibari island, Pemba. A leading candidate as a virulence factor is the loosely-bound circulating Fe (NTBI), which enters the circulation after supplementation. It is recommended that, if oral Fe is to be given, it should be consumed along with food to limit the intravascular exposure to NTBI. We hypothesized that the circulating NTBI would be associated with the serum Fe concentration and that consuming food with the Fe would limit the NTBI response.

Methods: Forty subjects, aged 24-36 months, were assigned to one of four groups (G): GI received oral Fe solution at time zero with blood extraction 180 min later; GII received water with sampling at 270 min; GIII received oral iron with blood extraction 270 min later; GIV received water with sampling at 270 min. Oral iron was 13 mg of Fe as FeSO4 syrup, with a snack based on 4 ounces of gelatin or flan plus juice served within 30-min of dosing. Serum Fe was measured with a photometric colorimetric test and NTBI by a fluorometric competitive binding assay.

Results: The Spearman correlation coefficient of NTBI vs serum Fe was r=0.15 (p=0.32, n=38). Pooled serum Fe was 28.1 ± 15.5 µg/dl with iron plus food (n=19) vs 17.6 ± 7.6 µg/dl without oral Fe (n=20) (p=0.01). Corresponding circulating NTBI averaged 0.37 ± 0.35 and 0.31 ± 0.37 µg/dl (p=0.61) respectively, with 25% undetectable NTBI in the iron and 35% in the placebo groups.

Conclusions: Despite the close proximity of the oral supplement dose to a meal, significant Fe uptake into the circulation can be detected, whereas NTBI concentrations remained at basal levels in this meal-feeding situation.

Key words: Children, iron-supplementation, non-transferrin-bound iron, malaria, Guatemala

PO2469

VALIDATING ESTIMATES OF TRADITIONAL FOOD INTAKE IN THE CREE AND INUIT POPULATIONS OF NORTHERN CANADA

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Background and objectives: Hunting and gathering patterns vary throughout the year as a result of animal migration and weather patterns. Due to the seasonal nature of consumption, estimates of traditional food (TF) in indigenous populations in northern climates are difficult to obtain. Validation of TF reported on a food frequency questionnaire (FFQ) used a ratio of estimated energy intake (EI) to basal metabolic rate (BMR).

Methods: FFQ recorded year-long TF intake from the "Nituuchischaayihitaau Aschii: A Multi-Community Environment-and-Health Longitudinal Study in Iiyiyiu Aschii" and the International Polar Year (IPY) Inuit Health Survey (IHS). Two hundred and one adult Cree participants (aged 18 and above) and 2081 participants from the IHS responded to a FFQ aimed at obtaining all TF over the previous 12 months. Average portion size using standard portion models (Santé Quebec, Canada) was obtained along with the frequency. Using this data, daily energy from TF was calculated. EI from TF was compared to estimates of BMR to determine the validity of reports.

Results: The energy reported from TF on FFQ was 4995 ± 6412 and 1263 ± 3216 and BMR was 1800 ± 281 and 1555 ± 262 in the Cree and Inuit respectively. The ratio of reported energy intake from TF to BMR in the Cree was 2.48±3.57 with a maximum of 22.0. In the Inuit population, the ratio was 0.80 ± 1.96 with a maximum of 43.9.

Conclusions: Given ratios of total daily energy intake to BMR of 1.4-1.9 established by the WHO, and because TF represents only a fraction of the diet of our participants, this would indicate a clear overestimation of total TF intake. Although it is important to get an estimate of intakes of TF in indigenous populations, investigators need to be aware of the limitations of the methods they are using.

Key words: Traditional food, indigenous, food frequency, validation

PO2470

RECEIVER OPERATING CHARACTERISTIC CURVE ANALYSIS OF ANTHROPOMETRIC MEASUREMENTS VERSES BODY FAT ASSESSED BY AIR DISPLACEMENT PLETHYSMOGRAPHY IN INDIAN WOMEN.

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Background and objectives: Optimal fatness is a key to healthy and longer life. Assessment of fatness with a better accuracy using simple and cost effective tools is important to curtail the consequences of excess body fat. A study was carried out to assess the relative ability of anthropometric indicators of fatness as compared to the percent fat measured by Air displacement plethysmography (ADP) in Indian adult women.

Methods: Sixty-six healthy women aged between 30 and 60 years having normal BMI as per WHO classification (BMI, 18.5 - 24.9 kg/m2) were included in the study. Body composition was assessed using Air Displacement Plethysmography (BodPod, LMI, USA) to obtain percent body fat (%BF). Hieght, Weight, Skinfold thickness (SKF) at four different sites (triceps, biceps, sub-scapula and supra-iliac) and circumferences at seven position viz upper-arm (AC), neck, chest, waist, hip, thigh and calf were measured using standard procedures. BMI, WHR, Waist- Stature-Ratio (WSR) and Hip-to-Height-Ratio (HSR) were calculated. The Receiver Operative Characteristic (ROC) analyses were done and areas under the curves (AUC) were used to compare the relative accuracy of each indicator to assess the fatness, where fat above 30% was considered as excess fatness.

Results: The mean fat percentage was found to be 34.4 ± 6.7.All the measured circumferences and SKFs, BMI, WSR and HSR were positively correlated with fat percentage at 0.01 significance level. The probability of detecting fatness expressed by the AUC was found to be higher for triceps (0.970), BMI (0.934) and AC (0.927), hence, can be considered as better predictors for fatness among the indicators studied. The AC can be considered as an accurate indicator of fatness which is cost effective.

Conclusions: Amongst the indicators studied, triceps, BMI and AC were found to be better indicators of fatness.

Key words: ROC curve, fat percentage, air displacement plethysmography, triceps, BMI

PO2471

PROVITAMIN-A-CAROTENOIDS AND RETINOL ACTIVITY EQUIVALENTS: APPARENT BIOAVAILABILITY OF ALPHA-CAROTENE AND BETA-CRYTOXANTHIN IS GREATER THAN THAT OF BETA-CAROTENE IN SPANISH SUBJECTS

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Background and objectives: Current assumptions about RAE (international standard of measure for vitamin-A) are based on the supposition that the absorbabilities of the provitamin-A-carotenoids are the same. Beta-carotene is assigned the maximum contribution to retinol intake, and this has been established on the basis of its bioavailability from foods. The other two provitamin-A-carotenoids are considered to have the same bioavailability and potential for conversion to retinol, which is half that of beta-carotene. Objective: Assessment of provitamin-A-carotenoids (alpha-carotene, beta-carotene, beta-cryptoxanthin) and retinol in serum and diet and comparison of their apparent bioavailabilities in Spanish subjects.

Methods: Subjects: n= 108 (54 men), aged 20-35 y and 45-65 y (n=54/group). Normal serum cholesterol and BMI, consumption of varied diet and no nutritional supplements were selected as Inclusion criteria. Dietary assessment: 3-day food records questionnaires and carotenoid data-base of food composition (Beltrán et al Nutr. Hosp 2012). A validated HPLC method for serum carotenoids and retinol (Olmedilla et al Clin.Chem 1997). Apparent bioavailability calculated dividing the blood level of each carotenoid by its intake.

Results: Serum beta-carotene and beta-cryptoxanthin concentrations are close, but in diet, that of beta-carotene is more than 6-fold-higher than that of beta-cryptoxanthin or alpha-carotene. Beta-carotene represents 76% of all the provitamin-A-carotenoids consumed (both groups of age) but, in contrast, in serum, the percentage of beta-carotene is closer to that of beta-cryptoxanthin (51-55% vs 37%). The apparent bioavailability of alpha-carotene was twice that of beta-carotene, and that of beta-cryptoxanthin was close to that of alpha-carotene. Bioavailabilites of alpha-carotene and beta-cryptoxanthin compared with that of b-carotene (as standard) are 1,3 and 4,6 (median values) respectively. The contribution of these two provitamin-A-carotenoids to the vitamin-A intake could be greater than that considered currently (RAE).

Key words: Carotenoids, serum, diet, bioavailability

PO2472

BODY FAT DISTRIBUTION OF CHILDREN AND ADOLESCENTS IN ABEOKUTA, SOUTHWEST NIGERIA

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Background and objectives: Excessive central fat in children and adolescents is a risk factor for cardiovascular and metabolic disorders. The aims of this study were to compare the body fat distribution patterns of children and adolescents in Abeokuta, Nigeria with an international reference standard and to determine the prevalence of general and central obesity.

Methods: Five hundred and seventy children aged 5 to 19 years were selected from seven schools using multi-stage random sampling. Extensive anthropometric measurements were made. Values obtained for Nigerian children were compared with corresponding values for the African-American children.

Results: Females had higher mean BMI, TSF, SSF, WC, HC, WHR and WHtR, while males had significantly higher STR. The mean BMI, WC, TSF and SSF values were lower for our subjects than for African-American subjects at all ages. On the other hand, in both sexes, STR was higher among Nigerian than African-American subjects up to 12 years old. Thereafter the values were similar. The mean WC was similar to those reported for African-American males up to 8 years, and females up to 7 years of age; thereafter, African-American had higher values. According to NCHS/WHO criteria based on BMI, 10 (1.8%) of the children were overweight, seven (70%) of whom were females. The only obese child (0.2%) in the study was female. The prevalence of central obesity using WC and WHtR measures was 4.4% and 5.8% respectively.

Conclusions: Subjects had relatively high central body fat despite their low mean BMI.

Key words: Overweight, central obesity, children, adolescents, Nigeria

PO2473

COEXISTENCE OF STUNTING AND THE RISK OF OVERWEIGHT/OBESITY AMONG PRESCHOOL CHILDREN ATTENDING A PERI-URBAN DAYCARE CENTER IN METROPOLITAN GUATEMALA CITY?

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Background and objectives: Much of the developing world is passing through a so-called "nutrition transition" and double-burdens of malnutrition. Stunting is a form of undernutrition. Meanwhile, we are seeing the emergence of overweight/obesity on the excess side. Our objective here was to see if stunting and overnutrition coexist in a peri-urban day-care center in Guatemala City.

Methods: Heights and weights were measured and birthdates obtained in 174 participating preschoolers (aged 3-6 years) at Fe y Alegría in the community of Peronia, 16 km from the capital. We transformed the measurement into Z score of height-for-age (HAZ), defining stunting as < -2SD and calculated body mass index (BMI), with overweight defined as 85th-96.9th percentile and obesity as ≥97th. Our reference was ANTHRO v3.2.2 and ANTHRO-Plus v1.04 (WHO, Geneva).

Results: The mean age in years was 5.1 ± 1.0, with 52.3% boys. The overall mean HAZ was -1.0 ± 0.9 (median:-1.0; range:-3.2 to +1.1), with corresponding descriptive statistics for boys of -0.8 ± 0.9 (median:-0.9; range:-3.2 to +1.1) and for girls -1.2 ± 0.8 (median:-1.2; range:-3.1 to +0.9) (p=0.02). The overall stunting prevalence was 12.1%, with 12.1% for boys and 12.0% for girls. Overall prevalence of overweight was 12.1% and obesity, 2.0%. By sex, they were 14.3% and 2.3%, and 9.6% and 1.2%, respectively. The prevalence of overweight/obesity in stunted children (n=1) is 5.6%, and that in non-stunted subjects (n=23) is 13.2% (p=0.346).

Conclusions: The 12.1% stunting prevalence here must be considered as mild, well below the national rate of 49.8% for under-fives. Similarly, the 14% of combined overweight/obesity practically superimposes on the fraction of a population encompassed between 85th and 100th percentiles. Coexistence of under- and over-nutrition is minimal in this setting.

Key words: Children, anthropometry, stunting, overweight/obesity, Guatemala

PO2474

PSYCHOSOCIAL FACTORS ASSOCIATED WITH LOW ENERGY REPORTING IN MALE AND FEMALE MALAYSIAN UNIVERSITY STUDENTS

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Background and objectives: This cross-sectional study aimed to identify potential psychosocial factors associated with low energy reporting in Malaysian male and female university students.

Methods: A total of 806 university students (39.7% males and 60.3% females), aged 19 to 24 years (M = 20.7, SD = 1.9), from six randomly selected universities completed the Multidimensional Body Image Scale, Eating Attitudes Test-26, Depression Anxiety Stress Scale, International Physical Activity Questionnaire, and a two-day 24-hour dietary recall. Body weight and height were measured. The ratio of total energy intake to estimated basal metabolic rate (EI:BMR) and the Goldberg cut-off point were used to classify participants into under-reporters and adequate reporters of EI.

Results: About 30.9% of the males and 33.3% of the females were under-reporters. Significantly higher proportions of male and female under-reporters of EI were overweight and obese than adequate reporters. Multiple linear regression analysis revealed that lower EI:BMR values were associated with higher BMI (r= -0.257, p < 0.001), higher body dissatisfaction (r= -0.299, p < 0.001), higher depression r = -0.169, p=0.004), and lower stress (r= 0.185, p = 0.005) in females, whereas with higher BMI (r= -0.378, p<0.001) in males. Other factors were also included in the models but they were not significantly associated with EI:BMR (i.e physical activity, anxiety, and disordered eating). These final models explained 24.5% of variance in females and 17.6% in males.

Conclusions: Factors associated with low energy reporting differed according to sexes among university students. Thus, programs targeting these students should consider these differences.

Key words: Low energy reporting, psychosocial factors, university students

PO2475

DIETARY PATTERNS IN AN ADULT POPULATION FROM ARGENTINA

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Background and objectives: Dietary patterns (DP) have been used to identify different combinations of foods that may be associated with mortality and risk of chronic disease. The objective of this study was to identify DP in the adult population of Argentina, and explore associations with socio-demographic features.

Methods: We defined DP among 3,000 adults between 35 to 74 years old, participating in CESCAS I, a population-based cohort study carried out in two cities in Argentina, Marcos Paz and Bariloche. Data on food intake was obtained from a validated self-administered food frequency questionnaire. Principal component Analysis (PCA) was used to identify DP. A summary score for each pattern was then derived and used in multiple regression analysis to examine the relationship between DP and socio-demographic variables.

Results: Using PCA, we identified 3 major eating patterns. The first factor (Traditional dietary pattern), was characterized by a high intake of refined grains, red meat, whole fat dairy products, vegetable oils, and "mate", a traditional South American infused drink frequently consumed in Argentina; the second factor (Healthy dietary pattern), was characterized by a high intake of vegetables, fruit, low fat dairy products, whole grains, and legumes; the third factor (Processed-food dietary pattern) consisted mainly of processed meat, snacks, pizza, and "empanadas", a stuffed bread baked or fried. After adjusting for energy intake, we found that DP were associated with age, gender, and educational level. Healthy DP score was higher among women and high educational level (p=0.001) while men and young people scored significantly higher in the Processed-food DP (p=0.01).

Conclusions: Local DP has been identified in our population. This study will provide useful information to set priority targets for nutrition interventions, and promote healthy policies based on local food habits.

Key words: Dietary patterns, Argentina, adults.

PO2476

ASSESSMENT OF DIFFERENTIAL ITEM FUNCTIONING IN THE HOUSEHOLD FOOD SECURITY SCALE MODULE WITHIN A DISADVANTAGED AUSTRALIAN POPULATION

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Background and objectives: Food insecurity is the limited availability of or access to nutritious, safe and culturally-appropriate food, or inability to access these foods by socially acceptable means. Monitoring and surveillance of food insecurity is imperative for the development of policy and interventions to address the issue. The measurement of food insecurity in Australia is limited, relying on a single item that underestimates its prevalence. Recently, countries have been adopting the more comprehensive United States Department of Agriculture Household Food Security Survey Module (HFSSM). However, it is unknown whether items in the HFSSM are perceived differently between groups, for example ethnic minorities and women, which may confound or complicate the interpretation of sub-group differences.

Methods: We examined differential item functioning of the ten USDA-FSSM adult-related items, based on gender, country of birth (COB) and presence of children in the household. Data were collected via mail-based survey among a cross-sectional sample of 487 low-income households in Brisbane, Australia and analysed using jMetrik freeware.

Results: Items did not function differently based on COB. Between genders, moderate levels of differential functioning were evident for only the item pertaining to hunger. Items functioned differently between households with and without children, with six of ten items displaying moderate differential functioning and a further three revealing large amounts of differential functioning. This is likely due to item bias, reflecting confounding with presence of children in a household. Care should be taken with the interpretation of results between households with and without children. Alternatively a separate measure of food insecurity may be constructed, however this may complicate comparisons between other groups and studies.

Conclusions: Differences in item function in the HFSSM exist between households with and without children. Care should be taken in the interpretation of results between these sub-groups.

Key words: Food security, food insecurity, measurement

PO2477

ASSESSMENT OF HOUSEHOLD FOOD SECURITY: DESIGN OF A STANDARDIZED APPROACH AT THE WORLD FOOD PROGRAMME

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Background and objectives: The World Food Programme (WFP) operates throughout the world, providing emergency relief and food assistance to the most needy. Information on household food security, a key determinant of diet and nutrition outcomes, is used to guide program activities. This paper describes results of the design phase of a project to improve and standardize reporting of food security indicators across countries.

Methods: A mixed-methods approach included an extensive review of documents from international food and nutrition agencies and scientific literature from the nutrition, health, agriculture, and economics disciplines. Key stakeholder input was obtained from a working group of WFP staff in 17 countries and the headquarters' teams of the Food Security Analysis Service (FSAS). Empirical testing was conducted with FSAS household datasets from South Sudan, Nepal, Tajikistan, El Salvador, Guatemala, and Djibouti.

Results: The new approach provides a framework for combining and reporting food security indicators on current food consumption, such as the WFP Food Consumption Score. It also includes indicators on income status and asset depletion, which affect a household's ability to feed itself in the face of future shocks. Household status is reported across four categories: food secure, and mild, moderate, and severe food insecurity. Comparison with previous approaches showed similar prevalence rates of the two most severe categories, but significant differences with the 'secure' category across all countries tested.

Conclusions: New to this approach was the use of four categories of food security, allowing for distinction between 'secure' and 'mildly food insecure' households. This can be useful for WFP programming on school feeding, nutrition, and other efforts to protect livelihoods. More importantly, calculation of a summary indicator of household food security in a standardized and transparent way can improve communication with relevant actors, and facilitate effective action.

Key words: Food security, assessment, households, food programs

PO2478

DEVELOPMENT AND VALIDATION OF AN INFANT COMPLEMENTARY FEEDING INDEX

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Background and objectives: Childhood malnutrition is a priority health problem in Sri Lanka, and suboptimal complementary feeding practices is considered a major contributor. In order to address this issue, frontline healthcare workers need to conduct rapid assessment of feeding practices of infants and young children, and intervene if necessary. The objective of this study was to develop an index which can be used by frontline healthcare workers to conduct a rapid quantitative assessment of complementary feeding practices of infants at individual level.

Methods: The development of the index was carried out involving eight experts in the fields of public health, paediatrics, medical nutrition and biochemistry, using the Delphi technique. Indicators belonging to the seven domains of milk feeds, meal frequency, food variety, nutrient density, food hygiene, responsive feeding and miscellaneous were given scores by the experts, depending on their relative importance for the age groups 2.0-3.9, 4.0-5.9, 6.0-8.9, and 9.0-11.9 months. The first age group was included to capture premature introduction of solids. The construct validity of the index was assessed against anthropometric parameters of a sample of 624 infants.

Results: The Infant Complementary Feeding Index developed consists of 25 variables, which ranged from 2-5 in each of the seven domains. The scores received for each domain of complementary feeding practices of infants in the sample were significantly associated ($p<0.05$) with their z-scores for weight for age and height for age, when assessed using the multiple regression method, after controlling for the confounding variables of sex, birth weight, maternal age, maternal education, father's occupation and family income.

Conclusions: The index developed is a valid tool for a quantitative assessment of infant complementary feeding practices.

Key words: Infant complementary feeding, infant nutrition, nutrition assessment, feeding index

PO2479

GROWTH AND DEVELOPMENT OF CHILEAN ADOLESCENTS BELONGING TO A COHORT OF CHILDREN BORN PRETERM

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Background and objectives: Catch-up growth in children born preterm occurs in the first months of life; it can be slow and progressive and, in some cases, growth recovery takes place in adolescence. The objective was to study the growth and development of adolescents born preterm and compare them to term-born adolescents.

Methods: A sample of 91 children was taken from a cohort born preterm between January 1995 and December 1996 with birth weight <2500 g and gestational age <37 weeks residing in the urban areas of Chillan and San Carlos in the Bio-Bio Region, Chile. This sample was compared with 91 term-born children matched for gender, age, and attendance at the same educational institution. Assessment included BMI-for-age and height-for-age based on CDC/NCHS standards, Tanner puberty scale for development stages, body composition by skinfold, and percentage body fat with Slaughter´s formulae. Blood pressure and waist circumference were calculated to estimate cardiovascular risk.

Results: Overweight and obesity according to BMI-for-age was 23.0% and 24.1% in adolescents born preterm and term-born, respectively; 25.5% of adolescents born preterm and small for gestational age and 14.5% adequate for gestational age were overweight. Lower height was observed in 16.5% and 5.5% of the sample and control, respectively, according to height-for-age; a higher proportion of girls had lower height ($p<0.04$). A higher proportion of excess fat mass was found in adolescents born preterm than in the control, particularly in the suprailiac skinfold. No significant differences were found in blood pressure and waist circumference.

Conclusions: There is a group of preterm children who do not recover height during adolescence, especially girls. Cardiovascular risk is similar in both groups.

Key words: Adolescents born preterm, body composition, cardiovascular disease, growth recovery.

PO2480

TOLEDO AREA STUDY: ASSESSMENT OF GLYCEMIC INDEX IN ADOLESCENTS AND THEIR PARENTS.

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Background and objectives: The Toledo Area Longitudinal Study (TALS) examines the influence of dietary, anthropometric and metabolic parameters at birth and their parents about different cardiovascular risk factors in children and adolescents of Toledo Health Area. Glycemic load (GL) estimates the impact of carbohydrate consumption. Glycemic load control appears to be beneficial in dietary programs targeting metabolic syndrome, insulin resistance, and weight loss. The objectives are to determine GL and to evaluate the correlation between parents and adolescents. Methods. In a sub-sample of 53 adolescents TALS (16-17 years old) and their parents we measured GL (by multiplying Glycemic Index value by the grams of available carbohydrates in their diets) and the GL/1000 kcal. Descriptive statistics (median and interquartile range) and analytical (nonparametric tests) were performed by SPPS® 15.0.

Results: In adolescents GL= 127.7 (36), GL/1000 kcal= 61.9 (11); in fathers GL= 109.3 (49), GL/1000 kcal= 50.6 (13); in mothers GL= 98.3 (45), GL/1000 kcal= 56.1 (12). There was statistically significant difference between parent and adolescents in GL and GL/1000 kcal in ($p=0.040$ and $p=0.038$, respectively), but there was not between parents ($p=0.128$, $p=0.245$ respectively). There were statistical significant correlations between father GL and adolescent GL ($r=0.331$, $p=0.030$), father GL/1000 kcal and adolescent GL/1000 kcal ($r=0.392$, p=0,009), father GL/1000 kcal and mother GL/1000 kcal ($r=0.366$, $p=0.016$).

Conclusions: Despite the correlation between GL and GL/1000 kcal in fathers and adolescents, there were high levels of GL and GL/1000 kcal in the adolescent sample, wich may lead to premature insulin resistance and increased diabetes risk.

Key words: Diet quality, adolescents, parents, glycemic index

PO2481

VITAMIN B12 INTAKE AND STATUS IN CROATIAN CELIAC PATIENTS ON A GLUTEN-FREE DIET

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Background and objectives: Adequate vitamin B12 status is necessary for many biological functions in the body. It is well known that patents with untreated celiac disease have low serum vitamin B12However, inadequate serum vitamin B12 was also observed among celiac patients adhering gluten-free diet. Since gluten-free diet excludes only plant origin foods which contain gluten, the food of animal origin, as a good dietary source of vitamin B12, should not be reduced in celiac patients on a gluten free diet. The aim of this study is to determine vitamin B12 intake and it's correlation with vitamin B12 status in celiac patients adhering gluten-free diet.

Methods: The survey was carried out on a 33 celiac patients (19-69 years) adhering gluten-free diet in average 8.9 years, who were not taking vitamin B supplements. Vitamin B12 intake was calculated based on a seven-day food record using food composition tables. Fasting venous blood samples were drawn from all subjects to determine serum Vitamin B12 concentration by radioimmunoassay.

Results: Median intake of vitamin B12 was 3.3 μg/day and in all subjects exceeded 100 % EAR (102-597 % EAR). Although none of the subjects had inadequate vitamin B12 intake suboptimal status of vitamin B12 (<208 pg/ml) was found in 18 % of subjects. Significant positive correlation was found between vitamin B12 intake and status ($p<0.05$).

Conclusions: Long life gluten-free diet is necessary for celiac patients to prevent malabsorption; however it seems that these patients are still at risk for some nutritional deficiency, such as vitamin B12, even after long adherence to a gluten free-diet. Monitoring of Vitamin B12 status should be a routine even in celiac patients on a long life gluten-free diet.

Key words: Celiac disease, vitamin B12

PO2482

NUTRITIONAL AND SAFETY EVALUATION OF LEGUME-BASED COMPLEMENTARY FOODS CONSUMED BY YOUNG CHILDREN IN NORTH WOLLO, ETHIOPIA: A DIFFICULT COMPROMISE

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Background and objectives: In developing countries, a significant share of the complementary foods is legume-based. This study aimed to identify the most frequently consumed legumes; to quantify the corresponding nutrient intakes by young children in North Wollo, northern Ethiopia; and to estimate iron and zinc bioavailability of the legume-based foods.

Methods: A cross-sectional study, using two in-home, 24h-recalls was conducted among 12-23 months-old breastfed children (n=76) in two rural villages in North Wollo. The household processing of legume-based foods was observed and samples were collected for analyses of iron, zinc, calcium, phytate, and polyphenols.

Results: The contribution of legume-based foods to the total intake (estimated need) was 17% (12%) for energy, 28% (77%) for protein, 20% (6%) for calcium, 38% (16%) for vitamin A, 29% (38%) for iron, and 21% (9%) for zinc. Grass peas, broad beans and field peas were the most frequently consumed legumes, in the form of shiro stew -mostly prepared from blends of grass pea and broad beans- and split field pea stew (SFP). Processing comprised: roasting, splitting and cooking with oil and spices. Both stews had similar zinc contents (~3.2 mg/100 g DM), but shiro had higher iron (1.8 x) and calcium (1.5 x) and lower phytate contents than SFP stews. Consequently, much lower phytate:Fe and phytate:Zn molar ratios were observed in shiro compared to SFP stews suggesting a better mineral bioavailability. However, grass pea consumption was associated with a significant intake (25 mg/day) of the neurotoxin β-ODAP (β-Oxalyldiaminopropionic acid).

Conclusions: Mineral contents and estimated iron and zinc bioavailability in shiro were higher than in SFP stews. However, the risk of neurolathyrism associated to grass-pea consumption should be assessed, particularly in young children. Further investigations to reduce toxin levels through optimized processing are of interest.

Key words: Complementary foods, grass pea, β-ODAP, mineral bioavailability

PO2483

IMPACT EVALUATION USING CHILD ANTHROPOMETRY: TECHNICAL ERROR OF MEASUREMENT MATTERS

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Background and objectives: Precision of anthropometric measurements is affected by human error and instrument quality, which influence the magnitude of detectable changes over time and in response to intervention. However, measurement error is rarely reported or even assessed in child growth studies.

Methods: As part of a longitudinal trial to evaluate the impact of zinc supplementation among Burkinabe children 6-30 mo old, 4 teams of 2 anthropometrists were trained to measure height, weight and mid-upper arm circumference (MUAC) according to WHO recommendations. Throughout the 15 mo of study, regular retraining and 13 standardization sessions were completed by recruiting 10-12 children measured twice by each team. The square root of the measurement error variance defined the technical error of measurement(TEM).

Results: TEM for child length across all standardizations (n=132 children) was 0.43 cm; this fluctuated between 0.27 and 0.67 cm throughout the study and permitted detection of a true change of 1.2 cm (range: 0.8-1.9) with 95% confidence (95%DC). The TEM for weight was 45 g (range: 30-105; 95%DC range: 86-297) and for MUAC was 2 mm (range: 1-4; 95%DC range: 2-10). During the intervention, 10,333 16-wk growth intervals and 2,547 48-wk intervals were assessed. TEM accounted for 38%, 19% and 213% of the mean 16-wk changes in length, weight and MUAC, respectively; and 12%, 6% and 69% of the respective mean 48-wk changes.

Conclusions: Regular training, supervision and standardization throughout a 48-wk trial increased the precision of anthropometric measures used for impact evaluation. Despite this, MUAC was inappropriate to measure 16-wk changes. TEM results can be used to select proper outcome indicators, evaluate staff/instrument performance and compare efficiencies of using longer time intervals versus larger sample sizes in planning trials with growth outcomes.

Key words: Anthropometry, child, measurement error

PO2484

NEW DOMESTIC PROCESSING METHODS: EFFECT ON POTATO NUTRITIONAL COMPOSITION

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Background and objectives: Potatoes nutritional and bioactive features are influenced by thermal processing conditions, defining its nutritional composition and health impact. Consumers seek increasingly for faster domestic cooking methods, such as microwave cooking in alternative to current frying or baking. Also, several devices are being commercialized for healthier frying simulation, without a documented characterization of the final processed food nutritional data. Thus, this study aimed to assess and compare the influence of these domestic processing methods on the quality of potatoes processed with olive oil.

Methods: Potatoes were processed by frying, baking, microwave and a low-fat frying device, with equivalent shape and olive oil amounts, except frying. Samples were evaluated for crude fat, fatty acid composition, vitamin E, total carotenoids and total phenols.

Results: Microwave cooked potatoes presented similar fat contents as standard frying, higher than those achieved by baking or with the low-fat frying device tested, but the fatty acid composition was similar. Vitamin E loss was comparatively higher after frying but no significant differences were found for total carotenoids. Potatoes phenolic compounds were partially loss during cooking, being apparently higher after baking.

Conclusions: The distinct nutritional features obtained highlight for the importance of detailing the food compositional tables regarding each processing method, including the "new" domestic methodologies, increasingly used by consumers.

Key words: Potatoes, extra virgin olive oil, domestic cooking, food composition.

PO2485

SODIUM AND POTASSIUM STATUS IN AUSTRIAN CHILDREN: IS THERE A CORRELATION BETWEEN THESE PARAMETERS?

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Background and objectives: The boom in semi-prepared foods has led to high levels of salt consumption. Salt consumption is associated with raised blood preassure, cardiovascular diseases and high NaCl intake is linked to increased risk of stroke. The objectives of the study were the evaluation of sodium (Na) status (salt intake) and potassium (K) status and to investigate if plasma K status correlates with urine Na concentration in austrian children.

Methods: Data were collected within a cross sectional study in 400 children (7–14 years) which was conducted 2010/12 to prepare the Austrian Nutrition Report 2012307 spot urine and blood samples were collected, salt intake was estimated from data based on 24h urine (Na steadystate was assumed). K concentration was evaluated in blood plasma and Na concentration in urine.

Results: Na/g Creatinine: <100 mmol/g: 45.7%, 100–150 mmol/g: 23.6 %, >150 mmol/g: 30.7 %. Calculated salt intake: <6 g/d: 22.8 %, 6–10 g/d: 39.7 %, >10 g/d: 37.4 % Potassium: <4.1 mmol/l: 36.5 %, 4.1–4.7 mmol/l: 52 %, >4.7 mmol/l: 11.5 % A weak negative correlation between plasma K level and Na/g Creatinine status could be shown (r_s=-0.11, $p<0.05$).

Conclusions: It was demonstrated, that slightly higher urine Na status correlates with lower plasma K status. It was shown that 77.1 % of austrian children consumed >6 g/d of salt. More than one third showed K concentrations under reference levels, most of these had marginally lowered K levels (2.5–4.1 mmol/l), no child showed serious K deficiency (<2.5 mmol/l). Even if there is no alarming K deficiency, salt consume in austrian children should be reduced.

Key words: sodium, potassium, salt, children

PO2486

FOOD GROUP INTAKE AMONG HEALTH-CARE PROFESSIONALS, UNIVERSITY OF ANTIOQUIA, COLOMBIA

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Background and objectives: The importance of healthy foods intake in order to maintain a good health and nutrition has long been recognized and health-care professionals are expected to do so. The objective is to characterize the intake of some food groups (dairy, vegetables, fruits, sugary drinks) among health-care professionals at University of Antioquia, according to sociodemographic and anthropometric variables.

Methods: Cross-sectional study derived from Latinmets Colombia 2010-2011. The Food Frequency Questionnaire validated for the PREDIMED study and adjusted to Latinmets Multicenter was applied to 283 volunteers (professors and students) 18-65 years old. Foods were grouped up for the analysis and food intake was converted to times a day. Results were compared to Colombian guidelines intake recommendations. A descriptive analysis and Spearman correlation coefficient with α=0.05 were performed. SPSS-v.18.

Results: Dairy: 25.8% have two servings a day, 63% of them are middle-class, 35,6% are 18-24 years old and 65.7% have a normal BMI. Vegetables: 36.7% fulfill the requirements, 62.2% of them are middle-class and 66.3% have a normal BMI. Fruits: 18.4% fulfill the requirements. 40% have sugary drinks once a day or more. A direct association between fruit and vegetables intake and socioeconomic status and age was found ($p<0.05$), sugary drinks intake was inversely associated to age.

Conclusions: Some sociodemographic variables such as socioeconomic status and age influenced fruit, vegetables, and sugary drinks intake among health-care professionals. Surprisingly, dairy products, fruit, vegetables, and sugary drinks intake among this population was not as expected.

Key words: Food frequency questionnaire, healthcare personnel, food intake.

PO2487

HIGH SODIUM AND LOW POTASSIUM INTAKE AMONG YOUNG URBAN WOMEN IN SRI LANKA: NEED FOR EDUCATIONAL INTERVENTION

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Background and objectives: Current evidence supports the need to reduce Na and simultaneously increase K intakes to reduce hypertension and cardiovascular diseases. No recent data exists on Na/K intake in Sri Lanka. This study determined Na and K intake by 24-hour urinary excretion method, and validated dietary tools; 24-hour dietary recall (24hDR), food frequency questionnaire (FFQ) to assess Na/K intake in women.

Methods: Two-stage cluster sampling enrolled 83 apparently healthy women (18-30 years) from Colombo Municipality, Sri Lanka. Pre-tested questionnaires assessed general information, dietary Na/K intake, knowledge, attitudes and practices (KAP) related to salt and physical activity. Na and K intakes were measured by 24-hour urinary excretion (52 satisfied urine collection criteria) against which, dietary tools were validated. Scores were calculated for knowledge and attitudes.

Results: The mean excretion of Na and K over 24-hours and the K:Na ratio were 3.14 ± 1.12g (8.0 ± 2.8 g salt), 1.3 ± 0.6 g/day and 0.25 ± 0.11 respectively. None of the women met the joint dietary guidelines for Na (<2g/d) and K (>3.51g/d). Knowledge and attitudes were poor, with 58.2% and 54% women below the mean scores for knowledge; 7.0 ± 3.4; and attitudes; 21.2 ± 3.7 respectively. The main source of Na was added salt during cooking (68%) and of K were oily foods (22%; 90% of that from coconuts). Bland Altman analysis found 24hDR for Na intake (mean bias -0.02g; 96% of estimates within the limits of agreement) and FFQ for K intake (mean bias -0.08g; 94% of estimates within the limits of agreement) to be comparable with 24-hour urinary excretion measurements.

Conclusions: Na and K intakes did not meet guidelines and most women had inadequate KAP related to salt necessitating public health oriented educational interventions. 24hDR and the FFQ respectively are accurate in assessing Na and K intake in young women at group level.

Key words: Salt intake, women, dietary tools

PO2488

THE CORRECTION OF UNDERESTIMATION OF ENERGY INTAKE BY USING NEURAL NETWORKS

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Background and objectives: Underestimation of energy intake (EI) in a dietary record is often a problem in nutritional assessment. The aim of the study was to improve the value of EI according to the fundamental principles of energy physiology by using neural networks.

Methods: The study included 450 women aged 20-45 with BMI >18.5 kg/m2. A three-day dietary record was used. For analysis were taken two working days and one day off. The underestimation of the EI was verified by the Goldberg method (Goldberg et al. 1991). The data with sufficient energy estimation (according to body fat and age) was used for training neural networks. We searched for the best models with the use of regression analysis in linear (Multilayer perceptrons – MLP) and non-linear (Radial Basis Function - RBF) mapping. To further statistical analysis the best five models with different number of neurons were selected (from 2 to 14).

Results: Only 14% of the women had a correct estimation of EI. After calculating the energy values by neural networks, the adequate energy to the nutritional status had 69-75% of women. Using neural networks improved the values of EI and increased the relation between EI and nutritional status. EI corrected by RBF models correlated slightly better to output of EI than MLP (mean: 0.32 vs. 0.26). EI changed by MLP compared to RBF and unchanged EI gave higher correlation coefficients for the body fat (0.79 vs. 0.48 vs. 0.17, respectively) and the sum of the thickness of skin-folds (0.91 vs. 0.57 vs. 0,25).

Conclusions: Neural networks allowed to reduce a number of women with underestimation of energy intake and to qualify more women to further analysis.

Key words: Energy, nutritional assessment, neural networks

PO2489

GROWTH AND BODY COMPOSITION FROM BIRTH TO 6 MONTHS IN INFANTS BORN TO PREGNANT MOTHERS AT RISK OF GESTATIONAL DIABETES

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Background and objectives: Fetal overnutrition, due to maternal obesity and/or gestational diabetes mellitus (GDM) may "program" the fetus to obesity and metabolic disturbances in later life. Adiposity in early life, independent of birth weight, might predict future disease risk. We investigated the adiposity and growth trajectory of infants born to mothers at risk of GDM, for the first 6 months of life.

Methods: This study is part of a clinical trial comparing two diets during pregnancy on offspring birth weight and pregnancy outcomes. Body composition was measured at birth and at 3 months of age by air-displacement plethysmography. Infants' anthropometry was assessed every month, for the first 6 months. Children more than 1SD weight-for-length (WHZ) are considered "at risk of overweight" and those more than 2SD WHZ are "overweight" (World Health Organization).

Results: Mean maternal (n=139) age and pre-pregnancy BMI were 34.7 + 0.4 years and 25.2 + 0.4 kg/m2, respectively. 32 infants (15 males) had body composition measured at both time points. Median percentage [range] fat mass (%FM) at birth and at 3 months was 8.7% [2.5 to 17.6] and 26.2% [19.4 to 32.3] in males and 12.0% [3.8 to 18.7] and 23.0% [14.8 to 33.2] in females. At 3 months of age, 9.5% of the children measured (Nn=43) were at risk of overweight and 2.4% were overweight. At 6 months of age, 9.1% (n=33) were at risk of overweight.

Conclusions: %FM significantly increased in male and female, from birth to 3 months of age ($p<0.001$). This study provides gender-specific data on growth trajectory and body composition in infants born to mothers at risk of GDM, who are potentially at risk of developing obesity in later life.

Key words: Growth, body composition, GDM, obesity

PO2490

COMPARISON OF FORMULAS FOR ESTIMATING WEIGHT AND HEIGHT WITH ANTHROPOMETRIC REAL MEASURES OF ADULTS AND ELDERLY

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Background and objectives: Body weight and height measures are essential for the construction of indicators that participate in the establishment of nutritional diagnosis, besides being essential for dietary and pharmacological prescription. The accuracy of anthropometric measurements is important for nutritional diagnosis more reliable. The objectives were to evaluate the feasibility of applying the formulas for estimating weight and height with anthropometric measurements obtained directly from adults and the elderly.

Methods: Check measurements of weight and height obtained directly, and compare with the measures set and measures estimated by various formulas checking the feasibility of their applications. We evaluated 169 individuals aged between 18 and 87 years.

Results: When comparing the results of estimated weight with the actual weight in 9.5% of the value estimated weight was exactly equal to the actual weight. Compared the estimated height with the actual height, was found that 5.3% of the population actual height value is exactly equal to the estimated height. The height values were calculated using formulas very close to the actual values, differing 1 or 2 cm. Calculating the standard deviation, the height estimated by the amplitude arm varied more than the other, indicating that the Chumlea`s equation is more stable. Regarding the measures referred to in both genders, individuals who were between 50 and 59 years overestimated their weight 2.89 kg, while the others tended to underestimate, highlighting the younger, who underestimated their weight with a difference of 1, 57 kg unless mentioned. Among the means of self-reported height and actual results are statistically identical.

Conclusions: Knowing the accuracy of these equations is critical to verify its applicability in clinical practice. Validation studies can contribute to the correct diagnosis and the most appropriate interventions mainly in individuals unable to be measured and more accurate estimates of weight and height were needed.

Key words: Nutritional assessment

PO2491

MONITORING THE NUTRITIONAL COMPOSITION OF PROCESSED FOODS: THE ARGENTINEAN EXPERIENCE

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Background and objectives: In Argentina, cardiovascular disease causes about 100,000 deaths and 250,000 events every year at a cost of more than one billion dollars. In 2011, the Ministry of Health agreed with the food industry to reduce sodium content in processed foods. Also, a modification in the Codex Alimentarius will decrease TFA to less than 5% of total fat in processed foods by 2014. Our objective is to build an Argentinean food composition database as part of the Global Food Monitoring Group led by The George Institute, Australia in order to have an independent source of nutritional information to monitor food composition changes over time.

Methods: This is a descriptive study to capture a full listing of all processed food products for sale in Argentina. This includes in-store collection of nutritional information from the foods labels of products. Processed foods will be categorized into food groups and food categories for the primary analyses which will compare mean levels of nutrients.

Results: Advanced smartphone technology developed by The George Institute to collect the nutritional information has been piloted and used in our country. Baseline data collection was performed from december 2012 to january 2013. We have collected a total of 1179 products from 12 food groups: bread and bakery products, cereals, cheese, meat and meat products, soups, sauces, canned foods, confectionary, fish and fish products, snacks, sauces, and drinks. For each group we collected information for 33 categories and 188 sub-categories.

Conclusions: The use of standardized methodology in conjunction with a collaborative approach to collect and share data will enable low-cost tracking of processed food composition around the world. This project represents a major step forward in transparently monitoring industry and government commitments to improve the food supply in Argentina.

Key words: Food database, nutritional composition, processed foods

PO2492

LOW WEIGHT FOR AGE ACCORDING TO WHO IN PRETERM NEONATES FROM A HIGH RISK MONITORING PROGRAM "KANGAROO" FROM HOSPITAL UNIVERSITARIO DEL VALLE IN CALI, COLOMBIA

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Introduction: Pondostatural recovery is critical for the premature (PreT) neonate development at risk of stunting and > mortality. Objective: To determine the prevalence of low weight for age (LWA) according to WHO, in very low birth weight PreT (VLBW) at the Hospital Universitario del Valle in Cali, Colombia, and potential associations. Methodology: Prevalence study in 63 PreT of VLBW (<1500 g) from a High Risk Monitoring Program "Kangaroo". Sociodemographic, maternal and neonatal variables were considered. According to WHO, it was considered LWA = >-2 SD. Statistical analysis included prevalence estimation of LWA in PreT and corresponding confidence interval 95%, the estimate of other descriptive measures of interest and association analysis by multiple logistic regression.

Results: In these PreT mean age 23.4 ± 6.2 months, mean birth weight 1132.1 ± 223.6 grams, found a prevalence of 20.6% of LWA to following between 11 and 33 months and male predominance. Association analysis showed> LWA opportunity by origin, education, multiple pregnancies, maternal diseases other than diabetes, hypertension and syphilis, and weight for gestational age. Finally associated factors were desired pregnancy, partner and final height.

Conclusion: Only about 20% of PreT of VLBW (<1500 g) followed between 11 and 33 months, showed LWA, being associated with sociodemographic variables as desired pregnancy and partner and neonatal variables as final height.

PO2493

PREVALENCE OF SARCOPENIA IN YOUNG ADULTS FROM TABASCO MEXICO

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Background and objectives: Sarcopenia (S), is defined as the degenerative loss of skeletal muscle mass normally occurring during aging. However, there are reports of young adults with muscle loss, even though that S is a late manifestation; its earliest beginnings are probably to occur with a sedentary lifestyle and poor nutrition. The aim of this study was to investigate the prevalence of S in a sample of young adults of Villahermosa (Tabasco, Mexico).

Methods: The study subjects were assessed by bioelectrical impedance (Tanita BC-418) and were administered the IPAQ questionnaire of physical activity. The Presence of Sarcopenia was assessed by measuring the skeletal muscle mass index (SMMI), which is calculated dividing appendicular skeletal muscle mass (ASMM) by height (m2).

Results: 198 subjects were included (24.75% male and 75.25% female) with a mean age of 30.46 ± 10.95 years. Sarcopenia was found in 33.3% of the sample, from which 3.5% presented severe sarcopenia and 29.8% moderate sarcopenia with greater presence in males (81.6% men and 18.4% women). Of the subjects with Sarcopenia, 60.9% had a minor physical activity.

Conclusions: The presence of Sarcopenia is not restricted to geriatric persons as it also occurs in young adults. Therefore, it's necessary to carry out strategies for prevention and timely diagnosis of these conditions in young people, to improve their quality of life and productivity.

Key words: Sarcopenia, aging, young adults.

PO2494

RELATIONSHIP BETWEEN SALTY TASTE ACUITY AND ZINC NUTRITIONAL SATAUS IN KOREAN YOUNG ADULTS

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Background and objectives: Zinc nutritional status has been associated with variation in taste perception. In this study, we examined whether salty taste perception is related to zinc nutritional status in young adults.

Methods: 207 free-living healthy young adults aged 20-29yrs were recruited, and salty taste acuity was evaluated by determining salty taste threshold using sensory test. Zinc nutritional status was examined by measuring dietary zinc, serum zinc and the expression level of leukocyte zinc transporters gene.

Results: Among various zinc transporters examined, ZnT1, ZnT6, ZnT9, Zip1, Zip6 and Zip7 were abundantly expressed in the leukocytes. In particular, the level of leukocyte Zip7 mRNA had significantly positive correlation with zinc intake in female ($r=0.23$, $p<0.05$). In male, dietary zinc and serum zinc had no association, but the level of leukocyte ZnT9 mRNA had negative association with salty taste threshold (standardized $\beta= 0.048$, $p=0.03$). On the other hand, available zinc intake had negative association with salty taste threshold (standardized $\beta= 0.467$, $p=0.04$) in female. Furthermore, the level of leukocyte Zip7 mRNA had negative association with the salty taste threshold (standardized $\beta= 0.479$, $p<0.01$), and this relationship was maintained after adjustment for available zinc intake (standardized $\beta= 0.414$, $p=0.01$).

Conclusions: Our data shows that zinc nutritional status is associated with salty taste acuity, especially in female. Further, our study results suggest that dietary zinc affect the gene expression of Zip7, which may lead to altered taste perception for salt.

Key words: Salty taste acuity, zinc status

PO2495

ANEMIA AND MICRONUTRIENT STATUS AFTER MICRONUTRIENT POWDER SUPPLEMENTATION AMONG MALNOURISHED AND WELL-NOURISHED CHILDREN IN AN URBAN SLUM OF DHAKA

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Background and objectives: Anemia and micronutrient deficiency is very common among children with undernutrition. This study aimed to assess the effect of daily 2 months micronutrient powder (MNP) supplementation on anemia and micronutrient status of malnourished and well-nourished children in an urban slum of Dhaka, Bangladesh.

Methods: MNP supplementation was provided daily to a total of 392 children aged 6-24 months, including 223 malnourished children (Weight-for-age-z-score, WAZ <-2 sd) and 169 well-nourished children (WAZ >-1 sd). The research staff directly observed the consumption of MNP. Venus blood was collected during enrollment and 5 months after enrollment. Haemoglobin (Hb), serum retinol and serum zinc levels were measured. Anemia was defined as Hb concentration of <11 g/dl and the cut-off values used for vitamin A deficiency and zinc deficiency were serum retinol level of <20 μg/dl and serum zinc concentration of <65 μg/dl.

Results: Anemia prevalence had significantly reduced from 65.1% to 51.7% (p=0.01) in malnourished children after MNP supplementation but no significant change was observed in well-nourished children. Low serum retinol level (<20 μg/dl) was observed 38.8% and 35.5% in malnourished and well-nourished children, respectively, at baseline which then reduced to 36.7% and 30.9% at end-line, respectively. However, serum zinc deficiency (<65 μg/dl) had deteriorated from 15.9% and 14.5% to 31.6% and 21.1% during trial period among mal-nourished and well-nourished children, respectively.

Conclusions: In this study MNP supplementation was more effective in malnourished children in reducing anemia. Vitamin A status had also improved. However, zinc deficiency further deteriorated. Further evaluation is needed for the well-nourished children as because 2 months MNP supplementation may not be optimum for improving their anemia status.

Key words: MNP, malnutrition, children, Bangladesh

PO2496

DEVELOPMENT OF DATA COLLECTION TOOLS TO BE USED DURING FOOD INTAKE STUDIES IN ILLITERATE, LOW-INCOME COMMUNITIES

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Background and objectives: Nationally representative food intake data is needed to determine the effect of the consumption of animal products on human dietary exposure (in terms of both over- and undernutrition), as well as to extrapolate the burden which the industry has on the environment. However, to provide correct data towards the development of policies and programmes specifically aimed at malnutrition in low and very low socio-economic households, intake data specific to each socio-economic group is needed. Due to the complex demographics of the population, highly divergent economic circumstances and low level of literacy amongst lower socioeconomic groups, the collection of certain data amongst these groups have proved to be a challenging task for researchers due to a lack of appropriate tools.

Methods: To enable the collection of correct data in low and very low socio-economic groups, specific pictorial tools were developed. To translate product consumed to nutrients ingested, data on actual edible portion of each food portion is required. Physical dissection of the specific foods included in the pictorial tool was dissected into meat and non-meat components. The nutritional contribution of low-cost or wild animal foods, often consumed as an alternative to high-end animal products by these low socio-economic households, was determined.

Results: A pictorial tool was developed based on research conducted on the current eating habits of low socio-economic consumers in South Africa, including the types of animal foods often consumed (including indigenous species such as insects and rodents), preparation techniques employed, and usual portion sizes.

Conclusions: This tool enables researchers to visually question illiterate consumers on what type and quantity of animal foods they consume.

Key words: Animal protein consumption, portion sizes, pictorial research tool

PO2497

A NUTRIENT PERSPECTIVE ON CLIMATE CHANGE AND SUSTAINABLE RED MEAT PRODUCTION AND CONSUMPTION

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Background and objectives: In order to determine the impact of livestock production and the effect of the consumption of animal products on human dietary exposure (in terms of both nutrient and anti-nutrients), as well as to extrapolate the burden which the industry has on the environment (sustainability and green economy), correct intake data is required for the complete and diverse South African population. By uncovering relevant information on the consumption and perceptions of animal-derived protein foods, the relevant industries can be equipped with information to re-align production, processing, policy development as well as consumer education. Towards this aim a study was formulated to investigate the perceptions and utilization of animal product by different socio-economic groups in South Africa.

Methods: Adapted questionnaire-based personal interviews were performed in three different socio-economic groups from 3 of the 9 provinces of South Africa.

Results and Conclusions: Although animal products are consumed by all (from high to low socio-economic groups), the nutritional contribution from certain low-cost animal products such as meat-bones, chicken feet and insects are questionable. Results will be presented and critically discussed.

Key words: Climate change, red meat consumption, sustainability

PO2498

RELATIONS BETWEEN NUTRITION FOR GAME PERFORMANCE IMPROVEMENT AND AROMA FOR FATIGUE REDUCTION DURING SPORTS

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Background and objectives: Proper nutritional intake in each game is necessary for good physical performance. It has been reported that fragrance elements of aroma are effective in mental care before games and fatigue recovery after games. We examined the relations between the effect on fatigue reduction by aroma and nutritional intake during exercise aimed to improve game performance.

Methods: A total of 17 male collegiate students from the athletic club participated. Students chose voluntarily their favorite aroma. The bike-riding exercise test was carried out in two ways by smelling a preferable aroma (exercise with aroma) and by not smelling aroma (exercise without aroma). The oxygen intake was measured using a gas mask. The examinees were asked to point the finger at a certain rating of perceived exertion (RPE) during the test. After the experiments, the mood states questionnaire with/without aroma was administered. The food intake frequency method was used by the self-administered questionnaire before the experiments. Respective data with/without aroma was analyzed statistically.

Results: 'Exercise with aroma' test showed significantly low in terms of RPE. Also, in the questionnaire after the experiments, 'Feeling tired' item was significantly different, and 'Fatigue' item was low level. Although only two students reported suitable amount of nutritional intake, seven students showed that the animal protein ratios were high. As for the energy per weight, only 'exercise without aroma' group showed significantly higher ratios in 'bad feeling', 'lack of concentration' and 'fatigue' among energy deficiency group than among the energy sufficiency group.

Conclusions: This study indicated that the use of aroma during exercise eased the fatigue. Glycogen exhaustion causes the decline of athletic ability. Therefore, further research is needed to verify that the combination of proper nutritional intake and aroma usage leads to game performance improvement.

Key words: Aroma, nutrition intake, fatigue reduction, glycogen exhaustion

PO2499

ISSUES IN CHARACTERIZING RESTING ENERGY EXPENDITURE IN OBESITY AND AFTER WEIGHT LOSS

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Background and objectives: Normalization of resting energy expenditure (REE) for body composition using the 2-compartment model (fat mass, FM; fat-free mass, FFM) may lead to erroneous conclusions when comparing REE in people with a wide range of adiposity as well as before and after substantial weight loss.

Methods: Different methods of REE normalization were compared: (i) normalization for FFM and FM (ii) by the inclusion of %FM as a measure of adiposity and (iii) based on organ and tissue masses. Results were compared between healthy individuals with different degrees of adiposity as well as within subject before and after weight loss.

Results: Normalizing REE from an "REE vs. FFM and FM equation" that (i) was derived in obese participants and applied to lean people or (ii) was derived before weight loss and applied after weight loss leads to the erroneous conclusion of a lower metabolic rate (i) in lean persons and (ii) after weight loss. This is revealed by normalization of REE for organ and tissue masses that was not significantly different between lean and obese or between baseline and after weight loss. We found evidence for an increasing specific metabolic rate of FFM with increasing %FM that was explained by a higher contribution of liver, kidney and heart mass to FFM in obesity. Using "REE vs. FFM and FM equations" specific for different levels of adiposity (%FM) eliminated differences in REE before and after weight loss in women.

Conclusions: Normalization of REE based on FFM and FM may lead to spurious conclusions about metabolic rate in obesity and the phenomenon of weight loss-associated adaptive thermogenesis. Using %FM-specific REE prediction from FFM and FM in kg may improve the normalization of REE when subjects with wide differences in %FM are investigated.

Key words: Body composition, resting energy expenditure, obesity, weight loss

PO2500

BODY COMPOSITION CHANGES AFTER 12 MONTHS OF MULTIAPPROACH INTERVENTION IN SPANISH OVERWEIGHT AND OBESE ADOLESCENTS: THE EVASYON STUDY

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Background and objectives: Multiapproach interventions appear to achieve the most beneficial effects in the treatment of obese adolescents. They include management protocols involving behaviour modifications, family support and lifestyle, requiring the input of multidisciplinary professional teams. Aim of this study was to assess body composition changes after twelve months of a multiapproach therapy including diet, exercise and behavioural modification in obese adolescents. Materials and

Methods: One hundred and one Spanish male and female adolescents aged 13 to 16 years with overweight and obesity, were included in a multicenter intervention study. Anthropometry was assessed by weight, height, BMI and skinfolds. Friedman test was used to compare anthropometric measure-

ments during follow up, and post hoc comparisons with Wilcoxon signed-rank test was conducted with Bonferroni correction applied.

Results: In males, we observed, after one year, significant changes in weight (-4,1 kg), height (+2.1 cm), BMI (-2.9 kg/m2), sum of 6 skinfolds (-25.4 mm), fat free mass (+2.9 %), waist circumference (-11.1 cm) and waist to height ratio (-0.07). In females, there were significant changes fat mass index (-2.2 kg/m2), fat mass percentage (+1.1%), sum of 4 skinfolds (-14.8 mm), hip circunference (-1.9 cm) and waist to hip ratio (-0.06). Changes in weight, height, BMI, sum of 6 skinfolds, fat free mass, waist circunference and waist to height ratio were higher in males than females.

Conclusions: Body composition changes after a multidisciplinary intervention were observed in both genders, but changes were higher in males than in females. Acknowledgements: Funded by Spanish Ministry of Health and Consumption (PI 051080, PI 051579), and GENUD Research Group is funded by European Regional Development (MICINN-FEDER). We gratefully acknowledge all adolescent and their families who participated in the study.

Key words: Body composition, intervention study, fat mass, fat free mass

PO2501

ELECTRIC BIOIMPEDANCE VERSUS FLUID BALANCE METHOD FOR HYDRATION STATUS EVALUATION IN HOSPITALIZED ELDERLY PATIENTS.

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Background and objectives: Dehydration is a common condition and frequent cause of hospitalization in older people, being associated with higher mortality and morbidity. The evaluation of those different methods to evaluate the hydration status of elderly people may be important. The study aimed to properly assess hydration status among hospitalized elderly patients by using two different methods electric bioimpedance (BIA) and Fluid Balance (FB).

Methods: Fifty patients aged ≥ 65 years of all departments in a tertiary hospital were included according to admission time. Patients on critical care and renal insufficiency were excluded. 48 to 72 hours after admission, hydration status was measured by BIA according to ¡°Standardized Biovectornormogram¡°, allowing patient's classification in: normally hydrated, dehydrated and hyper-hydrated and FB was estimated by counting of all liquids lost and taken in from the body.

Results: The mean age of patients (48% men) was 76.5¡À6.5 years. According to BIA 18% (9/50) of patients presented dehydration, 58% (29/50) normal hydration status and 24% (12/50) hyper-hydration. The percentage of patients with negative FB was significantly higher in dehydration group (78%, 7/9) compared with normal hydration (30%, 9/29) and hyper-hydration (20%, 2/12). An association between dehydration status measured by BIA and negative FB has been observed ($p<0.01$). However, a high percentage of patients without dehydration by BIA presented a negative FB (26.8%, 11/41).

Conclusions: A high percentage of elderly patients had an abnormal hydration status. Despite of the association between BIA and FB method, only negative FB could be considered in clinical practice in order to detect and prevent future dehydration in these patients.

Key words: Dehydration, elderly, bioimpedance, fluid balance

PO2502

PREVALENCE OF MICRONUTRIENT DEFICIENCIES AND ANTHROPOMETRIC STATUS OF WOMEN AND PRESCHOOL CHILDREN IN RURAL BURKINA FASO

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Background and objectives: In Burkina Faso, the nutritional situation is characterized by high prevalence of malnutrition and micronutrient deficiencies among women and children, but only scarce data are available. This study aimed at determining the prevalence of anemia, low serum concentration of retinol, iron, ferritin and zinc among mothers and preschool children in two rural provinces of the country.

Methods: A cross-sectional survey was carried out in December 2010 in the two provinces. A representative sample of 240 mothers and their 36-47 month-old children were randomly selected. Anthropometric measurements were performed using WHO procedures. A sub-sample of 90 mothers and 90 children had venous blood sampling. Haemoglobin (Hb) was measured using a Hemocue201 system. After centrifuged, sera were frozen at -20°C until analyses were performed. Ferritin, serum transferrin, CRP and AGP were measured by ELISA

technique. Serum iron content was measured by colorimetric method, serum zinc by atomic absorption and retinol by HPLC system.

Results: Underweight concerned 14.1% [10.9-17.3] of women and 31.3% [25.6-37.0] of children were stunted. The prevalence of anemia (Hb<110 g/l) was 35.7% [28.6-42.8] in women and 72.4% [65.6-79.2] in children, respectively. Low serum iron concentration (<8 μmol/l) concerned 20.1% [14.2-26.1] of women and 53.9% [46.2-61.6] of children. Low body iron stores was detected in 7.6% [3.5-11.6] and 5.1% [1.6-8.6] of women and children, respectively. Prevalence of low ferritin adjusted for inflammation was 3.2% [0.4-6.1] in women and 2.0% [0.0-4.2] in children. Zinc deficiency affected 38.6% [31.3-46.0] of women and 64.3% [57.0-71.7] of children. The prevalence of vitamin A deficiency was 13.3% [8.4-18.3] among women and 33.9% [26.6-41.1] among children.

Conclusions: Micronutrient deficiencies were at a high level in this area, and constantly higher among children than among women. Preventive measures such as micronutrients supplementation or food fortification are needed.

Key words: Malnutrition, anemia, zinc, vitamin A, Africa

PO2503

VITAMIN A, IRON AND ZINC CONTENT OF COMMERCIAL MAIZE MEAL AND BREAD SAMPLED AT HOUSEHOLD LEVEL IN SOUTH AFRICA

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Background and objectives: In 2003, a national mandatory food fortification programme was introduced in South Africa. Bread wheat flour and maize meal are fortified with various micronutrients, including vitamin A, iron and zinc. The aim of this study was to determine the vitamin A, iron and zinc content of maize meal and bread sampled at household level in two urban and two rural sites.

Methods: Maize meal (250 g) and/or supermarket/local shop bread (three inner slices) were collected from 50 randomly selected households from each study site. Maize meal samples were reduced to 10 composite samples per site, each consisting of five randomly selected samples. Bread samples were composited similarly; bread slices were kept intact; one composite sample consisted of 15 slices; over all, eight composite samples were obtained for both brown and white bread. Maize meal and bread samples were analysed by the Southern African Grain Laboratory for vitamin A, iron, zinc and moisture content.

Results: Based on 12.5% moisture, 100 g uncooked maize meal contained 105.7 to 183.3 μg RAE vitamin A, 3.0 to 4.2 mg iron and 1.8 to 2.1 mg zinc across the four study sites; representing 56-97% of the minimum fortification level as per legislation for vitamin A, 76-108% for iron and 89-100% for zinc. Mean content of brown bread, per 100 g and based on 39% moisture, represented 57%, 197% and 167% of the minimum fortification level for vitamin A, iron and zinc, respectively; white bread represented 89%, 222% and 207% for vitamin A, iron and zinc, respectively.

Conclusions: Vitamin A, iron and zinc content in uncooked fortified maize meal sampled at household level was lower than the legislated requirement; bread vitamin A content was lower, and iron and zinc content higher than the legislated requirement.

Key words: Maize meal, bread, micronutrient content

PO2504

NUTRITIONAL INTEREST OF NA, K, CA, MG, FE, MN, CU, ZN, CR AND MO LEVELS IN DARK BEERS

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Background and objectives: Dark beer is a type of German lager with a strong flavour and dark in colour. Spain was the fourth largest beer producer in the European Union in 2010. The objectives of this study were to determine the concentrations of Na, K, Ca, Mg, Fe, Mn, Cu, Zn, Cr and Mo in dark beers and also to evaluate the contribution of moderate consumption of dark beers to the recommended daily intakes (RDI) set for the Spanish adult population.

Methods: 28 samples of dark beers commercialized in Tenerife were analyzed. Samples were degassed with ultrasounds (5 min) and placed in porous porcelain crucibles (25 ml). Subsequently, samples were passed through a water bath (100Â°C/30 min), heater (80Â°C/24 h) and muffle furnace (Â±450Â°C/48 h). The obtained ashes were diluted with 1.5% HNO3 to a volume of 50 ml. Metal determination was performed by atomic emission spectroscopy with inductively coupled plasma (ICP-AES).

Results: The metal mean values were: 67.92 mg/l of Na, 342.25 mg/l of K, 54.81 mg/l of Ca, 86.51 mg/l of Mg; 0.187 mg/l of Fe, 0.157 mg/l of Mn, 0.229 mg/l of Cu, 0.093 mg/l of Zn, 0.011 mg/l of Cr and 0.011 mg/l of Mo. The estimation of the contribution of moderate dark beer consumption (330 ml for women and 660 ml for men) to the RDIs revealed the following data: Na (1.49 - 2.99%), K (3.64 - 7.29%), Ca (2.01 - 4.02%), Mg (9.52 - 16.31%), Fe (0.34 - 1.37%), Mn (2.88 - 4.51%), Cu

(6.87 - 13.74%), Zn (0.44 - 0.65%), Cr (14.52 - 20.74%) and Mo (8.07 - 16.13%) for women and men, respectively.

Conclusions: Moderate consumption of black beer contributes significantly to the Cr, Mg, Mo and Cu daily dietary recommendations.

Key words: Dark beer, metals, RDI, ICP-AES

PO2505

ESSENTIAL METALS AND TRACE ELEMENTS IN YOGURTS. NUTRITIONAL EVALUATION.

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Background and objectives: Milk and dairy products are a group of foods widely consumed by the population, contributing to the intake of essential elements, mainly Ca. The objectives of this study were to determine the concentrations of Na, K, Ca, Mg, Cu, Fe, Mn, Zn, Cr and Mo in two types of yogurt (plain and flavoured) marketed in Tenerife (Spain) and also to evaluate the contribution of the intake of a yogurt/day (125 g) to the established RDI for adults.

Methods: 36 samples of two types of yogurt (plain and flavoured) were purchased in supermarkets in Tenerife and analyzed. 20 g were weighed in a porous porcelain crucible, dried in a heater (70Â°C/72 h) then in a muffle oven (450Â°C/48 h). The obtained ashes were dissolved in HNO3 at 1.5% to a volume of 25 ml. Metals were analyzed by the ICP-AES technique (inductively coupled plasma atomic emission spectroscopy).

Results: The mean concentrations in the yogurts were: 454.5 mg Na/kg, 1,101 mg K/kg, 1,018 mg Ca/kg, 115.1 mg Mg/kg, 0.268 mg Cu/kg, 0.327 mg Fe/kg , 0.023 mg Mn/kg, 2.785 mg Zn/kg, 0.021 mg Cr/kg and 0.035 mg Mo/kg. The consumption of 125 g of yogurt/day contributes to 14.14% of the RDA of Ca in women, 10.48% of the RDA of Cr in adult males, 9.71% of the RDA of Mo in adults and 4.97% of the Zn RDA for adult males, among others.

Conclusions: Daily consumption of yogurt contributes to the dietary intakes of essential metals and trace elements.

Key words: Inductively coupled plasma spectrometry, intake, metals, yogurt

PO2506

COMPARISON OF EQUATIONS TO PREDICT BODY WEIGHT AMONG ADULTS IN A TERTIARY HOSPITAL

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Background and objectives: Body weight is very important to monitoring the nutritional status during hospitalization but cannot always be detected by conventional methods; therefore, researchers have developed equations to estimate it. The aim of this study was to evaluate the concordance of equations for estimating weight.

Methods: Cross-sectional study conducted among 200 inpatients, aged 18 to 59 years, both sexes. Patients were stratified in two groups according to gender and there were evaluated five equations to estimate body weight: two by Chumlea and three by Rabito. The concordance between all equations and the weight detected by scales was performed using Bland and Altman and intraclass correlation coefficient (ICC). Student's t test was used for comparisons.

Results: Mean age among men was 46.8 years and among women 43.1 years ($p<0.01$). Chumlea equations for weight prediction among Caucasians (which uses arm circumference and knee height) showed a concordance interval -23.5 to 1.4 kg (ICC= 0,75) among men and concordance interval -17.2 to 16.6 kg (ICC= 0,82) among women. Equations developed for black people showed a concordance interval -25.6 to 12.2 kg (ICC= 0,71) among men and a concordance interval -18.3 to 16.7 kg (ICC= 0,83) among women. Rabito's equations (which uses arm, calf and abdominal circumferences plus sub scapular skin fold) showed ICC= 0,91 (concordance interval -12.9 to 8.7 kg); ICC= 0,88 (concordance interval -10.1 to 16,8 kg). Finely, the Rabito equation which uses three circumferences and gender showed ICC= 0,91 (concordance interval -12.4 to 10.1 kg; ICC= 0,90 (concordance interval -13.7 to 12.5 kg), for men and women, respectively.

Conclusions: Although the equations developed by Rabito showed a better agreement when compared with the weight detected by scales among adults inpatients, the difficulty to obtain anthropometric measurements should be considered by professionals to choose an equation to be applied.

Key words: Weight, equations, adults

PO2507

MICRONUTRIENTS ADEQUACY AND FOOD PATTERN OF INDONESIAN YOUNG CHILDREN

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Background and objectives: The basic health survey called Riskesdas 2010 is the first nation-wide survey that collected individual food intake data in Indonesia, but no one has analyzed the data for micronutrient adequacy and food pattern of young children – a vulnerable group. Besides, micronutrients intake information from large nation-wide survey in Asian developing countries is very limited. This study analyzes micronutrients adequacy and food pattern of young children aged 1-3 yrs (YC) of Indonesia.

Methods: The electronic files of the Riskesdas 2010 data were used and analyzed. The cleaned data consisted of 1868 YC covering 33 provinces. The food data were collected using a 24-hour recall method. Calcium, phosphorus, iron, zinc, and vitamin A, B1, B9, and C intake were analyzed by using food composition tables. The food patterns were analyzed based on quantity and participation rate of 10 food groups consumed.

Results: Among the micronutrients analyzed, the mean adequacy level less than 70% requirement was zinc, iron, calcium and folic acid. This occurred until the third economic quintile. The higher the father education and family economic levels the higher the micronutrient adequacy of YC. Each of micronutrients adequacy levels among stunted and among rural YC was lower compared to normal and urban YC. The mean intake of cereals, tubers, bean, meat, eggs, fish, vegetables, fruit, milks, street foods were 278.2, 6.1, 18.5, 8.4, 21.9, 28.7, 48.9, 11.0, 37.9 and 37.1 g, respectively. All the food groups except cereals had a low participation rate. The stunted YC consumed fewer amounts of cereals, fruit, bean, milk and animal foods.

Conclusions: Most Indonesian YC especially from middle-low socioeconomic level had low intake of zinc, iron, calcium and folic acid, and more likely suffering from stunting. There is a need to increase the intake of foods rich in these micronutrients.

Key words: Micronutrient, food pattern, stunting, children

PO2508

CORRELATION BETWEEN 24-HOUR AND SPOT/VOID URINE SAMPLES FOR THE PURPOSE OF POPULATION SALT INTAKE ASSESSMENT

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Background and objectives: Spot urine samples have been investigated for population salt intake assessment with the sample standardised to 24 hours by measuring spot urinary creatinine, however diurnal variation affects results. The objective of this study was to assess spot and void urine samples collected after the evening meal and before bedtime, as these collection times have not previously been assessed for estimating population salt intake.

Methods: 605 adults living in Australia were enrolled, with a mean age of 56.5 ± 12.1 (SD) years (range 21 to 78) and 54% women. Participants provided a 24-hour urine sample and as part of the 24-hour sample, either: 1) a urine sample consisting of one complete void of the bladder, collected in the evening following a main meal (EVENINGMEAL), or 2) a spot sample collected immediately before bedtime (BEDTIME).

Results: Mean sodium excretion was 137 ± 57 mmol/day. Pearson's correlation, comparing the measured 24-hour urinary sodium versus the sodium-to-creatinine ratio of the spot/void sample was: r=0.48 (p<0.0001) (EVENINGMEAL), and r=0.51 (p<0.0001) (BEDTIME). This compares with the results of Mann and Gerber (2010) who found correlations of: r=-0.01 (p=0.97) (random collection time), r=0.14 (p=0.42) (morning collection), and r=0.67 (p<0.001) (evening collection prior to meal).

Conclusions: Significant correlations were found between measured 24-hour urinary sodium and spot/void sodium-to-creatinine ratio for urine samples collected after the evening meal and before bedtime. Further analysis is required to determine if these correlations at an individual level translate to estimation of population salt intake using predictive equations.

Key words: Sodium, salt, spot, assessment, population
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PO2509

TIME SINCE VITAMIN A SUPPLEMENTATION (VAS), POLIO VACCINE DISTRIBUTION AND OTHER FACTORS AFFECT THE VALIDITY OF VAS POST-EVENT COVERAGE ASSESSMENT

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Background and objectives: Information on coverage of high-dose VAS programs relies on administrative tally sheets or post-event coverage surveys, but the validity of these reports has rarely been assessed. In a longitudinal study, we investigated factors related to false positive VAS survey responses.

Methods: 6,365 parents of children aged 6-30 mo participated in a longitudinal study, during which two semi-annual VAS campaigns occurred. Every 4 wks, caregivers were shown a photo of VAS capsules and asked if their child received VAS in the previous 4 wks. After 6 mo, a photo of the locally administered oral polio vaccine (OPV) was also shown. A positive response for VAS was considered valid during the 4 wks following each VAS campaign. Positive responses during the remaining periods were considered false positives as VAS was not available elsewhere.

Results: During 38,958 interviews that took place >4 wks after a VAS campaign, 13.6% reported that their child received VAS (false positive). The odds of false positives increased with shorter time since the last VAS campaign (OR=8.00 if interview was 4-6 wks from previous VAS campaign compared to >3 mo; p<0.0001); when OPV were distributed in the reporting period (OR=3.46; p<0.0001); when no photo of OPV was shown (OR=1.28; p<0.0001) and when the interview took place earlier in the longitudinal study (p<0.0001). Other factors associated with false positives included the relationship of respondent to the child, the age of the child, place of residence, ethnicity, mother's occupation (all p<0.0001) and mother's marital status (p<0.0042).

Conclusions: Post-event VAS coverage surveys should be scheduled as soon as possible following VAS campaigns, and pictures should be shown of both VAS and any oral vaccines distributed during the same period.

Key words: Burkina Faso, vitamin A supplementation, survey

PO2510

VALIDITY AND RELIABILITY OF BIOELECTRICAL IMPEDANCE ANALYSIS TO ESTIMATE BODY FAT COMPARED TO AIR DISPLACEMENT PLETHYSMOGRAPHY AND DUAL-ENERGY X-RAY ABSORPTIOMETRY

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Background and objectives: Body fat percentage (BF%) is most accurately predicted using air displacement plethysmography. Dual X-ray Absorptiometry (DXA) and Bio-Impedance Analyser (BIA) also predict BF%, but have not been validated against air displacement plethysmography in a large sample of healthy adults. The objective was to assess the validity of BIA and DXA for assessing BF% against air displacement plethysmography, and to test the repeatability of each method.

Methods: BF% of 164 adults (18-70 y) was assessed twice within 5 days using air displacement plethysmography, DXA and BIA. Validity was determined by comparing methods (t-test), Pearson's correlations, linear regression and method of triads. Repeatability was assessed by Pearson's correlations and comparing first and second measurements.

Results: Overall, there was a good relationship between BIA and air displacement plethysmography (r2=0.88). Mean BF% difference for air displacement plethysmography – BIA was 2.04%[95% CI 1.68-2.40]. Half of BIA measurements ranged from 4.6 below to 0.4 above air displacement plethysmography (median 2.00; 25th, 75th percentile: -0.4, 4.6). Mean BF% difference for air displacement plethysmography – DXA was 0.39%[95% CI 0.02-0.77]. DXA BF% from 20% - 40% had a good relationship with air displacement plethysmography (r2=0.78, intercept=-0.02, slope=1.03), but BF% <20 and >40 were lower and higher than air displacement plethysmography, respectively. Method of triads showed strong correlations between both BIA and DXA and the 'truth' (validity coefficient =0.967 and 0.974, respectively). For repeatability, within-subject correlations were strong for all methods (air displacement plethysmography 0.9898; DXA 0.9951; BIA 0.9953). Analysis of differences between visits show most were <1%, but up to 5.6% (air displacement plethysmography).

Conclusions: On average, air displacement plethysmography BF% can be predicted from BIA readings by adding 2%. DXA compares well to air displacement plethysmography from 20-40% body fat, but underestimates BF% <20 and overestimates >40.

Key words: Body fat, air displacement plethysmography

PO2511

NUTRITIONAL STATUS AND DIETARY INTAKE IN CHILDREN WITH SICKLE CELL DISEASE

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Background and objectives: Children with sickle cell disease (SCD) homozygous type (SS) usually present poor nutritional status due decreased appetite, inadequate dietary intake and increased energy expenditure. The goal was to evaluate the associations between nutritional status and dietary intake.

Methods: Children (2-5 y) with SCD-SS from Rio de Janeiro participated in the study. Age and gender-specific Z-scores for body mass index (BMI), weight, height and weight/height and adequacy for mid-upper arm circumference (MUAC), triceps skinfold and mid arm muscle circumference (MAMC) were determined. Dietary intake was evaluated by two 24-hour recall to assess estimated energy intake (EEI), carbohydrate, protein, total fat, calcium, phosphorus and magnesium.

Results: 40 children were evaluated (65% male), 15% were at risk of overweight and 2.5% presented overweight. Height-for-age and weight-for-age Z-scores were low in 12.5% and 2.5%, respectively. Mean EEI was 1399 ± 414 kcal/d provided from carbohydrate (58%), protein (15%) and total fat (27%). Mean total fat intake was low in 72% children under 3 y, according to DRI. EEI was associated with adequacies of MUAC ($r=0.41$, $p<0.008$) and MAMC ($r=0.38$, $p<0.017$), weight-for-age ($r=0.40$, $p<0.011$) and height-for-age ($r=0.32$, $p<0.046$) Z-scores. Carbohydrate, protein and total fat intake were correlated with adequacies of MUAC ($r>0.34$, $p<0.032$) and MAMC ($r>0.33$, $p<0.038$). Carbohydrate intake was also associated with weight-for-age ($r=0.41$, $p<0.009$) and height-for-age ($r=0.37$, $p<0.020$) Z-scores. Protein intake was associated with weight-for-age ($r=0.40$, $p<0.011$) and weight-for-height ($r=0.41$, $p<0.024$) Z-scores. Total fat intake was associated with triceps skinfold`s adequacy ($r=0.37$, $p<0.019$). Calcium intake was below DRI in 78% of the children. Calcium and phosphorus intake were correlated with adequacies of MUAC ($r>0.44$, $p<0.005$) and MAMC ($r>0.54$, $p<0.000$), BMI-for-age ($r>0.49$, $p<0.001$), weight-for-age ($r>0.60$, $p<0.000$), height-for-age ($r>0.42$, $p<0.005$) and weight-for-height ($r>0.51$, $p<0.004$) Z-scores.

Conclusions: Adequate dietary intake was associated with better nutritional status. Nutritional following is necessary to improve nutritional status in SDC-SS children.

Key words: Sickle-cell-disease, dietary intake, nutritional status

PO2512

OSMOLALITY OF 50 BEVERAGES THAT ARE COMMERCIALLY AVAILABLE IN SAN FRANCISCO

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Background and objectives: Beverage osmolality (solute concentration) is a key determinant of a beverage's absorption and impact on cell hydration and metabolism. Food composition tables, diet analysis software, and beverage labels do not report beverage osmolality.

Methods: This study described the osmolality of 50 beverages available for purchase at supermarkets in San Francisco, USA. Beverage osmolality was measured by freezing-point depression osmometer at room temperature. Beverage pH was measured by pH meter. Beverages with an osmolality above the normal concentration of blood and threshold for cell shrinkage-stimulated anti-diuretic hormone release (ADH) (280 mmol/kg) were distinguished from those below this threshold.

Results: Beverage osmolality ranged from 0 to 1130 mmol/kg. The majority (70%) of beverages sampled had an osmolality above 280 mmol/kg.

Conclusions: The majority of beverages sampled had an osmolality over the threshold for ADH release. Further work is needed to pursue the implications of beverage osmolality for consumers.

Key words: Beverage, osmolality, hydration, food composition tables

PO2513

HOSPITAL MALNUTRITION, PREVALENCE AND ECONOMIC IMPACT

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Background and objectives: Among the diseases caused by a lack of nutritional content, due to the impact and the effects it produces, stands out the malnutrition. In the last few years, malnutrition acquired a special significance within the hospital environment and it is known now as an entity called ' Hospital

malnutrition '. Our objectives were (i) to determine the prevalence and incidence of malnutrition in our area, quantifying the costs they impose; (ii) to analyze the connection between hospital malnutrition, average stay (EM) and premature reentry.

Methods: We carried a cohort study in order to assess the nutritional status of patients admitted to a hospital in third level. To all the patients, selected at random, a nutritional assessment protocol was applied in order to determine the weight, height, arm circumference, skinfold thickness, and serum concentrations of albumin, transferrin and prealbumin. The quantification of the costs included drugs, diet (basal, therapeutic and artificial), hospital stay and costs according to diagnosis-related groups (DRGs).

Results: We included 817 subjects (average age 50.9 ± 18.5 years), males accounted for 62.9%, and women for 37.1%. 45.9% of subjects (n=375) suffered from malnutrition. Seven days later, the prevalence of malnutrition was 58.7%; those patients that were admitted already malnourished suffered a deterioration of the 59,9% on their nutritional status in comparison to their baseline. Males were the most affected. There was an increase in costs related to malnutrition in association with the length of hospital stay (68.04% more) and use of medications. The average stay (EM) and premature readmission rate were higher in subjects admitted in the hospital with malnutrition.

Conclusions: The high prevalence and the impact of malnutrition require the proposition of mechanisms that may allow us to reveal their true reach and to develop the necessary programs to its solution.

Key words: Undernutrition, prevalence, costs

PO2514

DIETARY DIVERSITY IS A GOOD INDICATOR OF MICRONUTRIENT INTAKE AMONG KENYAN WOMEN IRRESPECTIVE OF SEASON

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Background and objectives: Food seasonality has been shown to affect dietary diversity and nutrient adequacy, however, the direction of this effect and impact on the association between diet variety and adequacy is not known. To ensure that dietary diversity can be used as indicator of micronutrient adequacy irrespective of season, we examined the seasonal variations in dietary diversity and micronutrient adequacy, and their association among Kenyan women of reproductive age.

Methods: We used repeated non-consecutive 24 hr-recalls during post-harvest (period 1, Oct, 2007, n=75) pre-harvest (period 2, April, 2008, n=205) and post-harvest (period 3, Oct, 2008, n=187) seasons, constructing dietary diversity scores (DDS) based on 13 food groups with minimum intake of 15 g and calculated mean probability of adequacy (MPA) for 11 micronutrients. Correlations and regression analysis tested the association between DDS and MPA and effects of season on this association. Sensitivity/specificity analysis detected low and high nutrient adequacy.

Results: DDS ranged from 4.3 ± 1.2 in period 1 to 3.1 ± 1.2 in period 3, indicating a low diverse diet mainly based on starchy staples with little or no organ meat and fish. MPA ranged from 0.50 ± 0.06 in period 1 to 0.24 ± 0.05, period 3. DDS and MPA were significantly associated in all periods, highest association in period 3 (r=0.54). A cut-off of DDS of 3 maximized sensitivity/specificity in all periods, detecting low adequacy (MPA<40%).

Conclusions: DDS and MPA are sensitive to seasonal and annual fluctuations, but seasonality does not affect their association. DDS can be used as simple indicator for micronutrient adequacy irrespective of season.

Key words: Dietary diversity score, nutrient adequacy, women, season

PO2515

VITAMIN K2 ALTERS BONE METABOLISM MARKERS IN HIGH FAT DIET-INDUCED OBESE MICE

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Background and objectives: There are several reports that obesity is a risk factor for osteoporosis. Vitamin K is essential for α-carboxylation of certain glutamic acid residues of vitamin K-dependent proteins. More recently, it became apparent that vitamin K can increase bone mineralization and decrease bone resorption in in vitro studies. The aim of this study was to examine the effects of menaquinone supplementation on prevention of bone loss in high fat diet-induced obese model.

Methods: A total of 21 four-week-old C57BL/6J male mice were divided into three groups: the 10% kcal fat control diet group (CD, n=7), the 45% kcal fat diet group (HFD, n=7), and 45% kcal fat with 200 mg/1000 g menaquinone-4 (vitamin K2) diet group (HFD+vitamin K2, n=7) for 12 weeks. Serum levels of bone metabolism markers, including osteoprotegerin (OPG), osteocalcin, and receptor activator of nuclear factor kappa-B ligand (RANKL) and bone mineral density were measured.

Results: Serum levels of osteocalcin in the HFD+K2 group (51.01 ± 7.33 ng/ml) was higher than those of the HFD group (41.84 ± 1.524 ng/ml). Serum OPG of CD group, HFD group,

and HFD+K2 group were 1.47 ± 0.42 ng/ml, 2.31 ± 0.31 ng/ml and 2.90 ± 0.11 ng/ml ($p<0.05$), respectively. Serum RANKL of HFD group (0.40 ± 0.060 ng/ml) was significantly higher than the HFD+K2 group (0.21 ± 0.03 ng/ml) ($p<0.05$). Moreover, both the CD and HFD groups had a significantly higher serum RANKL to OPG ratio compared to HFD+K2 group ($p<0.05$). BMD of HFD+K2 group was higher than the other groups.

Conclusions: Present study demonstrates that vitamin K2 supplementation had favorable effect on bone mineralization and increased osteoblast over osteoclast activity in mice fed a fat diet. Our findings support a potential beneficial effect for vitamin K2 on reduction of osteoporosis risk in obese mice.

Key words: Menaquinone, bone mineral density, osteocalcin

PO2516

MEASUREMENT OF ENERGY REQUIREMENT BY HEART RATE METHOD AND PWC170 FOR YOUNG ACTIVE AND SEDENTARY WOMEN

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Background and objectives: The energy expenditure of individuals and groups are of vital interest to nutritionists for policy, therapeutic and research purposes. Heart rate monitoring with individual calibration has been advocated for assessing energy expenditure in field studies and has been compared with the 'gold standard' techniques of doubly labelled water and indirect calorimetry. The broad objective was to determine the energy requirements by heart rate method and Physical Work Capacity (PWC170) for young active and sedentary women.

Methods: A cross-sectional study on 30 collegiate young women (18-23 years) was conducted. Young active women (Group A) (n=15) and age matched sedentary women (Group S) (n=15) were selected. Group A selection was based on an inclusion criterion. Institutional ethical clearance was obtained. Data was collected on general information, anthropometry, blood pressure, body composition, PWC170, HR-VO2 relationship, dietary and physical activity to compute energy requirements.

Results: Mean total daily energy expenditure (TDEE) by factorial method for Group A was 2256 ± 246 Kcal and for Group S was 1772 ± 163 Kcal. Mean TDEE by heart rate method of Group A was 1952 ± 68 Kcal and of Group S was 1579 ± 116 Kcal. TDEE by factorial method gave nearly 16% higher values ($p<0.05$) for Group A and 12% higher values ($p<0.05$) for Group S than the heart rate method. PAL for Group A was nearly 32% higher as compared to Group S. Mean PWC170 values for Group A and Group S were 94.8 ± 6.9 and 93.5 ± 13.9 watts respectively.

Conclusions: The heart rate technique is a useful tool for computing energy requirement of active groups because of its simplicity and potential use in free living conditions. More research is needed to measure TDEE on India's growing sedentary population.

Key words: Energy requirement, heart rate method, PWC170, factorial method, TDEE

PO2517

PERCEPTION OF CURRENT BODY SIZE OF RESTAURANT'S WORKERS IN RIO DE JANEIRO: BRAZIL

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Background and objectives: Current body size (CBS) refers to a picture that someone has in mind about body size, image, and shape. Our objective was to analyze the perception of CBS in relation to body size and shape as to be normal, real and ideal using informed and measured weight and height and the drawings scale of silhouettes.

Methods: A sectional study with 272 workers, 37 ± 11 years (57% men), in seven restaurants of Rio de Janeiro State, Brazil. The Stunkard's figure rating scale was used for measuring the perception of CBS; height and weight were self-reported and measured by trained interviewers; nutritional state was calculated by BMI. For comparisons between sexes the Mann-Whitney test was employed for p<0,05.

Results: In the evaluation of regular diet, 73% informed to be unsatisfied with the composition and regularity of feeding. The referred BMI classified as normal weight and overweight between 49.3% to 50.7% for men and 40% to 60% for women, respectively. Measured BMI positioned men from 40.3% to 59.7%, and women from 20.9% to 79.1%, as normal weight and overweight, respectively. Regarding satisfaction with BMI, 43% of men and 14% of women reported to be satisfied, and 76% of women reported the wish to reduce silhouette. When CBS perception is compared to measured BMI, 26.3% of men and 15% of women see themselves as how they really wanted to be on the rating scale. Women showed a greater overweight prevalence as compared to men (U=259438.91; p=0.0001).

Conclusions: The majority of workers reported to be dissatisfied with CBS and diet, mainly women who expressed a desire to have a different silhouette. Emphasis must be taken in CBS approach for a individualized practice of health professionals.

Key words: Obesity, body image, nutritional status

PO2518

DEVELOPMENT AND VALIDATION OF A COMPUTER-NUTRITION CALCULATION (CNC) PROGRAM BASED ON KOREAN FOOD BALANCE PAGODA

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Background and objectives: This study was performed to evaluate the validity of a computer-nutrition calculation (CNC) program based on Korean Food Balance Pagoda, which is being used at the Samsung Medical Center (SMC) in Seoul.

Methods: CNC was developed to calculate the number of representative nutrient value of the food groups. 136 participants (72 males, 64 females) were recruited from participants at the health promotion center of SMC. Daily dietary intakes were interviewed using 24 hour recall method and CNC. Dietary intakes were calculated with Can-pro 3.0 (2005, Korean Nutrition Society). Pearson's correlations were used to identify the relationship between 24 hour recall method and CNC.

Results: The Pearson's correlation coefficients for nutrients ranged from 0.27 (vitamin A) to 0.94 (energy) with a mean of 0.44. The kappa value ranged from 0.15 (vitamin C) to 0.57 (protein) with a mean of 0.35. More than 51.3% of the subjects were classified into the same quartiles.

Conclusions: Therefore, our CNC program is considered a briefly proper method to assess nutrient intakes in healthy Korean adults. It was expected that the CNC program can be useful for nutritional counseling.

Key words: Validation, Korean Food Balance Pagoda

PO2519

NUTRITIONAL ASSESSMENT BY ANTHROPOMETRY, FROM THE USERS OF THE "BOM PRATO" PROJECT

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Background and objectives: To face the hunger and malnutrition problem in the low income population in Brazil, the Government of the State of São Paulo, aligned with the actions of the "Fome Zero" (Zero Hunger) Program, has created initiatives such as "Bom Prato" (Good Meal) Project, to offer complete, balanced and high-quality meals to low income families (elderly, unemployed, underemployed, homeless and itinerant). In spite of having a low cost (about US$ 0,50), the meals have a high caloric value (400 kcal for breakfast and 1200 kcal for lunch). Our objective was to assess the nutritional status of "Bom Prato" Project users by anthropometry.

Methods: 315 people between 19 and 59 years old, who reported going to the restaurant at least three times a week, have been evaluated by measures on weight, height, waist and neck circumference and applying questionnaire about lifestyle.

Results: It refers to an overweight population of both genders, noticing that 42.7% were overweight and 17.2% were obese, judged by BMI (Body Mass Index). The risk of cardiovascular disease evaluated by several parameters was high: by the waist circumference (38.4%), the hip-waist relation (13.3%) and the conicity index (29.2%), it showed a strong relationship with overweight. The abdominal obesity is considered an important risk factor for cardiovascular diseases, diabetes, dyslipidemias and metabolic syndrome. Smoking habit showed an inverse correlation with body weight in the sample. Physical inactivity was shown in evidence, since only 35.2% do regular physical activity.

Conclusions: Despite the adoption of projects related to the alimentation and nutrition field in the country, we found a low income population, with overweight and prone to develop chronic diseases, according to the demonstration by the nutritional transition. Lifestyle changes are the key for the obesity control and prevention of those diseases. Therefore, this kind of project is very important to offer nutritionally appropriate meals for urban population.

Key words: Obesity, nutritional assessment, cardiovascular diseases

PO2520

THE ASSOCIATIONS BETWEEN MEAL FREQUENCY AND BODY COMPOSITION IN ADULTS

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Background and objectives: This research was done in order to investigate the effects of meal frequency on body composition with the use of various parameters. The participants of this research are 300 people.

Methods: all the participants were required to record two week days and one weekend day meal consumption in order to determine their meal frequency. The participants recorded the time they started eating and finished eating.

Results: There was a negative relation between average number of meals consumed and body mass, BMI, waist circumference, fat body mass, lean body mass ($p<0.001$). The difference between classification of BMI and average number of meals consumed is determined as statistically important by

the researcher ($p<0.001$). A negative relation between average number of meals consumed and energy consumed, total body fat, saturated fatty acid and monounsaturated fatty acid intake is found ($p<0.05$). A positive relation between average number of meal consumed and fiber, some vitamins, minerals and water intake was found ($p<0.05$).

Conclusions: This preliminary investigation suggests that eating more frequently, characterized by an eating pattern of approximately three meals and two snacks, was related to lower BMI and maintenance of weight loss. However, as this investigation also found that greater frequency of snack episodes were positively related both to energy intake and physical activity, additional research is needed to examine the role of eating frequency and physical activity in weight loss maintenance.

Key words: Meal frequency, BMI, body composition

PO2521

BRAZILIAN FOOD COMPOSITION DATABASE (TBCA-USP): UPDATE ON VITAMIN DATA

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Background and objectives: Several studies have been carried aiming to quantify vitamins in Brazilian foods; however, this information is disperse in many publications. The goal of the present work was to elaborate a database regarding the composition of vitamins A, C and E in Brazilian foods, aiming to make it available to the population and scientific community.

Methods: For elaborating the vitamin database, data originated from validated methodologies for each compound were compiled, whereas the vitamin A database includes data on retinol and on seven types of carotenoids (α-carotene, β-carotene, β-criptoxantin, lycopene, lutein, violaxantin and zeaxantin), while the vitamin C database includes data on ascorbic and dehydroascorbic acids. For the vitamin E database, data on all available tocopherols and tocotrienols were compiled. The total content of vitamin A was calculated both as Retinol Equivalent (RE) and as Retinol Activity Equivalent (RAE); total vitamin C total was calculated through the sum of ascorbic and dehydroascorbic acids; and, for vitamin E, total values were expressed both as α-tocopherol Equivalents and γ-tocopherol.

Results and Conclusions: Data search was done throughout national and international journals, dissertations and thesis, in a total of 383 references published between 1975 and 2011. From the total references, 148 were compiled and 235 discarded, mainly due to the lack of mandatory information, such as validation of analytical methods. The vitamin database provides information on vitamin A (825 foods), vitamin C (517) and vitamin E (66). Most part of the compiled foods belong to the vegetables group (32%) and fruits group (29%), which represent the foods that are most purchased by the Brazilian population. The data about 1,408 compiled foods generated the vitamin database, and will be available in the TBCA-USP (www.fcf.usp/tabela) as well as in the NAPAN and FoRC platforms.

Key words: Database, food composition, TBCA-USP, vitamins

PO2522

USE OF PREDEFINED DIET QUALITY SCORES IN THE CONTEXT OF CARDIOVASCULAR DISEASE RISK DURING URBANISATION IN THE SOUTH AFRICAN PURE STUDY

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Background and objectives: Urbanisation is generally associated with increased cardiovascular disease (CVD) risk and accompanying dietary changes. Little is known regarding the association between increased CVD risk and dietary changes using approaches such as diet quality. The relevance of predefined diet quality scores (DQS) in non-Western developing countries has not yet been established.

Methods: The association between dietary intakes and CVD risk factors was investigated using two variations of DQS, adapted to the black South African diet. Dietary intake data were collected using a quantitative food frequency questionnaire (FFQ). CVD risk was determined by analysing known CVD risk factors. The setting was urban and rural areas in North West Province, South Africa. Apparently healthy volunteers from the South African PURE study population were studied (n=1710).

Results: CVD risk factors were significantly increased in the urban participants, especially the women. Urban men and women had significantly higher intakes of both macronutrients and micronutrients, with macronutrient intakes well within

the recommended CVD guidelines. While micronutrient intakes of the urban groups were generally higher than the rural groups, intakes of selected micronutrients were low in both groups. Both variations of DQS indicated improved diet quality in the urban groups and showed good agreement between the scores although they seem to measure different aspects of diet quality.

Conclusions: The apparent paradox between improved diet quality and increased CVD risk in the urban group can be explained when interpreting the cut-offs used in the scores against the absolute intakes of individual nutrients. Predefined DQS as well as current guidelines for CVD prevention should be interpreted with caution in non-Western developing countries.

Key words: CVD, diet quality scores, urbanisation

PO2523

DELAYED GROWTH IN COLOMBIAN SCHOOL CHILDREN WITH FUNCTIONAL GASTROINTESTINAL DISORDERS

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Background and objectives: It is possible that delayed growth (DG) of children with functional gastrointestinal disorders (FGDs) is reflected in their height. Objective: To determine DG according to the WHO in school children in Cali, Colombia with functional gastrointestinal disorders (FGDs) and establish associations. Methodology: Case (n=111) and controls (n=111) study in school children from a public school in Cali, Colombia with functional constipation (FC) (n=48), irritable bowel syndrome (IBS) (n=25), functional abdominal pain (FAP) (n=9), aerophagia (AE) (n=8), functional dyspepsia (FD) (n=7), abdominal migraine (AM), and FAP syndrome (FAPS), respectively (n=5), cyclic vomiting syndrome (CVS) (n=2) and non-retentive fecal incontinence (NRFI) and adolescent rumination syndrome (ARS), respectively (n=1), identified by the Rome III Criteria (Spanish version) in whom the following were considered: sociodemographic (age, gender), familial (single child, family dysfunction, parents with FGDs) and infectious (prior dengue) variables. The statistical analysis included estimation of FGDs prevalence, its corresponding 95%CI; estimation of other descriptive measurements of interest and association analysis through multiple logistic regression.

Results: In this population of school children with a mean age of 12.3±2.5 years (range 8 and 18), prevalence was found at 26.58% for FGDs, predominance of female gender and family dysfunction. FGDs was associated to gender (OR 1.00 CI95% 0.53-1.91 p=0.00). Age was the factor finally associated (OR 1.12 CI95% 0.99-1.26 p=0.05).

Conclusion: Nearly one third of the Colombian school children presented FGDs: 48 with risk of low height, 9 with low height, and 2 with severe low height; with older age being a risk factor.

Key words: Delayed growth, Functional gastrointestinal disorders, School children

PO2524

FIBER INTAKE IN COLOMBIAN SCHOOL CHILDREN WITH FUNCTIONAL GASTROINTESTINAL DISORDERS

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Background and objectives: The low fiber intake has been associated with functional gastrointestinal disorders (FGDs) such as functional constipation (FC) and irritable bowel syndrome (IBS). Our objective was to determine fiber intake through nutritional survey among Colombian school children with FGDs and associations.

Methods: Case (n=23) and control (n=46) study among school children in a private school in Cali, Colombia with IBS (n=15) and FC (n=8) identified by the Rome III Criterie (Spanish version). Nutritional (crude and dietetic fiber intake), demographic (age, sex, origin), and family (single child, parents with FGDs) variables were considered. Statistical analysis included estimation of the prevalence of malnutrition (MNT), its corresponding 95% CI, estimation of other descriptive measures of interest and association analysis by multiple logistic regression.

Results: Mean age 11Â ± 2 years; prevalence for MNT of 64%; predominantly males and originating in Cali, Colombia, and low crude fiber (1.8Â ± 0.8 g) and dietetic fiber (1.2Â ± 0.8 g) intake. In association analysis we found a greater chance of low fiber intake in single child (p=0.00) and associated factors were finally sex (p=0.13) and low crude fiber intake (p=0.18).

Conclusions: All colombian school children with FGDs showed low fiber daily intake and more than half of them had malnutrition, being risk factors sex and crude fiber intake.

Key words: Fiber intake, functional gastrointestinal disorders, school children

PO2525

NUTRITIONAL SURVEY IN COLOMBIAN SCHOOL CHILDREN WITH FUNCTIONAL GASTROINTESTINAL DISORDERS

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Background and objectives: Nutritional status may be disrupted in school children with functional gastrointestinal disorders (FGDs). The objective is to determine the prevalence of malnutrition (MNT) for body mass index (BMI) in Colombian school children and associations.

Methods: Case (n=23) and control (n=46) study among school children in Cali, Colombia with FGDs identified by the Rome III Criterie (Spanish version). Nutritional (calories, carbohydrate, protein, fats, zinc), demographic (age, sex, origin) and family (single child, parents with FGDs) variables were considered. Statistical analysis included estimating the prevalence of MNT, its corresponding 95% CI, estimating of other descriptive measures of interest and association analysis by multiple logistic regression.

Results: Mean age 11Â ± 2 years; prevalence for MNT of 63%, predominantly males, being natives of Cali, Colombia and consuming a low calorie, carbohydrate, protein, fats and zinc diet. The MNT was associated with the presence of FGDs (p=0.02), but not with the nutritional, demographic and family variables (p>0.05). In association analysis it was found greater chance of MNT in the male gender, being single child and younger. Finally associated factors were age and low zinc intake daily.

Conclusions: More than half of the Colombian school children with FDGs demonstrated MNT: 27 at risk of overweight, 12 overweight and 6 with risk of thinness, being risk factors the younger and low zinc intake daily.

Key words: Nutritional survey, functional gastrointestinal disorders, school children

PO2526

THE EFFECT OF BREEDING AND RETAIL PRACTICES ON THE NUTRIENT PROFILE OF BEEF

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Background and objectives: Due to the increased awareness of the global obesity epidemic, red meat is often seen as a culprit in weight gain and obesity. As a result the global meat industry has responded by decreasing the total fat content of red meat. Actions include breed selection, feed manipulation, and retail and food preparation practices, such as trimming. Consistency with the changes in carcass characteristics and retail and food preparation practices need to be maintained in order to reflect true composition. The composition of SA beef cuts with subcutaneous fat removed has not been determined before. The accurate composition data on what is actually consumed (trimmed cuts) will aid in consumer education, in-line with current nutri-marketing trends, to further the image of South African beef as part of a healthy diet.

Methods: An updated nutritional profile of three South African beef cuts (prime-rib (n=72), rump (n=72) and shoulder (n=72)) from four age groups according to the national classification system, cooked and raw, with and without subcutaneous fat, was determined. Nutrients determined include protein, fat, cholesterol and the fatty acid profile among others. Results and

Conclusions: The results have been applied towards: 1) Determining the changes in the nutrient composition of South African beef over time (since the previous composition study was done in 1990); 2) Determining the effect of age and feeding regime on the composition beef; 3) Determining the effect of retail trimming on carcass composition.

Key words: Nutrient content, beef, red meat

PO2527

NUTRITIONAL ADEQUACY OF MINERAL CONTENTS OF ORAL DIETS FOR RENAL PATIENTS PREPARED IN A HOSPITAL OF BELO HORIZONTE, MG, BRAZIL

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Background and objectives: Chronic renal failure (CRF) is an illness of high morbidity and mortality, and the chemical composition of the diet is fundamental to manage the pathology. This study aimed to assess the nutritional adequacy of Ca, Cu, Fe, K, Mg, Mn, Na, P, Zn and Se contents in oral hospital diet and in artisanal food oral complement (OFC) for renal patients prepared in a hospital in Belo Horizonte, MG, Brazil.

Methods: About 14% of the hospital menu served to renal patients had the mineral content analyzed by inductively coupled plasma optical emission spectroscopy (ICP OES). The samples were collected in duplicate during the months of May and September, 2010 and January, 2011. The results were evaluated with regard to nutrition mineral recommendations for adult and elderly patients, from both genders, with chronic renal insufficiency (CRI).

Results: Renal oral diets presented deficit of Ca and Fe in all times studied, reaching on average 31 and 58% of recommendation, respectively. On the other hand, the levels of Se and Na exceeded the maximum considered safe (UL) in 145 and 1409%, respectively, getting worse when diet was associated with OFC. The amount of K and P exceeded the recommendation in 119 and 114%, respectively, while Mg content did not reach the minimum recommended for adult and elderly men in any time. The amount of Mn satisfied the recommendations, while Cu and Zn were 95 and 90% below the recommended, respectively, in September.

Conclusions: The use of OFC in association with oral renal diet contributes to achieving the recommended levels of Cu and Mg, but at the same time increases the risk of Na and Se toxicity. It is necessary a better balance of mineral nutrient contents in oral diets for CRI patients.

Key words: Dietotherapy, food analysis, nutritional recommendation, mineral nutrition

PO2528

BODY COMPOSITION OF KUWAITI CHILDREN; ESTABLISHMENT OF A STABLE ISOTOPE FACILITY FOR ASSESSMENT OF TOTAL BODY WATER IN KUWAIT

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Background and objectives: Assessment of body composition provides a much needed tool to monitor and evaluate interventions to combat obesity, in particular during childhood. Stable isotope technique to estimate total body water (TBW) is the golden standard technique for body composition. The aims of this study were to install the technique for TBW and assess body composition of Kuwaiti children.

Methods: The Isotope Ratio Mass Spectrometer (IRMS) was calibrated with defined international reference water standards. 75 boys and 83 girls (7-9 years) participated in the study. A dose of deuterium oxide (1-3 g) was consumed after an overnight fast and deuterium enrichment in baseline and post dose urine samples was measured. TBW was calculated and used to estimate fat free mass (FFM). Fat mass (FM) was estimated by difference (body weight minus FFM).

Results: IRMS measurements were confirmed to be accurate and precise. Children were classified as normal weight, overweight or obese according to the World Health Organization (WHO) based on BMI-for-age z-scores. Statistically significant differences in body composition were observed between normal weight boys and girls while only minor differences were found in overweight and obese children. Of particular interest is the finding that both boys and girls children classified as normal weight or overweight had high % body fat, over 35% and 40 % respectively.

Conclusions: The introduction of state-of-the-art technology for assessment of body composition provides an opportunity to explore a wide range of applications, within Kuwait as well as in the Gulf region.

Key words: Body composition, stable isotopes, childhood obesity, IRMS, deuterium dilution, Kuwait

PO2529

EVALUATION OF DIET QUALITY WITH CHINA DIET BALANCE INDEX AMONG RESIDENTS IN JIANGSU, CHINA

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Background and objectives: To evaluate diet quality among residents in Jiangsu by using China diet balance index (DBI-07).

Methods: A multistage stratified cluster random scheme was used to draw the sample in Jiangsu for the China Health and Nutrition Survey cohort. Dietary intake data were determined by three consecutive 24-hour recalls and food weighing method. Blood pressure and anthropometric data were measured with standard protocols. Dietary quality was evaluated by using DBI-07 method.

Results: Intakes of fruits and vegetables, milk, and beans are insufficient whereas intakes of red meats, edible oil, and salt intake were excessive. Excessive intakes of energy and fat and imbalanced diet were more common among men than among women. Insufficient nutrients intakes were more severe in rural areas than in urban areas and in age group of 40-50 than in all other age groups.

Conclusions: Insufficient and excessive intakes of nutrients coexist in Jiangsu. Nutritional interventions need to target at people in rural areas, particularly people at age of 40-50 years.

Key words: Dietary balance index, dietary quality, dietary evaluation

PO2530

DETERMINANTS OF CALCIUM INTAKE IN CHINESE ADULT IN BEIJING

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Background and objectives: Calcium intake is low and calcium deficiency is prevalent in Chinese adults, but its determinants are unknown.

Methods: Data on a total of 1,086 participants in Beijing from the China Health and Nutrition Survey were used. Dietary intake data were determined by three consecutive 24-hour recalls and food weighing method. Multivariate linear regression was used to determine the association between calcium intake and some key demographic factors and dietary behaviors.

Results: The average calcium intake was 516.9 mg/day. It was higher among men than among women but the difference was not significant (544.1 mg/day vs. 491.6 mg/day, p=0.19). 87.8% of participants did not reach the intake level (800 mg/day) recommended by Chinese Nutrition Society. Calcium intake increased with age (r=0.127, p<0.001), and was not significantly associated with smoking status (p=0.876) and body mass index (p=0.146).

Conclusions: The proportion of people reaching the recommended calcium intake level in Beijing, China, is low, particularly among young adults.

Key words: Calcium intake, adult, determinants, China

PO2531

ASSESSMENT OF IODINE INTAKE AND EXCRETION AMONG ADULTS

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Background and objectives: Few studies explored iodine nutritional intake and excretion in adults in normal dietary situation. The aim of this research is to evaluate iodine intake and urinary excretion by using the duplicate-portion technique.

Methods: 8 healthy men and 8 healthy women aged 18-60 years were randomly selected to participate in this study. Amount and types of daily drinking water and beverages were recorded for three consecutive 24 hours by using a quantitative measurement. 24-hour urine samples were collected on the same day when the water and food consumption were assessed. Food samples and urine samples were collected and measured by using 3-day duplicate portion technique. Iodine content in water, food, and urine was analyzed subsequently.

Results: Median iodine intake was 196.1 μg/day among men and 171.0 μg/d among women. Among the 16 participants, 12 reached the recommended iodine intake level and 3 below 80% of the recommended level. The median proportions of iodine intake from food were 86.2% among men and 85.1% among women. 87.3% of iodine was excreted from urine. Urine iodine excretion was significantly associated with iodine intake (r= 0.873, p<0.001).

Conclusions: Dietary iodine intake may be a good indicator of nutritional iodine status.

Key words: Iodine intake, urinary excretion, duplicate-portion technique

PO2532

CHANGES IN BODY MASS INDEX AMONG YOUNG ADULTS IN HUBEI, 1991-2009

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Background and objectives: To study the distributions and trends of body mass index (BMI) among young adults aged 20 to 45 years old in Hubei province.

Methods: A subsample of adults aged 20-45 years (n=675 at baseline) from the China Health and Nutrition Survey was used. Anthropometric data were measured with standard protocols. Gender- and age-BMI percentage curves were constructed by using the LMS (lambda, mu, sigma) method.

Results: The prevalence of overweight or obesity increased by 13.9% in men and 12.0% in women during the 18 follow-up years. The increase in the prevalence of overweight and obesity was far greater than the decrease in underweight (by 4.0% in men and 3.7% in women). Age- and gender-specific percentile curves showed that BMI increased faster in men than in women. Compared to the distribution in 1991, BMI distribution curves flattened at higher levels of BMI in both men and women.

Conclusions: Body mass index and prevalence of overweight and obesity are increasing quickly among young adults in Hubei. Overweight and obese adults have gained more weight than their normal weight peers in past two decades.

Key words: Adults, body mass index, overweight, obesity

PO2533

TRENDS AND PATTERNS OF ENERGY INTAKE AMONG ADULTS IN SHANDONG PROVINCE, 2000-2009

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Background and objectives: Economic development in Shandong province, one of the largest provinces in China has affected dietary patterns. We explore the patterns and trends of energy intake and composition among Shandong adults from 2000 to 2009.

Methods: Two waves of data from the China Health and Nutrition Survey in Shandong Province conducted in 2000 (1142 subjects aged 18 and above) and 2009 (1095 subjects) were used. T-test analysis of pooled data was performed.

Results: In 2000, the average energy intake was 9089.2 kJ (2164.1 kcal), with 13.0%, 28.9% and 58.1% derived from protein, fat and carbohydrate, respectively. In 2009, the energy intake significantly increased to 12223.26 kJ (2910.3 kcal) ($p<0.01$). Energy from protein and fat significantly increased to 14.0% and 33.2%, respectively ($p<0.01$), while energy from carbohydrate significantly decreased to 52.8% ($p<0.01$).

Conclusions: During the past decade, fat and energy intake have shifted to being much higher than the Chinese reference nutrient intake levels (RNI).

Key words: Energy intake, fat, energy from fat

PO2534

VALIDATION STUDY OF ESTIMATION ERRORS IN VARIOUS PATTERNS OF RICE PHOTOGRAPHS

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Background and objectives: A method to use photographs has been considered as a useful tool for dietary assessment. However, estimation errors in different angles or dishes have not been sufficiently examined. We validated estimated volu-

mes about staple foods, rice in this study, changing that layout and volume. It is important for exact calculating of staple foods because they are largely composed energy intakes.

Methods: Fourteen patterns of rice photographs were prepared for the study. It changed volume (100 g, 150 g, 200 g, 250 g and 300 g), layout (e.g. normal, almond-shape, rice ball) and dishes (e.g. rice bowl, gratin dish, plate, lunch box). Standard rice was 150 g in regular size rice bowl. Dishes were put on plaid tablecloth then took right above or skewed angle by digital camera. Thirty-six of dietitian-course students estimated volumes from test images compared with standard image.

Results: The variability of all rice samples showed positive correlation with actual and estimated volumes from right above (r=0.50, n=504) and skewed angle (r=0.54, n=540). Serve in rice bowl samples indicated a high correlation with actual and estimated volumes in both angle, above (r=0.89, n=108) and skewed angle (r=0.87, n=144). Percentages of estimations within 20% of the actual volume were high in 200 g of rice bowl (above 82.8% and skewed angle 88.9%) and low in 150 g of gratin dish (above 30.6% and skewed angle 27.8%). Angle difference within 20% of the actual volume between above and skewed angle in 200 g rice on curry plate was 50.5% and 80.6%, respectively ($p<0.01$). Many participants commented, it was difficult to estimate volume when different dishes or unclear dish height.

Conclusions: Using food photographs to make better estimation for dietary assessment should need supplementation with some standard patterns.

Key words: Dietary assessment, photograph, staple food

PO2535

THERAPEUTIC USE OF VANADIUM FOR TREATMENT OF NON-INSULIN DEPENDENT DIABETES MELLITUS

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Background and objectives: Diabetes mellitus is a heterogeneous metabolic disorder characterized by hyperglycaemia due to defective insulin secretion, insulin resistance or both and controlled by vanadium in animals and humans. Evaluating vanadium's glucose-enhancing potential, biodistribution, bioavailability, biomolecular transformation, and mechanisms of action is essential for therapeutic relevance.

Methods: literature search.

Results: Gene expression, using Affymetrix arrays, was examined in muscle from streptozotocin-induced diabetic and normal rats treated with oral vanadyl sulfate. Genes for oxidative stress were identified and related with known oxidative properties, thereby implying that early transition metals formed from their chemical interactions with other metabolites may act as general transcription modulators. Vanadium compounds activate Akt signaling through inhibition of protein tyrosine phosphatases with consequent increment in insulin sensitivity in diabetics. A transmission electron microscopic study indicated that vanadyl sulphate through preserving islet beta cell ultrastructure, reversed diabetic symptoms in streptozotocin-treated rats. The blood glucose lowering properties of vanadium-vitamin B(12) bioconjugates and combined micronutrients (Cr, Se & V) were reported. Supplementation of Coprinus comatus and Cordyceps sinensis, rich in vanadium, decreased blood glucose and glycohemoglobin levels and increased glycogen synthesis in alloxan-induced hyperglycemic mice. Oral administration of vanadate in S. Bunge herbal decoction produced a stable blood glucose status and alleviating vanadium toxicity in rat. But other study reported gastrointestinal intolerance in type 2 diabetics after 6 weeks of vanadyl sulfate treatment at 150- and 300-mg doses. Bioavailability of vanadyl compounds is another required characteristic for supplementation and organic compounds are preferred to inorganic forms.

Conclusions: It is concluded that diabetics are not vanadium-deficient, since no difference in levels between diabetics and controls. Vanadium compounds are effective as antidiabetic at high concentrations and in organic forms, but ineffective when the treatment is withdrawn. Chronic consumption may cause vanadium bioaccumulation, therefore, large-scale randomized controlled trials are needed for recommending routine vanadium medication.

Key words: Vanadium, therapeutic use, diabetes mellitus

PO2536

RELATIONSHIP BETWEEN DIETARY NUTRIENTS AND OXIDATIVE STRESS MARKERS

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Background and objectives: Oxidative stress is associated with many lifestyle-related diseases. Breakdown of the balance between oxidative stress and antioxidant processes in the body is now recognized as an emerging health risk factor. Unhealthy dietary habits can cause cardiovascular disease and diabetes. However, the assessment of oxidative stress and antioxidant capacity measurement, nutrition management and therapy

are not well used in Japan. Therefore, we performed reactive oxygen metabolite (d-ROMs) tests and OXY-adsorbent (OXY) tests. The subjects were 30 middle-aged Japanese males (age: 49.7 ± 7.7) who underwent a health check-up at a Health Administration Center.

Methods: The Free Radical Elective Evaluator carpe diem (FREE, Wismerll Laboratory) was used to measure the levels of d-ROMs, reflecting active oxygen metabolites, and the levels of OXY, reflecting total antioxidant capacity. Habitual food intake, dietary energy and nutrients were determined using a quantitative food-frequency questionnaire.

Results: The levels of d-ROMs were 320 ± 78 U.CARR (mean ± SD) (normal range: 200-300). The levels of OXY were 355 ± 68 fmol/ml (normal range: 350<). Dietary intake of calcium and magnesium, zinc and saturated fatty acids (SFA) correlated negatively with serum d-ROMs (Ca: $p<0.01$, Mg, Zn and SFA: $p<0.05$). Dietary intake of folic acid correlated positively with serum OXY ($p<0.05$). OXY/d-ROMs ratio (potential antioxidant ability) correlated positively with dietary Ca and Mg, vitamin K and folic acid ($p<0.05$).

Conclusions: The levels of d-ROMs of the subjects were around the upper border of the normal range. Oxidative stress markers (d-ROMs, OXY, OXY/d-ROMs) were related to exogenous antioxidants in dietary nutrients, which is useful information for the primary prevention of lifestyle-related diseases and nutrition management.

Key words: Oxygen metabolite (d-ROMs) tests, OXY-adsorbent (OXY) tests, dietary nutrients, primary prevention, lifestyle-related diseases

PO2537

VALIDITY OF POPULATION LEVEL ASSESSMENT OF PLASMA AND MILK RETINOL CONCENTRATIONS USING THE ICHECK FLUOROMETRIC DEVICE IN INDONESIA

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Background and objectives: Vitamin A (VA) deficiency remains an important public health problem globally. One of the key challenges to providing appropriate VA interventions, targeted to the right population is the availability of accurate and logistically feasible methods for VA assessments under remote field settings. Our objective was to compare plasma and milk retinol concentrations assessed on site by the portable iCheck fluorometric device to plasma retinol concentrations of the same population as determined by HPLC. This is one of the few studies to validate the iCheck device in a population.

Methods: Blood samples taken from 347 children (6 – 59 months) and 96 of their mothers were analyzed for hemoglobin, retinol and C-reactive protein concentrations. Milk samples taken from the mothers who had babies aged 3 – 11 months were analyzed for retinol concentration. Plasma retinol concentrations for each subject were assessed both at the field using iCheck fluorometric device and in laboratory using HPLC. Milk retinol concentrations were assessed at the field using the iCheck device. Statistical analysis comparing plasma and milk retinol concentrations from iCheck to retinol by HPLC using correlations and Bland Altman analysis is currently underway and results will be ready at the time of the congress.

Results: To be submitted before the congress.

Conclusions: The findings from this study will demonstrate the validity of using the iCheck fluorometric device for population level assessment of serum and milk retinol concentrations in remote settings. The advantage of the iCheck device method is that it simplifies the logistics of blood and milk collection and analysis protocols in field settings.

Key words: Vitamin A, retinol, iCheck, HPLC, Indonesia

PO2538

DISCREPANCIES IN ASSESSMENT OF IODINE SALT CONTENT BETWEEN A RAPID TEST KIT AND TITRATION METHOD: EXPERIENCE FROM GHANA

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Background and objectives: A national survey in Ghana in 2009-10 included determination of iodine in household salt. Objective: To assess salt iodine content using a semi-quantitative and a quantitative method, with the aim of evaluating the validity of the semi-quantitative test for field-based quality control of salt iodisation in Ghana.

Methods: Salt samples were tested at the household using a rapid test kits (RTK) to obtain semi-quantitative results (0 ppm, <15 ppm or >15 ppm) for iodine. An additional sample of salt was collected for analysis of iodine content by titration. Negative and positive predictive values as well as sensitivity and specificity results were calculated for the presence of any iodine (>0 ppm) and for adequate iodine (>15 ppm).

Results: Salt was available from 1,206 households for analysis by both methods. The RTK results indicated that 61.8% of salt samples were not iodised and 21.4% were adequately iodised, compared with 8.3% and 48.2%, respectively by titration. The negative predictive value (NPV) of the RTK was 11.3% for any iodine in salt and 63.2% for adequately iodised salt. The specificity and sensitivity of the RTK for any iodine were 84.0% and 40.2% respectively. For adequately iodised salt, RTK specificity was 95.8% and sensitivity was 39.9%. The validity and predictive value of RTK results improved with improved salt quality.

Conclusions: The RTK showed poor predictive value for non-iodised salt when compared with titration. Potential reasons for this and its implications for field-based quality control of iodised salt and for interpretation of past and future survey results in Ghana will be discussed.

Key words: Iodine, salt, titration, rapid test kit

PO2539

MONITORING THE COMPLETENESS OF ADULTS' AND CHILDREN'S 24-HOUR URINE COLLECTIONS USING PABA

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Background and objectives: p-aminobenzoic acid (PABA) excretion is a well-established method of assessing the completeness of 24-hour urine samples collected by adults. The inter-individual variability led us to investigate whether those at the lower end of the distribution were continuing to excrete PABA over a longer period. We also investigated the applicability of these limits to children's urine collections.

Methods: To establish the reference range of PABA excretion consistent with a complete 24 hour urine collection we recruited 50 healthy, well-motivated adults; each took 3 x 80 mg tablets at intervals during a single day and 24-hour urine collections were made on the study day and the day following. To compare PABA excretion kinetics in young children with adults, PABA present in individual urine samples passed during the 8 hours after ingestion of one tablet was determined in 15 children aged 4-10 years and in 15 adults. This approach was preferred to a 24-hour collection in order to minimise the burden for child volunteers. PABA was measured by an in-house HPLC method utilising methanol in the mobile phase.

Results: The range of PABA excretion representing a complete collection in adults was determined for our HPLC assay to be 70-104% of the 240 mg dose (mean ± 2SD). Only traces of PABA were excreted the following day. PABA excretion by young children showed a similar pattern to adults, with excretion of a single tablet complete within 8 hours by all adult and child participants.

Conclusions: This study established limits for PABA excretion in complete 24-hour urine collections from adults, and demonstrated consistent kinetics which indicate that the limits are also applicable to children.

Key words: PABA, 24-hour urine, completeness, child

PO2540

AVOIDING MISLEADING CALCIUM MEASUREMENTS IN BLOOD PLASMA – A RAPID MANUAL ASSAY TO DETECT EDTA

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Background and objectives: Ethylenediaminetetraacetic acid (EDTA) is a commonly-used anticoagulant (eg. for haematology) which chelates divalent cations. Traces of EDTA contamination in plasma invalidate colorimetric measurement of calcium and other divalent cations, also enzymes such as alkaline phosphatase (ALP) which depend on them for activity. Procedures are commonly in place to avoid such contamination during clinical phlebotomy and sample processing, and high-throughput automated screening assays are available to detect this. In nutritional surveys and studies this issue is not always recognised. Trace contamination during phlebotomy or blood separation can give rise to misleading results. We aimed to develop a manual method to detect EDTA contamination in plasma, in order to identify and discard affected results.

Methods: A published automated assay for EDTA using pyridylazonaphthol (PAN) was adapted for manual use in microplate format, suitable either for spectrophotometry at 530 nm or for screening visually. The relevant range of EDTA concentrations was determined by spiking plasma with EDTA and measuring Ca, Mg and ALP colorimetrically.

Results: Using a 10 minute incubation and 20 µl sample in duplicate, a nonlinear calibration curve was obtained (530 nm) between 80 and 400 mg EDTA/l. This covered the range where EDTA caused a 10% error in Ca measurement (90 mg/l) and in ALP measurement (250 mg/l).

Conclusions: The small volume required makes this rapid manual assay appropriate for plasma samples of insufficient volume for automated instruments, and for research and lower-

throughput laboratories where such instruments are not available. The assay facilitates the exclusion from datasets of plasma Ca and ALP concentrations which because of EDTA interference do not reflect the in vivo concentration. This emphasises the importance of avoiding cross-contamination between samples from different phlebotomy tubes.

Key words: EDTA, calcium, plasma, interference

PO2541

INADEQUATE AMOUNT OF SLEEP AS ONE OF THE RISK FACTORS OF OVERWEIGHT AND OBESITY IN POLISH MALES

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Background and objective: Increasing prevalence of overweight and obesity in Polish population stimulated research on potential risk factors of this unfavourable phenomenon. The results of recently published studies suggest that aside from nutritional factors, also the duration of sleep can have a role in the emerging epidemic of obesity. The aim of study was to verify if there is a relationship between the presence of overweight or obesity and the duration of sleep in Polish population.

Methods: Questionnaire survey, anthropometric measurements (body weight, body height, waist circumference), and analysis of body composition (body fatness, basal metabolic rate) were conducted in 257 individuals, among them 110 men and 147 women. On the basis of declared duration of sleep, the participants were classified as "short sleepers", i.e. sleeping ≤6 hours per day, "normal sleepers" (7-8 hours per day), and "long sleepers" (≥9 hours per day). The results were subjected to statistical analysis.

Results: Mean values of body weight, waist circumference, BMI, and body fatness in male „short" and „long sleepers" were significantly higher than in the „normal sleepers" (body weight: 86.5 kg and 81.7 kg vs. 78.2 kg, p=0.022; waist circumference: 102.4 cm and 102.9 cm vs. 94.8 cm, p=0.003; BMI: 28.5 kg/m2 and 27.5 kg/m2 vs. 25.8 kg/m2, p=0.009; body fatness: 26.9% and 29.9% vs. 23.4%, p=0.008). The duration of sleep in women did not influence any of analysed parameters.

Conclusions: Both deficiency and excess of sleep can represent risk factors of overweight and obesity in Polish males.

Key words: overweight, obesity, body fat mass, sleep duration

PO2542

INFANT BODY COMPOSITION IS INFLUENCED BY BREAST MILK LEPTIN CONCENTRATIONS

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Background and objectives: The presence of leptin in breast milk suggests its involvement in infant growth and development and may represent a link between breastfeeding practices and the regulation of energy balance in the first months of life. The aim of this study was to investigate the main determinants of leptin concentrations in breast milk of lactating adolescents and its relationship with infant body composition.

Methods: Lactating adolescents (14-19 y, n=53) were recruited from a public prenatal clinic in Rio de Janeiro. Maternal serum and breast milk concentrations of leptin were assessed by ELISA. Infant and maternal body composition were determined by dual-energy X-ray absorptiometry at 5 ± 1 wk postpartum.

Results: Leptin in breast milk (0.49 ± 0.37 ng/ml) was much lower ($p<0.001$) than serum leptin (18.3 ± 11.9 ng/ml). Serum and breast milk leptin concentrations were positively associated (Pearson's correlation, $r = 0.38$, $p<0.05$). The most powerful determinants of breast milk leptin were investigated by a stepwise linear regression considering maternal serum leptin concentrations, total body mass, BMI at lactation, pre-gestational BMI, gestational weight gain, total body fat and period postpartum (in days) as potential independent variables. Maternal total body fat played the primary role in predicting breast milk leptin (R2=0.31). Pre-gestational BMI was second in importance increasing the cumulative partial R2 by 0.20. After adjustment for days post partum by partial correlation, leptin in breast milk was positively associated ($p<0.05$) with infant total fat mass ($r=0.39$) and percent fat mass ($r=0.43$).

Conclusions: Our results suggest that maternal body composition appears to influence the concentration of leptin in breast milk, which in turn may have implications for infant growth and development.

Key words: Leptin, breast milk, infant body composition

PO2543

APPLICATION OF ESTIMATED BODY WEIGHT EQUATION USING MID-UPPER ARM CIRCUMFERENCE (MUAC) AND CALF CIRCUMFERENCE FOR INDONESIAN POPULATION

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Background and objectives: Body weight is one of the most important anthropometric parameters in assessing nutritional status before the appropriate nutrition care is given to patients. Therefore, provision of the accurate information is a must. However, due to specific conditions of the patients, direct standing weighing sometimes is impossible to be done. In developed countries, this condition raised no problem by the availability of other weighing instruments such as wheelchair scale, bed scale, pod scale, and other that allow direct weighing. However, in developing countries such as Indonesia, most of the hospitals do not have such instruments. Therefore, in order to assess body weight, the estimation needs to be done by using available formula. Parameter mostly used to estimate body weight is Mid-Upper Arm Circumference (MUAC) and Calf Circumference (CC). However, the available equation was developed among Caucasians and Blacks. Therefore this study aims to validate the Chumlea I equation and develop the new locally specific formula.

Methods: A cross sectional study was carried out among healthy Indonesian adults aged 20-49 years old with normal BMI. Measurements of actual body weight, MUAC and CC was done to 194 subjects (97 males and 97 females). Estimated body weight was calculated using equation of Chumlea I and compared to their actual body weight.

Results: The mean actual body weight is 55.74 ± 6.06 kg for males and 48.37 ± 3.98 kg for females. The mean estimated body weight is 61.64 ± 6.17 kg and 51.04 ± 4.56 kg for males and females respectively. The overestimation is higher in male than female (5.9 kg and 2.67 kg respectively). The mean estimated using newly equation is 55.74 ± 4.56 kg for male and 48.37 ± 2.72 kg for female.

Conclusions: To estimate the body weight the locally specific equation should be used.

Key words: Body weight, MUAC, calf circumference

PO2544

BODY COMPOSITION OF ADULTS WITH SICKLE CELL DISEASE

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Background and objectives: Sickle cell disease (SCD) is one of the most common genetic disorders in the world. It is characterized among other things by the presence of hypermetabolism that impacts on body composition. The aim of this study was to assess nutritional status and body composition in Brazilian adults with SCD.

Methods: We evaluated SCD patients of both genders, 39 years old or older. Anthropometric measurements (body mass index (BMI), Calf, Fist, Abdominal and Hips circumferences) were performed, as well as skinfold measurement obtained from each separate observation was based on the sum of 4 skinfold sites (bicep, triceps, subscapular and suprailiac (Lohman, 1986)). The body composition (Durnin and Womersley, 1974) and determination of body fat (%BF) (Siri, 1968) were evaluated. All analysis was conducted in SPSS 19.0 (level significance was 5%).

Results: Among the 52 patients studied, mean age of 50.5 ± 6.1 (SD) years, 51% were classified as eutrophic (n=27), 28.8% overweight (n=15) and 13.5 % of obese subjects (n=7). Mean BMI was 24.3 ± 4.6 (SD) kg/m^2, average BF was 26.85 ± 8.5 (SD) %, fat mass (FM) and lean mass (LM) were 17.9 ± 7.8 (SD) and 47.5 ± 9.4 (SD) kg, respectively. Men (n=21) had lower mean BMI ($p<0.059$), %BF ($p<0.000$) and FM ($p<0.003$). Females (n=31) had lower average LM ($p< 0.043$). Patients had skinfold measurements and circumferences smaller ($p<0.000$) than those standards. There was a direct association between BMI and %BF ($p< 0.011$), FM kg and BMI ($p< 0000$) and LM ($p<0.003$).

Conclusions: This sample of Brazilian SCD patients had a propensity for a nutritional profile of excess body fat among women and men with lower values for necessary interventions differentiated between both genders.

Key words: Sickle cell disease, body composition, nutritional status

PO2545

ASSESSMENT OF THE GROWTH DEVELOPMENT OF CHILDREN UNDER 5 YEARS OLD IN LEBANON

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Background and objectives: Many morbidities and mortalities arise from poor growth during infancy, along with psychological impairment and delay in intellectual development. Regular assessment of growth patterns among pre-school children is an essential preventive method. However, in Lebanon, national growth charts have not yet been established and data is scarce on children under 5 years old. Given the vulnerability of this age group and the window of opportunity it presents, it is important to construct national growth standards to provide reference child growth curves for clinical, epidemiological and research purposes as well as becoming the base for future trends assessments.

Methods: A cross-sectional descriptive analytical study was carried out using the standard WHO two-stage Cluster approach. The study targeted children 2040 under 5 years old (free from chronic illness) through a household survey questionnaire in the different Caza in Lebanon, administered by trained data collectors. The household survey questionnaire was complimented by a self completed structured survey questionnaire with 104 pediatricians.

Results and conclusions: The interesting finding in the current assessment is that breastfeeding was highly encouraged by Pediatricians and was seen to be practiced by the parents surveyed: 47.1% reported practicing exclusive breastfeeding up to 5 months. The results showed that the majority of the children under 5 years old sampled have a normal growth pattern, with less than 2.4% being stunted. In addition, the growth curves that resulted from this study are similar in pattern and distribution as that obtained by WHO with the growth curves of this study showing mild obesity.

Key words: Child nutrition, growth monitoring, Lebanon

PO2546

USING HOMESTEAD FOOD PRODUCTION PROGRAM AS A PLATFORM TO DELIVER MULTIPLE MICRONUTRIENT POWDERS TO INFANTS AND YOUNG CHILDREN IN NEPAL

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Background and objectives: Anemia affects 46% of preschool children in Nepal. Micronutrient powders (MNP) are mainly distributed through the health platform. We assessed the value added in using Homestead Food Production program (HFP), as a platform to deliver MNP to children in Baitadi district, Nepal.

Methods: In this cluster-randomized controlled study, 330 children aged 6-9 months were enrolled into one of three study groups: 1) HFP + MNP 2) HFP or 3) control. The HFP + MNP group received 60 sachets of MNP every 6 months, over 12 months. The MNP contained 15 vitamins and minerals, including 10 mg iron, 4.1 mg zinc, 400 g vitamin A, 150 g folic acid and 30 mg vitamin C. Hemoglobin and anthropometry were measured at baseline and post-MNP supplementation.

Results: Baseline mean hemoglobin concentrations were similar for all groups (HFP + MNP = 105.8 g/l; HFP = 107.2 g/l and control = 107.3 g/l). Hemoglobin increased significantly in all groups, with a higher change in the HFP + MNP and HFP compared to the control (difference in difference: 3.9 g/l HFP + MNP vs. control; 3.3 g/l HFP vs. control; and 0.6 g/l HFP + MNP vs. HFP). However, these differences were not significant. Anemia decreased in all groups, with no significant benefit of the interventions, although the change was higher in the HFP + MNP (51.5 percentage points [pp]) than the HFP (48.6 pp) and control (39.6 pp). Stunting increased similarly in all groups and underweight increased in the HFP + MNP and control, but not the HFP group. There was no change in wasting among all groups.

Conclusions: The study showed that HFP can be used as a platform for MNP distribution in Baitadi district, Nepal. HFP alone had a potential of yielding similar benefits on anemia resolution as providing HFP + MNP. Further studies are required to confirm these findings.

Key words: Anemia, micronutrient powders (MNP), Nepal, children

PO2547

WHICH DIETARY DIVERSITY INDICATOR IS THE BEST TO USE IN YOUNG CHILDREN?

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Background and objectives: Due to rapid urbanization in many developing countries, street foods (SFs) have become increasingly important as an income generating strategy and as a fast and economical meal option. There is however, a paucity of data on the nutritional contribution of SFs to the diet. The aim of this study was to review studies which had determined the nutritional value of street foods (SFs) and their contribution to the diet of consumers in developing countries.

Methods: The electronic databases of Pubmed/Medline, Web of Science, Proquest Health, and Science Direct were searched according to predetermined search criteria.

Results: From a total of 639 articles, 23 studies were retained since they met the inclusion criteria. In summary, daily energy intake (EI) from SFs in adults ranged from 13% EI to 50.3% EI and in children from 13% EI to 40% EI. Although the amounts differed from place to place, even at the lowest values of the percent energy range, energy contribution from SFs made a significant contribution to the diet. Furthermore, the majority of studies suggest that SFs contribute significantly to the daily intake of protein, often at 50% of the recommended dietary allowance (RDA). The data on fat and carbohydrate intakes are of some concern because of the assumed high contribution of SF to the total intake of fat, trans fats, salt and sugar in numerous studies and their possible role in the development of obesity and non-communicable diseases. Few studies have provided data on the intake of micronutrients, but these tended to be high for iron and vitamin A, but low for calcium and thiamine.

Conclusions: Street foods make a significant contribution to energy and protein intake of people in developing countries and their use should be encouraged if they are healthy traditional foods.

Key words: Street food, urbanization, dietary intake, macronutrients

PO2548

IGROW: BRINGING TECHNOLOGY TO COMMUNITY-BASED GROWTH PROMOTION TO IMPROVE IMPLEMENTATION

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Background and objectives: Community-based growth promotion (CBGP) is practiced to help community workers better support families and detect childcare problems before they lead to undernutrition. Typically, community volunteers or health workers weigh a child monthly and check weight gain against a standard to judge growth adequacy. Based on the determination, they provide tailored counseling and other services to support continued good care or suggest needed changes. An easier and quicker method for accurately determining growth status could improve CBGP effectiveness and simplify training and supervision. Our objective was to identify an mHealth solution to improve the ability of community workers to accurately determine the adequacy of a child's growth and to offer prompts for the counseling.

Methods: We reviewed existing technology packages and determined the need to design a new package and to test it in a program with 1) a functional recording system 2) good monthly attendance 3) a good counseling system and 4) consistent use of growth information by community leaders and health workers to determine actions to improve nutrition.

Results: An mNutrition solution, iGrow, was constructed to record monthly weight per child, automatically calculate progress, and give instant feedback to prompt counseling. The system will aggregate growth information automatically at the community and district levels and be accessible to all stakeholders.

Conclusions: iGrow will enable accurate assessment of child growth, provide instant feedback for health workers who are freed up to focus on counseling, and ensure timely access to aggregated information for decision making by community leaders and district program managers.

Key words: Community based growth promotion, Health

PO2549

VALIDATION OF SKINFOLD THICKNESS EQUATIONS WITH AIR DISPLACEMENT PLETHYSMOGRAPHY FOR ESTIMATION OF BODY COMPOSITION AMONG ADOLESCENTS

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Background and objectives: With the rising trend of obesity among adolescents, it is imperative to be able to measure body composition accurately. Hence, this study aimed to validate conventional skinfold thickness (SKF) equations for measuring body composition among adolescents with a criterion method.

Methods: A total of 126 adolescents (50 boys; 76 girls) aged 12 to 18 years old from Kuala Lumpur participated in this study. Anthropometric measurements included body weight, height, and skinfolds. Body composition was determined by Durnin and Rahaman (1976), Slaughter et al. (1988) and Deurenberg et al. (1990) skinfold equations. The criterion method employed was air displacement plethysmography (ADP) technique using BodPod GS.

Results: Mean weight, height and body mass index (BMI) were 54.7±17.1 kg, 159.2±8.4 cm and 21.4±5.7 kg/m2, respectively. Mean body fat percentage from Bod Pod GS was 25.5±10.8%. Significant difference ($p<0.05$) was found between Bod Pod GS and Durnin and Rahaman (1976) (2.0±7.0%), Slaughter et al. (1988) (4.3±6.9%) and Deurenberg et al. (1990) (5.6±8.1%) equations. The SKF equations underestimated body fat percentage and fat mass but overestimated fat free mass (FFM). Nevertheless, there were significant correlations ($p<0.01$) between SKF with ADP for body fat percentage, fat mass and fat free mass. The highest correlation for body fat percentage with Bod Pod GS was Durnin and Rahaman (1976) ($r=0.825$, $p<0.01$), followed by Slaughter et al. (1988) ($r=0.824$, $p<0.01$), and Deurenberg et al. (1990) ($r=0.802$, $p<0.01$). Bland-Altman plots showed good agreements between all equations with Bod Pod GS but Durnin and Rahaman (1976) was the best.

Conclusions: We suggest that the Durnin and Rahaman (1976) equation for estimating body composition is the most appropriate for use in future studies among adolescents.

Key words: body composition, skinfold equations, air displacement plethysmography. Financial Disclosure: This study is partly supported by the International Atomic Energy Agency Coordinated Research Project (Code: 16392) and Universiti Kebangsaan Malaysia Arus Perdana Project (Code: UKM-AP-TKP-11-2010)

PO2550

IRON AND ZINC SUPPLEMENTATION IN YOUNG ADULT CAMEROONIANS IN POOR VITAMIN A DIETS

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Background and objectives: Minerals and vitamin A deficiencies coexist in Cameroon in all age groups. However, natural sources of Vitamin A are available and could be used to reach all the whole population. This study aims at assessing the serum levels of zinc and iron after 11 days supplementation with 20mg of zinc and iron, taken alone, together or at different times in free or low vitamin A diets.

Methods: Thirty two men aged 18 to 33 years, divided into 6 groups of 5 or 6 persons, were enrolled in the study and distributed as follow: groupe1: 5 persons not supplemented; groupe2: 5 persons supplemented with iron; groupe3: 6 persons supplemented with zinc; groupe4: 6 persons supplemented with zinc and iron together; groupe5: 5 persons supplemented with iron and zinc separately; groupe6: 5 persons supplemented with vitamin A the last day. The 5 last days, participants were put on free or poor vitamin A diets. Sera were collected at day 1, day 5 and day 11 for analyses of Zn and Fe levels by atomic absorption spectrophotometry.

Results: Highest seral iron and zinc concentrations were observed in groups either supplemented with zinc or with iron given alone. In those two groups, serum Zn concentrations increased from 0.69 ± 0.02 to 0.95 ± 0.13 (groupe2), from 0.48 ± 0.06 to 0.97 ± 0.11(groupe3); and serum Fe concentrations from 1.49 ± 0.54 to 3.49 ± 1.01(groupe2); and from 1.42 ± 0.45 to 3.41 ± 0.81(groupe3) respectively.

Conclusion: Supplementation with Fe or Zn alone increased both Fe and Zn serum levels participants. Further studies on a larger population are necessary to confirm that supplementation with zinc or with iron alone could raise both zinc and iron levels in serum simultaneously.

Key words: Supplementation, Iron, Zinc, Young–adults, Cameroon

PO2551

EFFECT OF GROUP GUIDANCE ON NUTRITION TO PATIENTS WITH CHRONIC RENAL FAILURE

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Background and objectives: The principles of dietary measures for chronic renal failure before starting dialysis are to reduce salt, restrict protein and ensure sufficient energy. For the purpose, it is essential to use the special foods for remedy whose constituents are uniquely regulated. The special staple foods of rice, noodle and bread that contain less protein are particularly required for implementation of dietary measures. Our hospital has organized the group guidance to explain how to use the special foods for easy practice of the measures since its opening in 1983 and held the 162th class in December 2012. In this study, the subjects were the patients who participated in the group guidance. Regular surveys on their attitude to diet had been conducted since 1991 and our objective was to compare the results of 2002 and 2011.

Methods: The anonymous questionnaire sheets were distributed to the patients before each guidance and filled and collected on the spot.

Results: There was no significant difference between men and women in both years. (1) The patients whose dietary method was measurement and calculation nearly every day to keep the instructed amounts were 45.0% in 2002 but significantly decreased to 18.4% in 2011. In contrast, those with rough estimate were 15.0% in 2002 and significantly increased to 44.7% in 2011. (2) The patients who bought the special foods from a dispensary near the hospital were 17.5% in 2002 and 40.9% in 2011, which was a significant rise.

Conclusions: A diverse variety of special foods have been developed recently to facilitate implementation of dietary measures. Understanding and continuation of the complex diet can eventually lead to self-management with rough estimate instead of precise measurement of food and nutrient calculation. In addition, the pharmacist of the dispensary where the special foods were dealt with always attended to the group guidance and sold them.

Key words: Nutrition, chronic renal failure, group guidance

PO2552

DEVELOPMENT OF RECIPE DATABASE FOR BREADS AND CAKES FOR PROCESSING DIETARY INTAKE SURVEY DATA

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Background and objectives: This study was performed to develop a representative recipe database for breads and cakes as a part of on-going work of building recipe database to be used in processing dietary intake survey results from the Korea National Health and Nutrition Examination Survey (KNHANES).

Methods: Frequently consumed breads and cakes were sought using dietary intake data from KNHANES 2009 to make a list for recipe collection. Out of the 10,944 bakeries located in seven metropolitan cities and Gyeonggi province in Korea, 500 bakeries were selected by probability proportional to size sampling and systematic sampling. More than 7,610 recipes for breads and cakes were collected by trained dietitians from 504 bakeries responded to the face-to-face interview in 2011. For each bread or cake, ingredient foods reported from different bakeries were pooled and sorted by appearing frequency and amount used. Ingredients with frequency less than 10% or weight less than 1% of total ingredients weight were excluded and weights of remaining ingredient foods were divided by number of recipes included to make a preparatory recipe for each bread or cake.

Results: We produced a representative recipe database for 103 breads and cakes with recipes from 11 or more bakeries and these were subject to experimental cooking to delineate the relationship between prepared dish volume and amount of ingredients with final adjustment, if necessary.

Conclusions: This database will be used in estimating ingredient food intake from breads and cakes intake reported in volume in KNHANES. In addition, it will be incorporated into the fundamental nutrition database used in the processing dietary intake survey data of KNHANES and consequently enable the more reliable estimation of food and nutrient intake of the Korean population.

Key words: Recipe database, bakeries, breads, cakes

PO2553

MEASURING THE VALIDITY OF DIETARY ASSESSMENT INSTRUMENTS: THE METHOD OF TRIADS

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Background and objectives: Assessment of long-term dietary intake has commonly been associated with significant measurement errors. Measurement error is a common source of bias in epidemiological studies, particularly for laboratory tests or questionnaires that are not considered to be a gold standard. These measures could be inaccurate if the two methods have correlated errors or if one of them has repeated measurements. Here, we suggest an approach to validate these measurements that is known as the method of triads.

Methods: We performed a literature search in the MEDLINE and PubMed databases for studies published in English between 1995 and 2012, using a database searching filter and manual selection as needed.

Results: The number of published studies is still small and methodological differences related to population, the type of questionnaire and the reference method hamper the comparability of the results.

Conclusions: The method of triads is a simple technique for assessing validity and reproducibility of continuous exposure measurements.

Key words: Dietary assessment, method of triads, validity

PO2554

ENERGY INTAKE UNDERREPORTING OF ADULTS FROM A HOUSEHOLD SURVEY IN NITERÓI, RIO DE JANEIRO, BRAZIL

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Background and objectives: Dietary surveys generally include energy intake (EI) as a valuable tool in assessing the nutritional status of populations. Thus, it is crucial that it be measured as accurate as possible. The objective of the present study was to identify the underestimation of EI, assessed by 24-hour dietary recall, using the EI to basal metabolic rate (BMR) ratio (EI/BMR) in a probability sample (n = 1726) of the adult population (≥ 20 years) of Niterói, Rio de Janeiro, Brazil.

Methods: BMR was estimated by the FAO/WHO recommended equations (Schofield - BMR_SCH) and by sex-specific equations recently developed and validated for the Brazilian population (BMR_BRA).

Results: Mean (SE) EI was 1570.9 (24.1) and 2188.8 (46.1) kcal/day for women and men, respectively. BMR_SCHO yielded significantly higher values than BMR_BRA (1512.2±7.1 and 1256.1±5.8 kcal/day). The overall EI/BMR_SCH ratio was 1.18 (0.02) and 1.28 (0.02) for women and men, respectively, and the underestimation, using the Goldberg cut-off, was 80.4 and 72.6%. The same values using the EI/BMR_BRA ratio were 1.40 (0.02), 1.56 (0.03), 66.1 and 55.6%. The lowest EI/BMR_SCH ratios occurred in the 50-60y age group (1.06±0.03 and 1.19±0.05) and in the obese (BMI ≥ 30 kg/m2) group (1.01±0.03 and 1.12±0.06, for women and men, respectively).

Conclusions: The data indicate important underestimation of EI, especially in individuals with excess body weight, which is higher if the internationally recommended BMR equations (BMR_SCH) are used.

Key words: Energy intake, Brazil, Basal metabolism

PO2555

APPENDICULAR LEAN MASS DETERMINED BY AN OCTOPOLAR BIA SYSTEM AND DXA IN MIDDLE-AGED AND AGED SUBJECTS FROM NITERÓI, RJ, BRAZIL

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Background and objectives: Appendicular lean mass (ALM) is important to derive skeletal muscle index, a variable used for screening of sarcopenia. Usually ALM is obtained by gold standard body composition methods that are cumbersome to apply in field and clinical studies. An alternative is the bioelectrical impedance analysis (BIA) using eight electrodes that can estimate the composition of the limbs. Our objective was to compare ALM estimated by octopolar BIA (OBIA) and obtained by dual x-ray absorptiometry (DXA) of middle-aged and aged subjects enrolled in the Programa Médico de Família (Family Physician Program) of Niterói, Rio de Janeiro, Brazil.

Methods: A total of 135 subjects over 45 years of age (99 women) participated in this cross-sectional study. ALM was obtained by the sum of arm and leg lean mass determined by DXA (GE IDXA) (ALM_DXA) and by OBIA (TANITA BC 418) (ALM_OBIA). Body mass and stature were also measured and body mass index (BMI) was calculated.

Results: Average ± SD age was 59.3 ± 10.0 years and 58.4 ± 9.1 for women and men, respectively. On average both sexes were overweight (BMI=27.9 ± 4,5 kg/m2 in women and 27.2 ± 4.4 kg/m2 in men) but women had significantly higher percent body fat than men (40.3 ± 5.6 vs 30.2 ± 5.7%). The sample comprised 75.4 and 72.0% of overweight + obesity (BMI >25 kg/m2) women and men. Mean ALM_OBIA was significantly different from ALM_DXA in women (17.2 ± 2.3 and 16.7 ± 3.0 kg, respectively) and men (24.2 ± 3.4 and 23.4 ± 3.6 kg) but represented a relatively low overestimation percentagewise (3.9 ± 7.7 and 3.8 ± 8.2%). ALM was only accurately estimated in obese (BMI > 30 kg/m2) individuals (mean difference of 0.2 ± 1.5 kg).

Conclusions: ALM was significantly overestimated by OBIA for the whole sample but was accurately estimated in obese individuals. Studies with a broader BMI distribution sample should be carried out to ascertain the validity of OBIA to estimate ALM in Niteroian adults.

Key words: Body composition, Brazil, validation studies

PO2556

FUNCTIONAL CAPACITY AND ITS ASSOCIATION WITH NUTRITIONAL STATUS IN THE ELDERLY

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Background and objectives: The aging process causes biological changes such as neurological and musculoskeletal disorders, leading to a progressive and irreversible loss of function in systems, interfering with functional capacity and nutritional status of the elderly, exposing him to a state of vulnerability and loss of independence. The aim of this study was to verify the association between functional capacity and nutritional status in an elderly population.

Methods: This is a cross-sectional home-based study with elderly individuals (60 years or more) of both sexes enrolled in the Family Health Strategy of Campina Grande-PB. Variables indicative of functional capacity (handgrip strength (HGS), flexibility/mobility and balance) and nutritional status (NS) (body mass index (BMI), arm muscle circumference (AMC) and corrected arm muscle area (CAMA)) were assessed. The association between functional capacity variables and NS was verified using the Chi-square (χ^2) test. The potential risk factors associated with functional capacity were verified by multivariate logistic regression, adopting a significance level of $p<0.05$.

Results: The study included 420 elderly subjects (68.1% women). The results of the association between variables indicative of functional capacity and NS showed that elderly people with good HGS were mostly overweight/obese and showed muscle reserve indicative of eutrophy. No significant association was observed between the mobility test and NS. Variables AMC and CAMA were associated with balance. In the multivariate logistic regression analysis, the eutrophic condition, verified by the AMC, was a risk factor for poor balance (OR 2.14, 95% CI 3.78 to 1.21).

Conclusions: The influence of nutritional status on the functional capacity in the elderly in this study indicates the importance of studies evaluating factors related to functional loss in this population.

Key words: Elderly, functional capacity, nutritional status

PO2557

PREDICTING OBESITY AMONG DIFFERENT 2 MAJOR ETHNICS IN EAST JAVA

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Background and objectives: Asians have a greater percentage of body fat (BF) and abdominal adipose tissue at lower Body Mass Index (BMI). The use of cut-off specific to ethnic groups is recommended. East Java, as one of the most population-dense province in Indonesia, hosts 2 major ethnics: Javanese and Maduranese. Therefore this study aims to assess obesity of both ethnics by using some indicators.

Methods: A cross sectional study with the total of 225 subjects aged 20-49 years old was recruited purposively. Anthropometric measurement includes weight and height for BMI calculation using Asian cut-off, %BF based on 4-sites skinfold thickness (triceps, biceps, suprailiac and subscapular) and digital body fat analyzer, waist circumference (WC) and hip circumference to calculate waist-hip ratio (WHR).

Results: One hundred and thirty seven respondents are Javanese, 88 respondents are Maduranese with 56 (24.9%) are male and 169 (75.1%) are female, aged 33 ± 8.76 years. Mean of all indicator is significantly higher among Maduranese compare to Javanese with $p<0.05$ (84.71 ± 10.55 and 81.9 ± 60.6 cm for WC, 1.00 ± 1.21 and 0.88 ± 0.64 for WHR, 25.65 ± 4.44 and 22.79 ± 3.61 kg/m2 for BMI, 33.40 ± 6.96 and 27.2 ± 7.83 % for %BF, respectively). Based on %BF, more Fat and obese among Maduranese compared to Javanese (57.7% and 85.2% respectively). This is in agreement with the classification using BMI, where more Maduranese were categorized as obese compared to Javanese (65.9% and 35.8% respectively). Maduranese also had more central obesity compared to Javanese (63.6% and 25.5% for WC, 72.7% and 39.4% for WHR respectively).

Conclusions: There is agreement between all indicators in classifying that Maduranese have higher body size and body fat particularly abdominal obesity compared to Javanese in East Java.

Key words: Abdominal obesity, Maduranese, Javanese

PO2558

EVALUATION OF NUTRIENT INTAKE AND DIET QUALITY INDEX-INTERNATIONAL (DQI-I) IN KOREAN GASTROINTESTINAL CANCER PATIENTS

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Background and objectives: It is suggested that evaluation of diet quality may be a great indicator of nutritional assessment. The purpose of this study was to investigate the nutritional status, dietary habits, and dietary quality for Korean gastrointestinal cancer patients.

Methods: This survey was conducted through anthropometric data, food frequency questionnaires and diet record survey to 339 cancer patients (colorectal cancer; n=143, stomach cancer; n=196) from February 2007 to December 2012.

Results: Most of the cancer patients (81.6%) were well-nourished, and 18.4% of the cancer patients were malnourished at preoperative status, respectively. The number of nutrients in Index of Nutritional Quality (INQ) < 1.0 of colorectal cancer patients were significantly higher than that of stomach cancer patients. The Korean's Dietary Diversity Score (KDDS) of colorectal cancer and stomach cancer patients were 3.6 and 3.8, respectively. The average Diet Quality Index-International (DQI-I) of colorectal cancer and stomach cancer patients were 67.7 and 62.5, and there was significant difference.

Conclusions: The proper dietary management should be needed for cancer patients.

Key words: Diet quality, nutritional status, colorectal cancer, stomach cancer

PO2559

CALCULATING CHILD AGE WITHOUT BIRTH RECORDS: VALIDATION OF A NEW METHOD FOR ESTIMATING DATE OF BIRTH

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Background and objectives: Because accurate child age in days is vital for assessing child nutritional status and adequate feeding practices and no comprehensive method of estimating date of birth without birth records was indentified, the Food Security and Nutrition Surveillance Project developed a new method of estimating child birthdates. While this method has proven easy to use in the field, the quality of the data returned by the method has not yet been validated.

Methods: Results from this method were compared to assumptions of a uniform distribution of child birthdates across weekdays/days of the month and the outcomes of anthropometric indicators derived from these birthdates were examined. The performance of this new method of birthdate calculation, was compared to the results from surveys in Bangladesh which did not use this method. Repeated subsamples of surveyed children drawn from both the new method and other surveys are used to estimate the variation of the observed distribution from what is expected.

Results: The seasonality of birth as measured through this new method shows high congruence between years and fits with the fertility cycle in Bangladesh. Simulation results indicate that the new system presents a better fit for a random uniform distribution model than the birthdates from other surveys in Bangladesh. Furthermore, the new methodology provides a lower proportion of outliers in weight-for-age and height-for-age estimation. This method maintains a low deviation from a uniform distribution even when used in short-term survey projects.

Conclusions: Based on the success of this model in enabling data collectors to record birthdates for children without birth records with little signs of surveyor preference or bias, this method should be used more widely in Bangladesh and scaled up and tested in other locations which have low coverage birth registration systems.

Key words: Anthropometry, date of birth, household survey

PO2560

SERUM RESPONSE TO A SINGLE DOSE OF DIETARY CAROTENOIDS FROM STEAMED, FRIED AND STEAM-DRIED SQUASHES PULP (CUCURBITA SPP)

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Background and objectives: Data on bioavailability of carotenoids are necessary for dietary recommendation. The objective of this study was to assess the serum response to a single dose of dietary carotenoids from steamed, fried and steam-dried pulp of C. maxima, C. pepo and C. moshata.

Methods: Three groups of 10 healthy volunteers aged 21-28 years with BMI 16.61-17.51 kg/m2, were fed respectively with C. maxima, C. moshata and C. pepo pulp processed in 3 different forms: steamed, fried and steam-dried. After 5 days of poor carotenoids and retinol diet, fasting subjects ate meals containing one of the forms of processing squashes (providing 8 mg β-carotene) with roasted hulled groundnut paste. Blood samples were collected before, 4 h and 8 h after the meal. Carotenoids and retinol content of the serum samples was analyzed by HPLC method. Triglycerides content was also evaluated.

Results: Considerable inter-individual variation was observed between serum response of carotenoids, retinol and triglycerides. Mean serum level of triglycerides increased significantly 4 h or 8 h after the test meal no matter the form of processing and the species. No significant difference was observed for all carotenoids and retinol values before and after the test meal at 4 h or 8 h. However, 27/29, 26/29 and 23/29 subjects had serum increment of provitamins A and 22/29, 16/29 and 12/29 subjects had increments of non provitamins A after consumption of steamed, fried and steam-dried squashes respectively.

Conclusions: Carotenoids of steamed squash had the best bioavailability followed by those of fried form and then steam-dried form. However, association of the three forms can efficiently contribute to improve vitamin A status of the population.

Key words: Squashes pulp, steamed, fried, steam-dried, carotenoids bioavailability

PO2561

BODY COMPOSITION IN AMATEUR AND PROFESSIONAL BOXING VERSUS PHANTOM

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Background and objectives: Boxing is a sport divided by categories according to body weight. One of its main objectives is to achieve proper weight and body composition. Full knowledge of body composition allows that at the time of competition boxers have components sufficiently balanced to reach maximum performance.

Methods: Twenty six boxers of the Argentine Box Federation, both amateur (n=19) and professional (n=7), were evaluated using the "Anthropometric Fractionation" (ENFA) method proposed by Drinkwater and Ross and modified by Basaluzzo, JM., that determines five components (muscle, fat, skeletal, visceral and residual masses), including both protein and calorie reserves (muscle/skeletal mass and fat mass/skeletal mass) and somatotype. Mean values and deviations of each variable were calculated for both categories, and were compared with sedentary subjects (Phantom).

Results: When comparing the profile of a boxer, both amateur and professional with a reference population, it is found that there are significant differences in body mass level, showing a predominance of muscle and skeletal mass and a decrease in fat mass. In bone diameters, increased diameter values were observed in wrist, humerus, ankle and anteroposterior (AP) chest, while bitrochanteric and bi-iliac diameter presented reduced values in both categories. Muscle perimeters show increased values in relaxed bicep, forearm, calves and chest in amateurs and professionals. The somatotype shows a meso-endomorph profile in amateurs and balanced mesomorph in professionals. The calorie reserve in professionals was found decreased: moderately in 3 subjects and severely in 4, while in amateurs, 2 had normal reserve, 9 moderately decreased and 8 severely decreased. Protein reserve was found decreased in 3 of 7 professionals and 5 of 19 amateurs.

Conclusions: This last situation is remarkable as decreased protein reserves may result in a reduced performance. It emphasizes the importance of assessing body composition in this sport.

Key words: Boxing, body composition, anthropometry, ENFA, somatotype

PO2562

PHYLLOQUINONE CONTENT OF VEGETABLES AND DIETARY VITAMIN K1 INTAKE IN CHINESE ELDERLY PEOPLE

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Background and objectives: Phylloquinone (Vitamin K1) plays an important role in bone and vascular health. However, there is no data of phylloquinone in the Standard Tables of Food Composition in China. The objective of the present study was to obtain a closer estimate of dietary intake phylloquinone.

Methods: Phylloquinone contents in vegetables samples (47 food items) were determined by a high-performance liquid chromatography method. Complete 3-d weighed dietary records were obtained from 138 participants aged 60-92 years living in northern China. Vitamin K1 intakes were assessed using phylloquinone contents here and Japanese data of the phylloquinone.

Results: Phylloquinone was widely distributed in green leafy vegetables (80 ¨C 638 μg/100 g wet weight) and the highest amount was found in celery leaf. The amount of the traditional wild vegetable in chicory, dandelion and shepherd's purse was 211, 354 and 459 μg/100 g, respectively. The vitamin K1 intake of all subjects was 229.7 ± 87.1 μg/d (83.0-575.0 μg/d) and 91.7% of participants met the adequate intake (AI) of vitamin K1 for adult in China. 18.8% of subjects had a vitamin K1 intake higher 300 μg/d. The contributions of green leafy vegetables, other vegetables, plant oil to total vitamin K1 intake were 53.8%, 21.0% and 16.1, respectively. Chinese cabbage larger (80 μg/100 g wet weight) provided 34 % of total vitamin K1 intake.

Conclusions: The present study shows that habitual vitamin K1 intakes in old adults living in northern China were high. Phylloquinone from green leafy vegetables were the major contributors to the total vitamin K1 intakes.

Key words: Vitamin K, phylloquinone, food composition, dietary intake, elderly

PO2564

EFFECTS OF ZINC DEFICIENCY ON TISSUE MINERAL DISTRIBUTION AND BONE METABOLISM

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Background and objectives: Zinc is an essential nutrient that is required in humans and animals for many physiological functions. Furthermore, zinc has been demonstrated to have a stimulatory effect on osteoblastic bone formation and mineralization. However, very few studies have documented the relationship between tissue mineral distribution and bone metabolism by zinc deficiency in rats. We hypothesized that zinc deficient diet induces mineral alteration in several organs, and affects negatively bone metabolism in rats.

Methods: Four-week-old male Wistar rats were assigned to three different dietary groups: a zinc adequate diet (zinc, 30 ppm) group (C), a zinc adequate diet (zinc, 30 ppm) and pair fed group (PF), and a zinc deficient diet (zinc, 1 ppm) group (ZD). The rats were fed their respective diets for 4 weeks.

Results: After 4 weeks of feeding, weight gain and food efficiency were significantly decreased in the ZD group compared to the two zinc adequate groups. Serum zinc concentration was significantly lower in the ZD group than in the C and PF groups. Compared to the C and PF rats, the ZD rats showed significantly low mean values in tibial bone mineral density (BMD) and bone strength. Additionally, serum osteocalcin, a bone formation marker, was lower in the ZD rats than in the C and PF rats. Urine deoxypyridinoline (DPD), a bone resorption marker, was higher in the ZD rats than in the C and PF rats. Interestingly, magnesium concentration in femur and tibia was increased in the ZD rats compared to the PF and C rats. Moreover, iron and copper concentrations in liver were significantly higher in the ZD rats than in the PF and C rats.

Conclusions: These findings in the present study suggest that several mineral alterations may affect indirectly bone fragility by zinc deficiency.

Key words: Zinc deficiency, bone, magnesium

PO2565

EVALUATION OF MINERAL STATUS IN RHEUMATHOID ARTHRITIS PATIENTS

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Background and objectives: Pathogenic events such as inflammatory cascades and cell damage are caused by reactive oxygen species (ROS), but they could be decreased with an adequate nutritional selenium (Se) and zinc (Zn) status. These minerals function as a component of antioxidant enzymes (glutathione peroxidase and superoxide dismutase), protecting cells from oxidant damage. Large amounts of ROS are produced in patients with rheumatoid arthritis contributing to the pathogenesis of the disease. Then, the present study aimed to evaluate selenium and zinc status in patients with rheumatoid arthritis (RA).

Methods: Sixteen RA patients, aged 30-65 y and attending clinical treatment in São Paulo Hospital, were included in this study. Plasma samples were collected and the determination of Se and Zn concentration was carried out by hydride generation atomic absorption spectrometry (HG-AAS) and flame atomic absorption spectrometry, respectively. Minerals intake was assessed through three 24-hour recalls using Nutwin software and GPx and SOD activity, using the kits Randox and Ransod, respectively.

Results: All patients presented decreased plasma Zn (52.4 ± 7.5 μg Zn/l) and Se concentrations (46.5 ± 14.0 μgSe/l), except for two of them for Se. These data were positively correlated to Se and Zn intake (r=0.4082, r=0.4553; p<0.05) and neither of the patients achieved the Dietary Reference Intake. Zn and Se intake were adjusted for energy. Se intake above daily requirement leads to an insufficient GPx activity (45.68 ± 21.67 U/g Hb) as shown in Pearson correlation (r=0.666, p<0.05). Besides that, SOD activity varied among patients (1503.5 ± 581.2U/g Hb).

Conclusions: Preliminary results indicate that our patients with rheumatoid arthritis are nutritional deficient in Se and Zn and this fact could compromise antioxidant defense system.

Key words: Selenium, zinc, rheumatoid arthritis, antioxidant defense system

PO2566

EFFECTS OF FOOD MATRIX AND COOKING PROCESS ON MINERAL BIOACCESSIBILITY OF ENTERAL NUTRITION FORMULAS

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Background and objectives: In order to avoid monotony when enteral formulas (EF) are used in prolonged treatment as feed supplement, a common practice is their incorporation into foods. However, nutritional properties of EF could be modified by food matrices and cooking processes. The objective of this study was to evaluate the in vitro bioaccessibility of Fe, Zn and Ca (%DFe, %DZn, %DCa) from EF and the impact upon their incorporation into sweet preparations.

Methods: Twenty commercial EF, both powder and liquid (EFP, EFL) were evaluated. Sweet preparations were: rice pudding (RP), banana smoothie (BS), tea (T) and chocolate dessert (CD). Mineral content was determined by atomic absorption spectrophotometry. Mineral bioaccessibility was estimated by the percentage of dialyzate mineral after a digestion process that simulates gastrointestinal processes. Also mineral potential supply of 200 g serving was analyzed.

Results: Fe, Zn and Ca dialyzability from EF was variable and generally low. The mean and range of mineral dialyzability were: %DFe: 2.38 ± 1.36% (0.36–5.48%), %DZn: 4.8 ± 3.1% (0.2–12.0%), %DCa: 9.5 ± 4.6% (3.8–18.1%). The EFL showed higher Fe dialyzability than EFP, which may be related to the processes carried out during the drying of the formulations for later reconstitution. However, no significant differences were observed in the cases of Zn and Ca dialyzability among EFP and EFL. Heating during EF-sweet food preparation (T and CD) lowered by 44.1 %DFe, possibly due to degradation of vitamin C, and by 52.7 %DZn and 25.3 %DCa, due to interaction with food components. EF and EF-sweet foods did not make a good supply of Fe, Zn and Ca, as it is recommended.

Conclusions: This study demonstrated how the bioaccessibility of these minerals is affected for food matrix in which EF is included as well as the heating during food preparation.

Key words: Enteral formulas, bioaccessibility, minerals, iron, zinc, calcium

PO2568

DIET ANALYSIS OF ELDERLY PEOPLE: DEVELOPMENT OF A FOOD LIST

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Background and objectives: Despite the phenomena of population aging, studies describing the feeding practices of elderly individuals are scarce. Our aim was to develop a list of the most ingested foods from community-dwelling elderly persons and to analyze the foods that contribute most to relevant health-related nutrients of these individuals.

Methods: The study was performed with 100 individuals aged 60 years and above, registered at a local reference center. To describe the nutritional status, the weight and stature were measured and the BMI- body mass index was calculated. To develop the food lists, two 24 h food recalls were applied, during two different seasons of the year. The food recalls were analyzed for food intake frequency and for percentage contribution of each food and each nutrient: energy, macronutrients, calcium and vitamin D.

Results: The participants were classified as following: 52% with BMI < 28 kg/m2; 15% with BMI between 28 and 30 kg/m2; 26% between 30 and 35 kg/m2 and 7% presented BMI > 35 kg/m2. The positive aspects related to food intake were rice, bean and green vegetable consumption. As negative aspects, we observed that the diet pattern was repetitive, since few foods contributed to a high number of nutrients. Furthermore, a high ingestion of refined carbohydrates was observed instead of whole foods.

Conclusions: The food lists allowed reflecting on educative interventions, and also allow future development of different food frequency questionnaires that are specific for this group.

Key words: Elderly, nutrition assessment, diet analysis

PO2569

BODY COMPOSITION AND PATTERN OF FAT DISTRIBUTION IN SCHOOL CHILDREN OF RURAL AND URBAN PLACES OF VENEZUELA

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Background and objectives: The pattern of central fat distribution is associated with atherogenic processes in childhood. Our aim was to evaluate body composition, muscle area (MA), fat area (FA) and the pattern of fat distribution in school children in Rural Areas (RA) and Urban Areas (UA) of Venezuela.

Methods: The research was exploratory descriptive. 458 children aged 4-14 years old in RA (58.9%) and UA (41.1%) were studied. Anthropometric variables were used to determine MA and FA and the distribution of adiposity by the Centripetal Index (CI) and Sestri (ST). For the categorization of MA and FA the national reference was used, a ST > 1 indicates tendency towards centralization and < 1 towards peripheral distribution. Data descriptive statistic, 't' Student test, analysis of variance and 95% significance level were used.

Results: RA children had higher values of MA, CI and ST than UA children and only FA was lower for RA. An increase of the variables according to subject age was observed, detecting significant increase in girls of RA in relation to UA. UA boys showed higher proportion of low MA and high FA; meanwhile the distribution pattern of peripheral adiposity was higher for the AU and the central adiposity distribution for RA. The older children tend to increase the central adiposity distribution more in boys than in girls in UA.

Conclusions: The body composition and the pattern of adiposity distribution differ between children living in rural and urban areas; this could be conditioned by socioeconomic variables, dietary habits, environmental, and physical activity.

Key words: Anthropometry, body composition, fat distribution

PO2570

DEVELOPMENT AND VALIDATION OF A SEMI-QUANTITATIVE FOOD FREQUENCY QUESTIONNAIRE FOR YOUNG SCHOOL-AGED CHILDREN

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Background and objectives: Accurate assessment of food intake in children and adolescents is an essential prerequisite for conducting epidemiological and clinical research on the links between diet and health. The objective of the present study was to examine the validity for estimating energy and macronutrients intake of a newly developed picture aid, semi-quantitative food frequency questionnaire (FFQ) for Greek children and preadolescents.

Methods: Sixty nine children, aged 10-12 years old (48% boys) were voluntarily enrolled in the study (86% participation rate). Children were asked to complete a 48 food items and 11 more supplementary questions, picture aid, FFQ as the test instrument and a 3-day dietary record (3DD) as the reference method. Anthropometric and lifestyle characteristics were also measured to evaluate the factors that may be related with reporting the dietary intake. The Bland and Altman method and the Wilcoxon signed rank test were used to evaluate the degree of agreement between the FFQ and the 3DD.

Results: The two methods were found to agree in terms of mean energy intake according to the Bland and Altman method, although a trend in overestimating energy intake was found as the intake increases. Additionally, results of the Wilcoxon signed rank test revealed the similarity of the distribution in energy intake as estimated from the FFQ and the 3DD (median (IQR): 2038 (1264 - 2651) kcals for the FFQ vs. 1902 (1583 - 2324) kcals for the 3DD, p=0.33). Concerning macronutrients intake, the agreement was also considered adequate as the mean difference for each nutrient was < 1 SD of the same nutrient intake as estimated from the reference method.

Conclusions: The FFQ can be used to estimate mean daily energy intake in children, as well as to estimate macronutrients intake at the group level.

Key words: Nutritional assessment, food frequency questionnaire, validation, children

PO2571

THE INFLUENCE OF DIETARY FAT ON THE FAECAL EXCRETION OF ZINC AND IRON

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Background and objectives: It has been reported that consuming diets high in saturated fatty acids leads to a greater faecal calcium excretion, presumably due to the formation of insoluble Ca-fatty acid soaps. In contrast, the impact of dietary fat on other divalent cations, such as zinc or iron, has received little attention, even though zinc or iron deficiency is prevalent. This study aimed to determine the faecal excretion of the latter micro-minerals from diets rich in either saturated or polyunsaturated fatty acids using the growing pig as a model for the adult human. Soybean oil and tallow were used as fat sources as they contain large amounts of available (present in the sn1 and sn3 positions and therefore available for soap formation) unsaturated and saturated fatty acids respectively.

Methods: Pigs received semi-synthetic wheat starch-based free phytate diets containing either soybean oil or tallow as the sole fat source (130 g/kg). The concentration of all other nutrients was equivalent across diets. Faeces were collected over a 72 h period after a 6 day acclimatisation period. Apparent faecal mineral flows were determined based on an indigestible marker (titanium dioxide).

Results: The faecal flows of zinc for pigs fed the tallow-based diets (220 ± 13.9 mg/kg) were significantly ($p<0.001$) higher compared to those for pigs receiving the soybean oil-based diets (163 ± 4.3 mg/kg). In contrast, the faecal flows of iron (224 ± 17.4 mg/kg) were not different ($p>0.05$) across dietary treatments. The fact that zinc, but not iron, was excreted to a greater extent in the presence of dietary saturated fatty acids supports the hypothesis that fatty acid soap formation may occur with minerals other than calcium and that not all minerals behave in the same way.

Conclusions: These results may have implications for diets for humans that are high in saturated fat even if zinc is present in adequate amounts.

Key words: Excretion, zinc, iron, saturated fat

PO2572

DEVELOPMENT OF ENGLISH HOMEPAGE OF NUTRITIONAL INFORMATION ON KOREAN FOOD FOR INTERNATIONAL INFORMATION EXCHANGE

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Background and objectives: In 2002, the FAO/INFOOD designated Korea's Rural Development Administration (RDA) as a representative institute for the food composition database in Korea. Korea's RDA has published food composition tables since 1970 and recently published the 8th edition of food composition tables including 2,757 kinds of foods and 22 kinds of nutrients. These Korean food composition tables are written in Korean but also include English subtitles. Despite the English translation, the homepage with the Korean food composition tables was only recently provided by Korea (http://koreanfood.rda.go.kr/). For this reason, the tables are quite limited for internationals who are concerned about the Korean food composition database. Therefore, it is urgent that Korea's RDA provide the tables through an English homepage. The purpose of this study is to develop an English homepage which can provide convenient access to nutritional information on Korean food.

Conclusions: This homepage service will contribute to an international information exchange about Korean Food.

Key words: English homepage, nutritional Information, Korean food, international information exchange

PO2573

STATUS OF SERUM 25 (OH)-VITAMIN D IN ELDERLY IRANIAN SUBJECTS AFTER ONE YEAR SUPPLEMENTATION WITH VITAMIN E AND C

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Background and objectives: Elderly patients with MCI (Mild Cognitive Impairment) show different levels of serum 25 (OH)-vitamin D. Vitamin D status especially in the elderly may be influenced by different factors. There is no data about how the serum 25 (OH)-vitamin D levels could be influenced by supplementation with antioxidants. In this study the impact of one year intervention with vitamin E and C on the status of 25 (OH)-vitamin D was assessed.

Methods: A double-blinded, placebo-controlled, study was conducted in 60 elderly Iranian subjects with MCI aged between 60-75 years (30 women and 30 men). Divided into two main groups, the intervention group included 30 subjects who were given a daily dose of 300 mg vitamin E (alpha-tocopheryle acetate) and 400 mg vitamin C (ascorbic acid) and the other 30 subjects (Control group) received specially designed placebo. All subjects were not taking any drugs that might interfere with vitamin D status. Serum 25 (OH)-vitamin D levels were assessed in all subjects at baseline, 6 and 12 months of intervention using 25 (OH)-vitamin D direct ELISA kit.

Results: Results show there was a significant difference between males and females both in the control and supplemented groups at six months of intervention: Control, males/females 72.1 ± 22.9 units; 158.3 ± 26.1 units, $p<0.019$, and Supplemented, males/females 64.2 ± 19.2 units; 136.3 ± 26.6 units, $p<0.036$, respectively. At the end of the intervention there was no significant difference between males and females in Supplemented group (67.5 ± 21.6 units; 137.7 ± 30.8 units, $p<0.073$).

Conclusions: One year of antioxidant supplementation with vitamin E and C in elderly subjects with MCI did not influence on the serum 25 (OH)-vitamin D levels.

Key words: Serum 25(OH)D, antioxidants, MCI, elderly

PO2574

THE QUALITY OF FOOD INTAKE OF FILIPINO HOUSEHOLDS: PROGRAMMATIC IMPLICATIONS

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Background and objectives: Food Consumption Survey is one of the components of the National Nutrition Survey conducted by the Food and Nutrition Research Institute. Food consumption data provides updates on the dietary intakes of Filipino households. Results are used to track changes in food and nutrient intake and serve as basis in formulating plans and programs to address malnutrition, food security and diet-related chronic diseases. This study aims to describe the food intake of the Filipino households and the proportion of households below the Estimated Energy requirement.

Methods: Using the data from the 2008 National Nutrition Survey, about 4,880 randomly selected households were included in the study. One-day food consumption data were collected using the food weighing method. Conversion of food intake to energy and nutrients was based on the Philippine Food Composition Table, and the energy and nutrient intakes were assessed using the recommended intake for energy and protein and the Estimated Average Requirements (EARs) for the rest of the nutrients.

Results: Results revealed a rice-fish-vegetable diet dominate the meal matrix of an average Filipino. Total food consu-

med was 861 g and energy intake was 1867 kcal per capita per day. About 40% of the households met the estimated average requirement (EAR) for nutrients like protein, calcium, iron, thiamine, riboflavin and ascorbic acid. Only niacin intake was high meeting 93% EAR. A declining trend was noted in the consumption of major food groups since 1978 to 1993 but an increasing intake of rice, fish and poultry was observed from 2003 to 2008.

Conclusions: Nutrition education on improving the quality of diet of Filipinos must be intensified and agricultural planners should consider the availability of variety of foods which are accessible and affordable by all Filipinos to reduce the rate of undernutrition in the country.

Key words: Food intake, nutrient, EAR

PO2575

A COMPARATIVE STUDY ON THE INFANT AND YOUNG CHILD FEEDING PRACTICE AND NUTRITION STATUS AMONG 6-23 MONTHS AGE GROUP CHILDREN

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Background and objectives: Child nutritional status is an essential component of a country's overall human development. Inappropriate feeding practices are linked with the malnutrition, overweight and obesity that may develop beyond the age of 2 years. The present study was aimed to assess the infant and young child feeding practice and nutrition status among 6-23 months age group children in nutrition intervention and non-intervention areas.

Methods: It was a comparative cross-sectional study. 350 subjects among age group of 6-23 months children. Anthropometric data were collected by standard techniques. Nutritional status was measured using Z score according WHO classification. χ^2 test, independent t test, Pearson's correlation, multiple regression and logistic regression was performed as $p<0.05$ level of significance.

Results: Initiation of breast feedings within an hour were 68% and 59.4% among NNP (National Nutrition Program) and non-NNP ($p<0.000$) area. Prelacteal fed were 34% in NNP and 37% in non-NNP area. Exclusive breast fed were 54.3% and 44% in NNP and non-NNP area ($p<0.034$). It was found that appropriate complementary feeding practice were 51.4% and 38.9% in NNP and non-NNP area. In NNP area, severe wasted, stunted and underweight was 3.42%, 6.28% and 10.28% respectively. In non-NNP area, severe wasted, stunted and underweight was 8.0%, 16.0% and 18.9% respectively. Significant difference was found between NNP and non-NNP areas of initiation of breast feeding ($p<0.000$), exclusive breast feeding ($p<0.034$) and complementary feeding practice ($p<0.034$). In Pearson's correlation there was found positive relationship between NNP and non-NNP area according to mean intake of energy, carbohydrate and fat ($p=0.000$, $p=0.021$ and $p=0001$, respectively).

Conclusions: This study showed that the infant and young child feeding practice and nutritional status are better in nutrition intervention area. Appropriate feeding practice plays an important role in their good nutrition status.

Key words: IYCF and nutrition, nutrition intervention, Z-score

PO2577

WATER AND BEVERAGE INTAKE IN HEALTHY SUBJECTS FROM EUROPEAN COUNTRIES

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Background and objectives: Intake of water is done mainly through consumption of drinking water and beverages plus water contained in food. Sometimes, the use of information from different sources and different methodological characteristics raises issues of comparability that are difficult to address. The main objective of this review was to examine the available techniques in assessing hydration status in epidemiological studies in Europe and describe which was the best and most frequently method applied to assess liquid intake in populations.

Methods: Sources of data on beverage intake available from European surveys and nutritional epidemiological investigations were selected from grey literature. With the average of intake of water, soft drinks and alcohol beverage intake, we calculated total fluid intake, reported in g/day.

Results: Twelve articles were included and all relevant data regarding beverage consumption was extracted. Beverages studies were carried out on healthy adults by different types of assessment. The averages of total beverage intake vary from 941 g/d for Spain to 2659 g/d for men in Germany.

Conclusions: From the limited data available, the results show that the average consumer is so different between countries. These differences derived from the methodology used. To our knowledge, there have not been developed recent epidemiological studies that focus on beverage intake in Europe. Further investigation into beverage intake is necessary to clarify what is the real amount of beverage intake in European population, which is the best tool for the evaluation, and to derive the standardized, harmonized and integrated results in reliable recommendations.

Key words: Water, beverages, epidemiological European studies

PO2578

DIFFERENTIAL RELATIONSHIPS BETWEEN FRIED FOODS INTAKE ESTIMATED BY SELF-REPORTED DIETARY INSTRUMENTS, THE MULTIPLE SOURCE METHOD, AND WEIGHT GAIN DURING PREGNANCY

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Background and objectives: Studies suggest that the Multiple Source Method (MSM) is a useful statistical technique to estimate usual food intake for individuals and populations. The aim of the present study was to compare the associations between fried foods intake estimated by the MSM, and two self-reported dietary instruments, in relation to excessive weight gain during pregnancy.

Methods: A prospective study was conducted among 88 adult pregnant women. Excessive weight gain during pregnancy was defined as > 0.51 kg/week, according to the Institute of Medicine criteria. Fried foods intake during pregnancy was assessed by a validated 85-item quantitative food frequency questionnaire (FFQ), 3 dietary recalls (24hR), and the MSM. Adjusted linear regression models were applied to assess the relationships between fried foods intake estimated by distinct approaches and excessive weight gain during pregnancy.

Results: The mean ± SD age of participants was 25 ± 5 years old, and 41% had excessive weight gain during pregnancy. The mean ± SD fried foods intake were 95 ± 64, 101 ± 64, and 84 ± 41 units estimated by the FFQ, 24hR, and the MSM, respectively. For every 100 g increment of fried foods intake, the ß1 (95% CI) for excessive weight gain was 1.2 (0.3, 2.1) for the MSM estimates, after adjustment for by maternal age, education, duration of follow-up, and gestational age at the last interview. No associations were found for fried foods intake estimated by the FFQ [0.4 (-0.28, 1.0)], and by the 24hR [0.3 (-0.34, 0.93)] and weight gain.

Conclusions: These data provides support for the use of the MSM approach estimates for usual food intake while evaluating diet-disease relationships during pregnancy. The results suggest a positive association between fried foods intake and excessive weight gain during pregnancy.

Key words: Multiple source method, excessive weight gain during pregnancy, self-reported dietary instruments

PO2579

PREVALENCE OF OVERWEIGHT AND OBESITY AMONG ADOLESCENTS IN SECONDARY SCHOOLS IN ABA SOUTH L.G.A ABIA STATE

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Background and objectives: Adolescent obesity is a serious public health problem because of its strong association with adulthood obesity and the related adverse health consequences. The published literature indicates a rising prevalence of adolescent obesity in both developed and developing countries. Our aim was to determine the prevalence of overweight and obesity among adolescents in secondary schools in Abia State, Nigeria.

Methods: A cross-sectional school-based survey was conducted to determine the prevalence of overweight and obesity in adolescents of Aba South L.G.A. A probability proportional to size was used to select 10 schools where 600 participants, aged 10-19 years were selected. Their weight, height, waist, hip, body mass index and triceps skinfold were assessed. Overweight and obesity was defined using IOTF, CDC and NHANES III cutoff points. Waist-Hip Ratio (WHR) was compared with the WHO standards. Data was analysed using descriptive statistics. Chi-square analysis was used to test the categorical variables at $p<0.05$.

Results: The prevalence of overweight seems high in both genders (3.0% and 6.7% in males and females respectively) ($p=0.005$) while obesity prevalence was low (1.0% and 2.5% in males and females respectively) ($p=0.085$). More female adolescents (1.2%) than males (0.3%) were classified as obese when triceps skinfold was used as a measure of obesity. About 36.0% of the adolescents were at high health risk when WHR was used as a measure of classification.

Conclusions: Based on the findings, it was concluded that there is need for ongoing individualized dietary education among adolescents in secondary schools in Nigeria.

Key words: Prevalence, overweight, obesity, adolescents, Abia State

PO2580

THE NUTRITIONAL CHARACTERIZATION OF RICE VARIETIES CONSUMED IN PORTUGAL

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Background and objectives: Portugal has the largest consumption of rice 15.8 kg/capita/year, in Europe. The present work aims to evaluate: rice nutritional profile, namely proximate, amino acid and mineral composition; arsenic content, as the most abundant contaminant and, compositional differences between varieties, year and place of harvest.

Methods: Samples were collected from the most representative national rice producers. Analysis was carried out by the following analytical methods: proximate by AOAC methods; amino acids by UPLC-DAD; starch, and amylase by enzymatic methods; mineral analysis by ICP-OES including copper, manganese, iron, zinc, magnesium, calcium, sodium, phosphorus and potassium and arsenic content by ICP-MS.

Results: Analyzed rice showed higher amylopectin (54.7 ± 7.3 g/100g) content than amylose (33.5 ± 3.8 g/100g) and total protein content of 7.1 ± 0.3 g/100g a low content of fiber and fat (<1 g/100 g) was found. The most abundant essential amino acids were aromatic amino acids with a 7.5% of total protein. The most abundant minerals were potassium and phosphorus with levels ranging from 91 mg/100 g to 107 mg/100 g. The arsenic content was determined by ICP-MS and the values were below 600 μg/kg.

Conclusions: Crop place showed to be the major source of variation in amino acid content. With respect to protein quality, cysteine, lysine, sulfur amino acids and isoleucine were considered limiting with protein digestibility corrected amino acids scores (PDCAAS) lower than 1. To assure the nutritional requirements for amino acids and subsequent protein synthesis, rice consumption must be followed by other food groups (e.g pulses, meat products) in order to provide the other essential amino acids. Rice contribution for mineral intake ranged from 3% DRI (iron and potassium) to 36% DRI (manganese). In this study, a very weak correlation between arsenic levels and amino acid content was observed.

Key words: Rice, food composition, data quality

PO2581

INTER-RELATIONSHIPS AMONG ZINC, HEMOGLOBIN, AND SELENIUM STATUS OF RURAL MALAWIAN WOMEN

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Background and objectives: Evidence of interactions between Zn and haemoglobin (Hb) and Zn with Se prompted a cross-sectional study to investigate possible predictors of Hb and plasma Zn in rural women living in low or high soil Se districts in Malawi.

Methods: Data on socio-demographic status and 1-d duplicate diet composites analyzed for Fe, Zn, Se and phytate (Phy) were collected from rural Malawian women aged 18-50 y from a low (Zombwe) (n=60) and high (Mikalanago) (n=60) Se district. Non-fasting blood samples were collected for Hb, plasma biomarkers of Fe, Zn, and Se status, and C-reactive protein and α-1-glycoprotein (AGP) for inflammation.

Results: The prevalence of Zn deficiency (plasma Zn <10.7 μmol/l) was high in both districts (>90%) and much greater than anemia (Hb<120 g/l) (21%), storage iron depletion (ferritin < 12 μg/l) or tissue iron deficiency (transferrin receptor >6.8 mg/l) (both <16%). This finding was attributed to the low Zn content of diets (median 5.7 mg/d) and high Phy:Zn molar ratios (20.0), and high total Fe content (21.0 mg/d). Regression analysis with Hb as the dependent variable showed that plasma Zn was the most important explanatory variable with the largest standardized coefficient (0.299), followed by log ferritin (0.248) and log AGP (0.175). Zombwe women had lower (p<0.05) intakes of Zn (4.8 vs. 6.4 mg/d) and Se (6.5 vs. 55.3

μg/d) and plasma Se (0.72 vs. 1.60 μmol/l) than Mikalanago women; plasma Zn did not differ (8.60 vs. 8.87 μmol/l). Correlations between plasma Zn and Se were positive (r=0.253; p=0.052) in Zombwe, but negative in Mikalanago (r=?0.273; p=0.035).

Conclusions: Plasma Zn was a more important predictor of Hb than log ferritin and was also associated with the women's Se status in both districts, albeit by different mechanisms.

Key words: Malawi, women, plasma Se, Zn, haemoglobin

PO2582

FOOD FORTIFICATION STRATEGY TO CONTROL MICRONUTRIENT DEFICIENCIES IN SENEGAL

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Background and objectives: Micronutrient deficiencies such as iron, folic acid, vitamin A, zinc, iodine are widespread in Africa and affect people of all ages and socio-economic groups. The primary cause being insufficient intake of bioavailable minerals and vitamins from foods generally high in inhibitors of micronutrients absorption. Programs such as dietary diversification, breastfeeding, supplementation and food fortification are strategies available for controlling and preventing micronutrient deficiencies. In Senegal, after food fortification was made mandatory by the Government, a National Fortification Alliance (COSFAM) was created with a national strategic plan.

Methods: The operational approach was based on fortified foods production, distribution, quality control and social marketing. A FRAT based survey to find the suitable vehicles in order to reach the target groups was conducted. A second survey on food recalls was made, and data on iron, zinc, folic acid and vitamin A status were collected in women of child-bearing age and children from 12 to 59 months. A social marketing campaign was launched on the concept at national level. The whole program was strengthened through capacity building for the technical staff on quality control.

Results: Wheat flour and edible oil were identified as foods vehicles. Currently, industries are producing fortified foods that are being commercialized and there is a progressive adhesion of populations. The baseline status of micronutrients in women of child-bearing age and children from 12 to 59 months of age is known. These data will allow a long-term assessment of the effect of the program.

Conclusions: The program helped in setting important health indicators of the selected vulnerable groups and allowed to develop a good strategy to progressively eradicate micronutrients deficiencies. However it is critical to have good inspection, monitoring and evaluation systems of the production and distribution lines for sustainable results.

Key words: Micronutrient deficiencies, strategy, food fortification

PO2584

SMARTPHONE BASED VITAMIN D MONITORING

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Background and objectives: In developed nations such as the United States, over 75% of the population is deficient for vitamin D, leading to a number of complications including bone health problems like rickets and osteomalacia, and more prevalent diseases including depression and cancer. While treatment for micronutrient deficiencies is simple even in developing nations, nutritional assessment of them are both time and cost prohibitive. We develop a point of care diagnostic for vitamin D monitoring that is unique through its synergy with an already ubiquitous technology, the smartphone.

Methods: The smartphone based monitoring system is composed of an "accessory" which connects to an Android smartphone or tablet and consumable "cartridges" that take finger prick blood samples. The accessory acts as a bridge between the smartphones communications, data, location, and display capabilities, and the microfluidic and health related technologies of the inserted cartridge. The cartridge processes the blood sample similar to the steps proceeding an immunoassay (extraction, separation, etc.), and then performs a gold nanoparticle based colorimetric reaction that measures the concentration of vitamin D present.

Results: The assay is optically read out by the accessory, and the results are communicated to the smartphone. Data is then simply displayed to the user who can monitor their levels overtime, or aggregated from multiple collection points and exported for further spatiotemporal analysis. Other users both at computers and in the field with tablets can view maps generated from the data and locate and track regions where malnutrition is worst. Sensitivity is similar to that of current immunoassays.

Conclusions: This work represents one of the earliest works of direct blood micronutrient detection on smartphone and tablet technology. By leveraging these new devices unique data and communications capabilities a new level of nutrition surveillance is possible.

Key words: Vitamin D, diagnostics, nutrition, nutrition assessment, micronutrients

PO2585

THE RISK OF ZINC DEFICIENCY DOES NOT DIFFER BETWEEN PREMENOPAUSAL FEMALE AUSTRALIAN BLOOD DONORS AND NON-DONORS: A CROSS-SECTIONAL STUDY

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Background and objectives: Lingonberry (Vacciniumvitis-idaea L) is a popular edible berry in Scandinavian countries and is increasing in popularity across Europe. Lingonberry possesses a complex polyphenolic profile consisting of a mixture of anthocyanins, phenolic acids, flavonols and proanthocyanidins which is of interest due to their putative anticancer activity. After consumption, phenolic compounds are subject to digestive conditions within the gastrointestinal tract which alter their structures and potentially their bioactivity. Given limited bioavailability in the small intestine, a substantial portion of berry phenolic compounds are likely to pass into the colon where they are degraded by the colonic microbiota. Therefore, it is reasonable to infer that the colonic epithelium is exposed to both the parent phenolic compounds and their degradation products. Our aim was to evaluate the impact of digestion and colonic fermentation on phenolic components and bioactivity of a lingonberry extract (LE).

Methods: LEs were produced by in vitro digestion and subsequent faecal fermentation and characterised by LC-MS and GC-MS. Bioactivity was tested using a physiologically relevant dose range (0-50 μg/ml phenols) with a 24 hour exposure in in vitro models representing key stages in colon carcinogenesis namely initiation (comet assay, HT29, mutagenicity assay HT29G17neo) and invasion (Matrigel invasion assay, HT115).

Results: LC-MS and GC-MS analysis confirmed digestive and fermentation processes altered the polyphenol composition relative to the original LE with the levels of simple aromatic components increased in the fermented extract. Digested and fermented LE exhibited significant anti-genotoxic ($p<0.05$), anti-mutagenic ($p<0.05$) and anti-invasive ($p<0.05$) effects compared to the appropriate controls (ANOVA, Post Hoc Dunnett T test) in all in vitro models.

Conclusions: This study indicates that despite extensive structural modification following digestion and fermentation, lingonberry extracts retain their ability to modulate cellular processes associated with colon cancer.

Key words: Lingonberry, phenolics, fermentation, anticancer

PO2586

DEVELOPMENT OF PREDICTIVE EQUATIONS FOR FAT BODY SEGMENTS IN SEROPOSITIVE HIV PATIENTS

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Background and objectives: With the advent of highly active antiretroviral therapy (HAART), HIV seropositive patients began to present themselves clinically stable. However, changes in body composition called lipodystrophy and metabolic syndrome are observed. The central point of the syndrome are changes in body composition that mainly involve the loss of fat in the limbs and face (lipoatrophy) and/or fat gain in the abdominal region and back neck (lipohypertrophy). To date, the determination of fat per body segment in this group can be obtained by imaging methods such as X-ray absorptiometry (DXA) but not by anthropometric measures, which would be more feasible to be used in practical clinic. It is important to monitor the amount of fat per segment using simple and low cost methods in order to optimize treatment of this group. Our aim was to develop equations by linear regression to estimate fat in each segment (arm, leg and trunk) considering anthropometric and bioelectrical impedance analysis (BIA) variables in HIV seropositive patients on HAART.

Methods: We measured circumferences (arm, waist, hip, thigh, calf), skinfolds (biceps, triceps, subscapular, suprailiac) and conducted examinations of segmental BIA and DXA in 100 HIV seropositive men. These variables were used to develop equations to estimate fat segments (arm, leg and trunk).

Results: We developed two models for estimation of arm fat and 2 for the trunk fat using only anthropometric measurements and two models for leg fat using BIA and anthropome-

tric variables. The coefficients of determination for models of arm, torso and legs were 0.66 and 0.66, 0.76 and 0.75, 0.5 and 0.45, respectively.

Conclusions: The developed equations allow the assessment of fat per body segment (legs, arms and trunk) through evaluation methods accessible, accurate and reliable used in clinical practice.

Key words: HIV, equations, body segments

PO2587

PROPOSED CUTOFF FOR OBJECTIVE DIAGNOSIS OF LIPODYSTROPHY IN HIV SEROPOSITIVE BRAZILIANS

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Background and objectives: The group of body composition and metabolic changes found in seropositive for HIV is called lipodystrophy syndrome. The central point of the syndrome are changes in body composition that mainly involve the loss of fat in the limbs and face (lipoatrophy) and/or gain fat in the abdominal region and back neck (lipohypertrophy). Large discrepancies in the reported incidence of lipodystrophy in scientific studies occur due to a lack of homogeneity of criteria for diagnosis. The fat mass ratio (FMR) was first proposed by Bonnet et al (2005) using an objective index of the X-ray absorptiometry (DXA) to identify lipodystrophy. FMR is defined as the ratio between the percentage of fat in the trunk and lower limbs. Our aim was to propose cutoff points for FMR in order to classify the lipodystrophy in male patients.

Methods: DXA and clinical examination was performed in 100 men on highly active antiretroviral therapy (HAART) and the FMR was calculated. ROC curves were constructed using clinical examination to identify the sensitivity and specificity to propose the cutoffs.

Results: The area under the curve (AUC) observed was 0,74 and the optimal cutoff point was 1.26, with a sensitivity of 73.63% and specificity of 72.2%. The FMR was significantly correlated with the time of HAART, age, CD4 and triglycerides.

Conclusions: FMR can be used to help in the diagnosis of lipodystrophy contributing to a more accurate diagnosis and early intervention, in order to avoid major changes in body composition.

Key words: HIV, lipodystrophy, diagnosis, DXA

PO2588

A BRIEF USER FRIENDLY TOOL TO ASSESS PATIENTS' NUTRITIONAL STATUS, DIETARY & EXERCISE PATTERNS

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Background and objectives: Nutrition plays a vital role in the healthcare process. Nutrition management involves dietary modifications and physical activity recommendations. There are several barriers for nutritional management at hospital settings including lack of resources, lack of time, and lack of knowledge about nutrition. Available nutritional screening tools for identifying patients at nutritional risk have a number of drawbacks. Therefore the objective of this study was to develop a brief user friendly tool to assess patients' nutritional status, dietary and exercise patterns.

Methods: Available nutritional screening tools for hospitalized patients were gathered from the reviewing the literature and conducting a preliminary survey. The "Pocket card" model was selected as a user friendly tool. The contents, wording and the figures of the tool were reviewed by three experts in the field of nutrition and dietetics. Ten healthcare professionals who are dealing with nutritional care process justified the format, contents and the presentation of the information in the tool. According to the comments of experts and professionals, the modifications were done and the final version of the "Pocket Card" tool was developed.

Results: The "pocket card" was developed as a user friendly tool. The size of the card was 5.83" inch in width and 8.27" inch in length. The tool was formatted as A5 size one page (front and back side) pocket card. Both sides of the tool were used and one side included assessment components while other side included recommendations for each component of the assessment. Assessment components as well as recommendation components were presented under the four sections named as Nutritional Status, Food Consumption Practices, Eating Behavior and Physical Activity Pattern.

Conclusions: The developed "pocket card" was a simple tool for assessing the nutritional status, dietary and exercises patterns of patients.

Key words: Patients, nutritional status, tool

PO2589

ASSOCIATION BETWEEN SERUM 25-HYDROXY-VITAMIN D LEVEL AND (FEATURES OF) THE METABOLIC SYNDROME: A CROSS-SECTIONAL STUDY IN THE NETHERLANDS

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Background and objectives: Vitamin D deficiency has been associated with an increased risk of type 2 diabetes mellitus, obesity and the metabolic syndrome (MetS). The mechanisms underlying these associations are not well understood. We aimed to assess the association between serum 25-hydroxy-vitamin D (25-OHD) levels with MetS, and its different components in a national sample of Dutch men and women aged 19-70 years.

Methods: Serum 25-OHD levels and MetS components were measured in 2,102 individuals participating in the health examination survey 'Measuring the Netherlands' (2009-2011). Metabolic syndrome was defined as having at least three of the following five risk factors: abdominal obesity, hypertension, low HDL-cholesterol, elevated glucose level and/or elevated triglycerides. Multivariate logistic regression models, adjusted for age, sex, education, ethnicity, smoking, alcohol, physical activity, season, and, if applicable, other MetS components, were used to assess the cross-sectional association between serum 25-OHD levels and MetS (features). Prevalent CVD and diabetes cases were excluded from the analyses. The final sample consisted of 1,899 individuals.

Results: The prevalence of MetS was 25%. Participants in the lowest (<52.9 nmol/l) and middle (52.9-71.1 nmol/l) tertiles of serum 25-OHD had a significantly higher prevalence of MetS compared to those in the highest tertile (>71.1 nmol/l): odds ratios (OR) (95% confidence interval): 1.63 (1.23-2.17) and 1.44 (1.09-1.90), respectively; p=0.0008). Following adjustment for potential confounders, serum 25-OHD was also inversely associated with abdominal obesity (OR=1.76 (1.32-2.35), lowest versus highest tertile; p=0.0001). In multivariate models, no statistically significant association was observed with any of the other MetS components.

Conclusions: In Dutch adults, lower 25-OHD levels were significantly associated with a higher prevalence of MetS and abdominal obesity, but not with prevalence of hypertension, low HDL-cholesterol, hyperglycemia and hypertriglyceridemia.

Key words: Vitamin D, metabolic syndrome, obesity, risk factors

PO2590

LEVEL OF ANAEMIA AMONG PREGNANT WOMEN IN TRIBAL INDIA

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Background and objectives: Anaemia in pregnancy is a common and serious problem especially in developing countries. It is estimated that almost twenty percent of maternal deaths are directly caused by anaemia and causes of another fifty percent of maternal deaths are associated with anaemia in the world. India is one of the countries with the largest prevalence of anaemia.

Methods: A cross sectional study was done in three blocks of Udaipur, Rajasthan, India covering a sample size of 699 pregnant women. Reference values for anaemia detection were taken as per international standards (UNICEF) and Indian (NFHS III 2005-06). The levels of anaemia were defined as per the values i.e. haemoglobin (Hb) above 11 g/dl (normal level), 10.0-10.99 g/dl (mild anaemia), 7.0-9.99 g/dl (moderate anaemia) and below 7.0 g/dl (severe anaemia).

Results: It is worrisome to note that 87 percent of the sample pregnant women were found to be suffering from any form of anaemia. This was found to be much higher than the national figures (59%). Nearly three-fifths of the pregnant women pregnant women suffer from moderate to severe anaemia (57%). The mean value Hb was found to be 9.7 g/dl with a standard deviation of 1.34 g/dl.

Conclusions: There is high prevalence of anaemia among pregnant women and this continues unabated despite multi fold programmes by the Government and interventions continuing for a long time.

Key words: Nutrition, pregnant women, India

PO2591

VALIDATION OF A SEMI-QUANTITATIVE FOOD FREQUENCY QUESTIONNAIRE FOR SRI LANKAN ADULTS

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Background and objectives: Sri Lanka is undergoing nutritional transition and diet-related chronic diseases are emerging as an important health problem. Currently, no validated food frequency questionnaire (FFQ) exists to measure habitual dietary intake of Sri Lankan adults. The aim of this study was to evaluate the validity of a newly developed FFQ for this population.

Methods: Dietary intake was measured using a FFQ and 7-day weighed food intake (7DWR). The FFQ consisted of 8 food groups containing the main foods comprising the diet of Sri Lankan adults, a total of 85 items and 12 color photographs to identify serving size. One hundred healthy adults were randomly recruited from a community sample and administrated the FFQ. Participants were then asked to record weighed food intake for seven days. Paired sample t tests and Pearson's correlation coefficients were conducted to determine whether the two instruments reported similar values for energy and nutrients.

Results: Eighty two subjects completed FFQ and 7DWR. Estimated mean energy intake ± SD from FFQ and 7DWR were 1794 ± 398 kcal and 1698 ± 333 kcal, respectively. Whilst the FFQ overestimated the energy intake when compared with 7DWR and 24DR the FFQ was significantly associated with 7DWR and 24DR for energy. We found a significant positive correlation between the FFQ and 7DWR for energy (r=0.39), percentage of energy from carbohydrate (r=0.40), percentage of energy from protein (r=0.52), percentage of energy from fat (r=0.34), carbohydrate (r=0.42), protein (r=0.26) and dietary fiber (r=0.32).

Conclusions: Based on these findings, the FFQ appears to be an acceptable tool for assessing the energy and nutrient intakes in this population.

Key words: Sri Lanka, food frequency questionnaire, validation, FFQ

PO2592

TRADITIONAL INDONESIAN FOOD HAS LOWER ENERGY DENSITY BUT NOT ENERGY PER PORTION THAN MODERN FOOD, STUDY IN MALANG INDONESIA

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Background and objectives: National Survey in Indonesia shows that prevalence of obesity and non-communicable disease in Indonesia has increased gradually. This condition can be caused by the shifting of life style from traditional into modern, including the food consumption. This research was aimed to identify the difference of the energy density, dietary fiber content, and energy per portion between Indonesian traditional food and modern food in Malang, Indonesia.

Methods: Sample was collected using purposive sampling for traditional food (n=19) and modern food (n=8). Energy content was analyzed in Laboratory of Research Institute in Legumes and Tubers (Laboratorium Balai Penelitian Kacang-kacangan dan Umbi-umbian/BALITKABI) Kendalpayak Malang, Indonesia. Analysis of dietary fiber content was calculated using NutriSurvey for Windows version 2004 with Indonesian Food Database. Statistical analysis was performed using SPSS software for windows.

Results: Indonesian traditional food has higher dietary fiber content than modern food (3.38 ± 0.97 grams vs. 1.51 ± 1.52 grams), and it has lower energy density than its counterpart (1.61 ± 0.58 kcals/grams vs. 3.14 ± 1.40 kcals/grams). However, traditional food has bigger size per portion than modern food (439.52 ± 126.45 grams vs. 175.94 ± 104.14 grams). It might be the reason why total energy per portion was not significantly different between traditional and modern food (662,48 ± 217.27 kcals vs 489.33 ± 196.20 kcals (Mann Whitney test).

Conclusions: Dietary fiber content contributes to lower energy density. However, energy density alone was not the only predictive factor to total energy intake, since it should be combinated with portion size.

Key words: Traditional food, energy density, fiber

PO2593

IODINE STATUS IN SPANISH WOMEN OF CHILDBEARING AGE

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Background and objectives: Women of childbearing age may be at risk of iodine deficiency in pregnancy and breastfeeding. An adequate maternal iodine status is essential for the correct thyroid function and the appropriate development of the central nervous system of the fetus and infant. The aim of the present study was to assess the nutritional status of iodine in women of childbearing age in Spain.

Methods: 157 women of childbearing age (18-44 years) were studied. Iodine status was assessed by the iodine concentration in urine over 24 hours and was determined by inductively coupled plasma mass spectrometry. Urinary iodine concentration (UIC) (μg/l) and iodine/creatinine ratio (I/Cr ratio) (μg/g) were categorized according to the cut-off points established by the World Health Organization. All calculations were made using SPSS (v19.0). Statistical significance was set at $p<0.05$.

Results: The median UIC among childbearing age women was 169.5 μg/l and the I/Cr ratio was 147.7 μg/g. Considering UIC and I/Cr ratio 0% and 1.5% had severe deficiency (<20 μg/l), 2.9% and 3.0% moderate deficiency (20-49 μg/l), 18.4% and 21.5% mild deficiency (50-99 μg/l), 41.2% and 37.8% adequate nutrition (100-199 μg/l), 14.0% and 14.1% was categorized as in risk of iodine-induced hyperthyroidism (200-299 μg/l) and 23.5% and 22.2% as in risk of adverse health consequences (>300 μg/l), respectively.

Conclusions: The 26% of women of childbearing age presented some type of iodine deficiency, but it was also noted that 36% of women had urinary iodine values indicative of risk of hyperthyroidism or adverse health consequences. The results of the present study suggest the need to monitor the iodine nutritional status in women of childbearing age.

Key words: Urinary iodine, status, childbearing women

PO2594

NOURISHMENT AND ITS RELATION WITH INMUNOLOGY INMUNITARY RESPONSE AND OXIDATIVE STRESS

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Abstract These last decade's articles were reviewed, all related to the topic and written in English and Spanish, well available at the Infomed intranet.

Background and objectives: It is a systematic bibliographic review about nutrition. Nutrients are classified as proteins, carbohydrates, fat, vitamins and minerals, needed in diet for the well functioning of the human being briefly discuss the design of the study/ program and how it was conducted. We would like to develop some projects of investigation to establish a useful therapeutic conduct which allow the patients to take the appropriate diet and prevent lots of disorders in the immunological system.

Methods: We performed a wide and systematic bibliographic revision about nutrition immunity and oxidative stress; on the second place we compiled and prosecuted the information.

Results: An analysis is done about the main antioxidants ingested by diet, due to the harmful effect that free radicals cause in the organism; on the other hand it is explained how nutritional manipulation of immunity may have clinical (cellular immunodeficiency, humoral and phagocitic weakness), biological and therapeutic implications. Besides, it is approached the effect that an adequate nutrition may have on the main defense mechanisms of the organism, present the main results with appropriate statistics/data analysis and pertinent discussion.

Conclusions: We analyzed the information of all current studies and in this bibliographic review, it is deductible the importance of an adequate nutrition to maintain a proper physical appearance and to diminish the oxidative stress mechanisms and improve our defenses.

Key words: Immunonutrition, antioxidants, olygoelements, immunodeficiencies

PO2595

THE RELATIVE VALIDATION OF EASY DIETARY ASSESSMENT TOOL USING URINE SODIUM AND NORMALIZED PROTEIN NITROGEN APPEARANCE AS BIOMARKERS

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Background and objectives: To delay the progression of chronic kidney disease (CKD), the reduction of sodium and appropriate protein and energy intake are recommended. Therefore, the suitable dietary assessment tool is necessary to monitor responses to therapeutic nutrition interventions in patients. Easy Dietary Assessment (EDA) was developed by Dr. Chanida Pachotikarn from Thai Dietetic Association and endorsed by the Nephrology Society of Thailand and Thai Nephrology Nurses Association to use as the tool to evaluate nutrient intake among CKD patients. The accuracy of EDA tool was assessed by comparison with the biomarkers.

Methods: Thirty participants who were not on anti-diuretic drugs were asked to record their 24 hour dietary intake and collect their 24 hour urine. The estimation of sodium, protein and energy intake using EDA tool were compared with urine sodium, normalized protein nitrogen appearance (nPNA) and INMU – Cal program.

Results: Positive significant correlation between total energy intake using EDA tool and INMU-Cal program were found ($r=0.796$; $p<0.01$). The results also demonstrated the significant correlation between dietary protein intake and nPNA ($r=0.431$; $p<0.05$). However, sodium intake was not associated with urine sodium ($r=0.338$; $p=0.067$).

Conclusions: EDA could be used as the dietary protein and energy assessment tool among Thai population with CKD. Conversely, this study indicates a limitation in using EDA to evaluate sodium intake.

Key words: Validation, CKD, protein intake

PO2596

FOLATE STATUS OF FILIPINO WOMEN OF CHILDBEARING AGE

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Background and objectives: Folic acid (FA) is a B-vitamin required for proper cell growth and development of the embryo to ward off major birth defects of the brain and spine, known as neural tube defects (NTD's). FA is required for the production of DNA, which is necessary for the rapid cell growth needed in the development of fetal tissues and organs in early pregnancy. The Philippine Health Statistics (PHS) listed congenital anomalies as the 5th leading cause of infant mortality which included NTD's, spina bifida, and hydrocephalus among others. Our objective was to assess the folate status of Filipino women of childbearing age.

Methods: A cross-sectional sample of 2119 Filipino women of reproductive age ranging from 15 to 45 years from the 7th National Nutrition Survey (NNS) were included. Serum and red cell folate were analyzed using radioimmunoassay (RIA).

Results: Based on red cell folate (<175 ng/ml), about 20.9%, were folate deficient while based on serum folate (<3.0 ng/ml), which is a measure of recent intake, the prevalence was 38.7%. On the regional level, the highest prevalence of serum and red cell folate was recorded in National Capital Region with 62.6% and 48% prevalence rates, respectively. On the other hand Northern Mindanao had the lowest prevalence of 10.7% for serum folate, while CAR and Cagayan Region had the lowest prevalence of 1.2% for red bood cell folate.

Conclusions: The high percentages of subnormal values of serum and red cell folate indicate alarmingly high prevalence of folate deficiencies among Filipino women of childbearing age. The findings strongly suggest the need for awareness and campaign for all women of childbearing age on the importance of taking folic acid every day day to reduce the risk of having a pregnancy affected by neural tube defects.

Key words: Folate deficiency, Philippines, childbearing age

PO2597

BODY COMPOSITION ASSESSMENT DURING REHABILITATION OF MALNOURISHED INFANTS AND CHILDREN IN A CLINICAL SETTING

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Background and objectives: Management of severe acute malnutrition (SAM) according to WHO guidelines reduces case-fatality but the use of enriched diets to promote rapid catch-up-growth after clinical stabilization may be associated with excess adiposity and poor lean deposition. We aimed to determine changes in body composition during rehabilitation of childhood SAM managed in accordance with WHO guidelines to assess whether achieved proportions of lean and fat are within reference range.

Methods: Forty male and female children with oedematous and non-oedematous SAM, aged 3 to 32 months were recruited. Measurements were conducted during the stabilization period (S1), catch-up growth at 50% weight repletion (S2) and at recovery on achieving at least 90% of reference weight-for-length (S3). Lean mass (LM) was determined using deuterium dilution in accordance with IAEA protocol.

Results: Data are mean ± SD. Weight-for-length Z-scores at S1 (non-oedematous: -3.0 ± 0.2; oedematous: -2.1 ± 0.2) improved to -0.48 ± 0.2 at S3. After stabilization on a maintenance diet, intake increased to 685 ± 101 kJ/kg/d and 3.7 ± 0.6 g protein/kg/d resulting in rapid weight gain (16.5 ± 5.1 g/kg/d) over 20 ± 10 d. TBW (% body weight) at S1 (67 ± 8) and S2 (67 ± 6) were higher than at S3 (63 ± 4), repeated ANOVA, $p<0.03$. Some estimates of TBW at S1 appeared unphysiological challenging the methodological assumptions applied in their derivation. At recovery, LM was consistent with reference values (71 to 92 % of body weight and 11 to 15 kg/m2).

Conclusions: Insecurity of estimates of TBW and LM at S1 limits the ability to capture changes in lean and fat during rehabilitation. However, rapid weight gain promoted by the enriched diet resulted in body composition within reference range.

Key words: Childhood malnutrition, rehabilitation, body composition

PO2598

DIFFERENCES BETWEEN VEGETARIAN AND NON-VEGETARIAN DIETARY PATTERNS AND THEIR NUTRIENT PROFILES STRATIFIED BY SEX AND RACE

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Background and objectives: Dietary patterns are of great interest as they reflect choices of food combinations. A description of major nutrient intakes by dietary pattern can help elucidate their possible contributions to the prevention of disease. The purpose of the study was to describe the associations between dietary patterns and nutrient intakes stratified by sex and race.

Methods: A cross-sectional study of 71751 subjects (mean age 59 years, 65% women, 76% white) from the Adventist Health Study-2 with data collected between 2002 and 2007. Participants completed a 204-item validated semi-quantitative food frequency questionnaire. Five dietary patterns were established: non-vegetarian, semi-vegetarians, pesco vegetarians, lacto-ovo vegetarians and strict vegetarians. ANCOVA analysis was used to determine differences in nutrient intakes by dietary patterns. Differences in non-dietary variables, such as age, BMI, smoking and physical activity are also reported.

Results: Mean nutrient intakes varied markedly between dietary patterns. Nutrient intakes were more similar for men and women than for blacks and whites. Supplement intakes were often markedly higher in women than in men and higher in whites than in blacks. Blacks had lower values of nutrients often associated with dairy intake and higher values of soy protein and marine fatty acids.

Conclusions: Nutrient intakes vary markedly between dietary patterns, more so than between the sexes or between blacks and whites. These differences may have health implications.

Key words: Diet, micronutrients, macronutrients, supplements, nutrient deficiencies

PO2599

COMPARISON OF CORRECTION FACTORS FOR EFFECTS OF SUBCLINICAL INFECTION ON PLASMA FERRITIN, BASED ON CROSS-SECTIONAL (INTER-GROUP) VERSUS LONGITUDINAL (INTRA-INDIVIDUAL) DATA

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Background and objectives: Subclinical inflammation and malaria parasitemia affect iron status biomarkers. To remove confounding effects of inflammation, a correction method has been proposed, based on ratios of plasma ferritin concentration (pF) among groups with different stages of infection, as classified by acute phase proteins (APP): elevated C-reactive protein only (CRP,G1); elevated α-1-acid glycoprotein (AGP) and CRP (G2); elevated AGP only (G3); and non-elevated CRP and AGP (G4). However, this method assumes that infected and non-infected individuals have the same nutritional status, which may not be the case.

Methods: Two blood samples were obtained 21 d apart from 412 asymptomatic Burkinabe children 6-23 mo old. Regression coefficients for pF by APP status were calculated independently using cross-sectional and longitudinal ANCOVA models, which capture inter-group versus intra-individual effects of APP on pF, and compared with F tests.

Results: Correction factors (CF) for pF from cross-sectional models (0.47;0.23;0.46;1, G1-G4, respectively) over-adjusted for the effects of APP on pF compared to longitudinal models (0.60;0.30;0.53;1, p=0.013); adjusted prevalence of iron deficiency (pF<12 μg/l) was 44.6% and 40.4%, respectively (unadjusted, 27.8%). Results suggest that pre-illness iron status was higher in children with subclinical inflammation than without, or that APP did not fully capture inflammatory effects. When pF was additionally adjusted for asymptomatic malaria (plasma histidine-rich protein II, HRP2), CF from cross-sectional and longitudinal models were not significantly different (APP, p=0.76; HRP2, p=0.23).

Conclusions: Basing CF on cross-sectional data in this population approximates the true effect of inflammation in an individual when both APP and malaria status are known. However, as prevalence estimates of iron deficiency were similar between APP-only models, cross-sectional adjustments may be adequate for survey data collection and programmatic decisions in this population.

Key words: CRP, AGP, ferritin, malaria

PO2600

COMPARATIVE STUDY OF THE ORAL ABSORPTION OF MICROENCAPSULATED FERRIC SACCHARATE AND FERROUS SULPHATE IN HUMANS

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Background and objectives: Iron is an essential trace metal whose absorption, extracellular concentration and body stores are efficiently regulated. According to the World Health Organization, iron deficiency is the most common nutritional disorder in the world. Because of dietary recommended iron intake is difficult to achieve from food alone, strategies for preventing iron deficiency have focused on food fortification with iron salts. Ideal iron fortificants should permit supplementing high doses of iron in food without changing their physical, chemical, or sensory properties. A microencapsulated ferric saccharate form (MFS) trademarked as AB-Fortis® has recently been developed, designed to produce no organoleptic or aspect changes during storage of fortified food even at high doses. The present work compared the absorption of iron from MFS to Ferrous Sulfate (FS) in healthy volunteers.

Methods: The study was a randomized cross-over, double-blind and postprandial intervention. Seventeen healthy adults from both sexes participated in the study. On each intervention day, after an overnight fast, the volunteers consumed either product, and blood sampling was carried out. The primary outcomes of the study were total serum iron and transferrin saturation.

Results: Transferrin saturation significantly increased after the intake of both products (p<0.005), reaching a peak value between hours 2 and 4. No significant differences were detected between MFS and FS, suggesting that iron absorption from MFS is equivalent to absorption from FS. No significant differences could be observed in serum iron concentration during the 6-h postprandial study.

Conclusions: MFS is a new ingredient with similar absorption to FS that allows the fortification of a wide range of food products with excellent stability, including cooked and non-acidic products.

Key words: Iron deficiency, microencapsulated ferric saccharate, ferrous sulphate, fortified milk

PO2601

DIETARY DIVERSITY AND ITS DETERMINANTS IN RURAL SOUTH-EAST PERUVIAN HIGHLAND

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Background and objectives: Dietary diversity (DD) is a key concept for nutrition security in resource-poor populations but may be influenced by seasonal food availability. Several studies have applied qualitative food scores as a proxy indicator of diet quality in Asian and African settings, but less is known in Latin America. The aim of this study was: A) To evaluate DD across three seasons: rainy (rain-S), post-harvest (post-S), and farming (farm-S) periods. B) To examine demographic and socio-economic determinants of DD.

Methods: A longitudinal study was carried out with 147 women aged 15 – 49 in three different seasons during 2007. Individual dietary diversity (DDS) and food variety scores (FVS) were calculated based on three qualitative 24 h dietary recalls. Demographic and socioeconomic information was collected using individual questionnaires.

Results: FVS but not DDS varied across seasons ($p=0.006$). Dietary patterns were similar between survey periods, and food scores differed according to agro-ecological zones ($p=0.000$). Less than halve the women consumed animal products, fruits and dark green leafy vegetables over the year. Adjusted for age, wealth and housing, and the number of household members, access to local markets was associated with higher food scores in all seasons ($p<0.01$). In addition, income sources determined DD during rain-S ($p<0.05$), while the educational level of household's head ($p<0.01$) and crop production ($p<0.05$) played the main role during post-S.

Conclusions: DD as measured with food scores is able to reflect the dietary quality and is sensitive to socio-economic factors. Access to markets might improve food diversification, since own food production does not supply the household with an adequate variety of foods. The production of indigenous plants and animal farming should be encouraged to ensure a balanced diet even in more distanced areas.

Key words: Dietary diversity, indigenous, food scores

PO2602

ASSESSMENT OF SELENIUM INTAKE FROM GRAIN IN KOREAN ADULTS

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Background and objectives: Selenium is an anti-oxidative mineral and essential nutrient for the risk reduction of oxidative degenerating diseases, which is rapidly increasing among Korean. Therefore, the assessment of Korean selenium intake is very important. However, the selenium intake level of Korean is not known until now because of the insufficient selenium food database on Korean food. Grain and legume intake of Korean is higher compared to western countries as they are staple food in Korean diet and major source for carbohydrate and vegetable protein. In this study, the selenium consumption of Korean adults through these plant foods such as grain, starch, and potatoes was assessed.

Methods: The original data set was chosen from 2010 5th KNHANES dietary data and was analyzed using SAS (ver 9.1).

Results: The Korean adult consumed grain and legume selenium with an amount of 11.9 μg/d. The highest contributing grain type in selenium intake of Korean diet was wheat supplying selenium of 5.2 μg/d, followed by rice with 4.2 μg/d. In regard to food item, rice was the highest supplier of selenium in Korean diet, followed by loaf bread.

Conclusions: Together with our prior study on the meat intake, this study shows that Korean people seem to be not at risk of selenium deficiency on average.

Key words: Selenium, Korean adult, grain

PO2603

NECK CIRCUMFERENCE AS A PREDICTOR OF OBESITY IN ADOLESCENTS UNDER AGE AND PUBERTAL STAGES

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Background and objectives: Obesity has a strong impact in many countries, causing many metabolic diseases. Central obesity is more strongly correlated to the risk of these diseases. In adults, Neck Circumference (NC) has been used as a screening tool for overweight. The aim of this study was to determine the cutoff points for NC identifying obesity in adolescents, according to age and pubertal stage.

Methods: Cross-sectional study that assessed adolescents from 10 to 17 years. Trained researchers took all anthropometric measurements, as weight and height, to calculate BMI, and NC. Obese adolescents ranked above +2 z-score of BMI according to the World Health Organization, 2007 were considered. The pubertal stage was assessed by Tanner boards. To compare the variables between the sexes the Mann-Whitney test was used, and significance was set at $p<0.001$. Receiver operating characteristic (ROC) analyses were used to determine the predictive validity of NC as well as evaluate optimal cutoff values for identifying obese adolescents.

Results: Among 1668 adolescents assessed 54.92% were female. It was found that 7.56% of girls and 10.51% of boys were obese. The mean values of NC (cm) were 30.33 for females and 33.19 for males ($p<0.001$). The cutoff points of the NC identifying obesity according to age for females and males were: 10-12 years (30.95 and 30.20), 13-15 years (32.60 and 33.55), 16-17 years (32.45 and 38.45), and according to pubertal stage: prepubertal (29.75 for both), pubertal (31.15 and 37.95) and post-pubertal (32.65 and 33.90). Girls had better Area Under the Curve (AUC) of NC according to pubertal than boys.

Conclusions: These data allow the assessment of central obesity in adolescents according to pubertal stage, using NC, a tool easier and with less margin for error than other measures, permitting identification and early intervention in the treatment of obesity in this population.

Key words: Neck circumference, obesity, adolescents

PO2604

VITAMIN A, ANEMIA, ZINC STATUS AND PARASITIC INFECTION IN MEXICAN SCHOOL CHILDREN

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Background and objectives: Micronutrient deficiency is a global health problem and it has been called the hidden hunger, because mild and moderate manifestations cannot be detected at a glance. Vitamin A, anemia and zinc deficiency have been reported as main nutritional deficiencies among school children. The aim of this study was to assess the biochemical status of vitamin A, anemia and the presence of parasitic infection in school children living in northwest Mexico.

Methods: One hundred sixty-eight school children that attended public elementary schools were evaluated; 104 of them were beneficiaries of a public nutrition aid program called Programa de Desayunos Escolares (PDE), and 62 were not beneficiaries (Reference group, GR). Measurements were taken at the start and at the end of the 2010-2011 school year. Anthropometric measurements, BMI, serum retinol, zinc and hemoglobin, as well as the presence of parasitic infections were evaluated.

Results: The prevalence of obesity was 27.5%. In the PDE group, 45.2% of children had low levels of serum retinol, as 42.4% had vitamin A deficiency (DVA, 0.35-0.7 mmol/l), and 2.8% presented severe deficiency (<0.35 mmol/l); at the end of the school year, 17.3% of children recovered from DVA and no severe deficiency was found ($p<0.001$). Anemia (Hb <11.5 g/dl) was detected in 6.8% of children and it decreased to 2.9% ($p<0.01$). In the GR group, 74.1% of children presented DVA, and it decreased to 62.8% at the end of the school year ($p>0.05$). The proportion of anemia decreased from 4.8% and to 1.6%. Zinc deficiency was not found in any of the two groups. Fifty percent of the children presented parasitic infection, and Giardia lamblia prevailed.

Conclusions: Vitamin A deficiency and anemia is a public health problem in northwest Mexico and the Desayunos Escolares Program may help to improve this deficiency.

Key words: Deficiency, vitamin A, anemia, zinc, México

PO2605

THE DEVELOPMENT AND VALIDATION OF FOOD PHOTOGRAPHS IN THE ONLINE HELLENIC HEALTH FOUNDATION (HHF) DIETARY ASSESSMENT TOOL

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Background and objectives: Food photographs are widely used in large-scale surveys. Picture series presenting Greek foods and dishes were developed and validated. They were integrated in the online dietary tool (HHF Nutrition Tool), which is used in the Greek national nutrition and health survey (HYDRIA).

Methods: Six pictures per each of 170 foods or Greek dishes were prepared. The 5th and 95th percentiles of portions previously reported by 28572 Greek adults (ages 20-86 years) were used as the smallest and largest portions. Based on perceptual research, the weights of intermediate portions were defined as equal increments on log scale. Densities of foods were calculated. Photos were taken in a setup ensuring technical standards and were integrated in the online dietary tool. The respondents' perception of the quantities displayed online was validated. For this, 106 individuals (37% males and 64% females, mean age 45

± 23 years) were invited to participate based on convenience sampling. Attention was given to cover different educational backgrounds and include at least 25 individuals aged 70 years and more. Dishes displayed included quantities either equal to those of the pictures or between adjacent pictures. Pictures from the same series were validated by respondents of different age, gender and education.

Results: More than 2,200 selections of the corresponding picture were performed. Based on the distribution of reported differences, 75% of the picture series performed well. According to ê-statistic, the agreement between true and selected pictures was very good in 18% and fair in 73% of the picture series. Series that did not perform well included salads, sweets and three soup dishes.

Conclusions: The use of pictures displaying foods and Greek dishes, with which survey participants are familiar, is expected to increase the reliability of the national nutrition survey.

Key words: Food pictures, Greece, HYDRIA

PO2606

IS INFLAMMATION CORRECTION NECESSARY TO ESTIMATE THE PREVALENCE OF IRON DEFICIENCY AMONG 3-12 Y-OLD THAI CHILDREN?: THE SEANUTS STUDY

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Background and objectives: While anemia is still prevalent in women and children in Thailand, there is limited data on iron deficiency (ID). We investigated the prevalence of ID and iron deficiency anemia (IDA) among Thai children using different approaches to correct for inflammation.

Methods: Blood samples from 496 children aged 3-12.9 y were assessed for hemoglobin (Hb), ferritin, transferrin receptor (TfR), TfR/ferritin index (TFI). Inflammation was determined by C-reactive protein (CRP) and α-1-acid glycoprotein (AGP). Acute phase protein (APP) was used (CRP > 5 mg/l and/or AGP > 1 g/l) and defined four groups of inflammation status: reference (normal CRP and AGP), incubation (raised CRP and normal AGP), early convalescence (raised CRP and AGP), and late convalescence (normal CRP and raised AGP). Ratios of geometric means of iron indicators for each inflammation group to reference group were used as correction factors (CF) to adjust iron values.

Results: Prevalence of infection was 7.3% and 31.7% based on CRP and AGP, respectively. Using ferritin, TfR and TFI, prevalence of ID was 1.8, 33.9 and 5%, respectively, and for IDA was 1.2, 5.9, and 1.8 %, respectively. Prevalence of ID increased after adjusting for APP (ferritin (3%)), but almost no change by TfR (33.5%), and TFI (5.4%). Percent anemia attributable to ID based on unadjusted vs APP adjusted ferritin values were 13.2 vs 15.4%; no change using TfR (64.8%) or TFI (19.8%). Using higher ferritin cutoff (< 30 μg/l) resulted in ID prevalence of 19-22.6%.

Conclusions: Adjustment for infection the prevalence of ID increased when ferritin was used, but no effect when indicators using TFR as iron status indicators. Discrepancies in prevalence of ID and IDA using ferritin versus TfR or TFI needs to be further explored.

Key words: Iron deficiency, anemia, inflammation, correction factor

PO2607

A WEEKEND-DAY IN FOOD RECORDING COUNTERS DECREASING ENERGY REPORTING OVER THREE DAYS IN SCHOOL CHILDREN

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Background and objectives: Food records are considered the most accurate dietary assessment method, using at least three days and including a weekend-day. This poses challenges, particularly amongst children, yet the school context may offer opportunities. Within a validation project, this quality control sub-study aimed to determine amongst grade 6 learners whether there is a difference in mean reported daily energy intake over three consecutive days of food recording, and whether there was a difference in mean energy intake in three different consecutive-day recording periods (Sunday-Monday-Tuesday [SMT] vs. Tuesday-Wednesday-Thursday [TWT] vs. Thursday-Friday-Saturday [TFS]).

Methods: As part of a mathematics assignment the 108 children from three classes were randomly divided into three recording periods (SMT: n=22; TWT: n=49; TFS: n=22) for weighing their total food and drink intakes with a digital food scale. For 93 children (50 girls, 43 boys; mean age 12.3 years) parental consent and child assent for research and useable data were received. Food records were analysed using FoodFinder™. Energy intake to resting expenditure ratios were calculated (EI/REE). Differences in mean energy intake over the three days of recording and the three recording periods were determined using the Friedman two ways analysis of variance with multiple comparisons.

Results: Mean body mass index z-score was 0.42 ± 1.1. Mean EI/REE was 1.45 ± 0.4. Overall there was a statistically

significant difference (p=0.03) in energy intake between day 1 and day 3. In the SMT and TFS groups there was no significant difference in energy intake over the three days.

Conclusions: The reported energy intake for the group over the three consecutive days was credible, but decreased, except when a weekend-day was part of the period. Food recording in school context is feasible, but should include a weekend-day.

Key words: key words apply: Dietary assessment; children; food records; weekend-day; validity

PO2609

BODY COMPOSITION AND WEIGHT CHANGES DURING PREGNANCY: A STUDY FROM NANJING, CHINA

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Background and objectives: Maternal body composition undergoes a deep adaptative change during the course of pregnancy. Fat mass, fat-free mass and total body water increase in different ways and their effects on pregnancy outcome represent a field of major interest in perinatal medicine. The present study was aimed at investigating changes in body composition characteristics and weight gain during pregnancy.

Methods: A total of 5186 healthy, pregnant women aged between 20 and 44 years participated in the study. Pregnant women were recruited from the outpatient department of Nanjing Maternity and Child Care Hospital, China. Maternal height and weight were measured digitally in a standardized way and Body Mass Index (BMI) was calculated. Maternal body composition was measured using segmental multifrequency Bioelectrical Impedance Analysis (BIA). Subjects were categorized into three trimester groups: Group I (<12weeks), Group II (13-26weeks) and Group III (27-39weeks). Descriptive statistics such as mean and standard deviation (SD) were calculated separately for three groups. Comparison of groups for variables was done using analysis of variance (ANOVA) with Scheffe post-hoc test.

Results: The mean change in maternal weight from the first to the third trimester was 10.32 kg. The mean fat mass for three groups (Groups I, II and III) was 17.21 ± 6.50 kg, 21.18 ± 5.76 kg and 22.50 ± 5.64 kg, respectively; fat-free mass was 40.19 ± 2.80 kg, 42.17 ± 2.85 kg and 43.98 ± 2.82 kg, respectively; total body water was 28.87 ± 3.58 l, 31.56 ± 3.54 l and 32.54 ± 3.52 l, respectively.

Conclusions: The findings could represent more exaggerated physiological responses to the pregnant state in the primiparous and provide reasonable and effective guidance on maternal nutrition and exercise.

Key words: Body composition, pregnancy, bioimpedance

PO2610

WAIST CIRCUMFERENCE AS A SCREENING MEASUREMENT FOR CENTRAL OBESITY AMONG EGYPTIAN ADOLESCENTS

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Background and objectives: Childhood obesity has become an ever-increasing problem and is now considered to be a disease of epidemic proportion. Early childhood obesity enhances its adulthood risk. The aim of the study was to validate waist circumference (WC) as a screening measurement for central obesity among Egyptian adolescents with using of body mass index (BMI) as a golden standard test.

Methods: A random stratified multistage cluster-sampling design of preparatory and secondary school students was used. Four governorates from Upper Egypt and three from Lower Egypt were selected. Weight, height, and WC were measured and BMI was calculated and categorized according to national center for health statistics and national center for chronic disease prevention and health promotion (2000). By using receiver operating characteristic (ROC) analysis, the ROC curve of waist was drawn to show how well it could separate subjects into groups of ¡°with or without¡± overweight or obesity, with BMI being the gold standard test.

Results: 6018 adolescents were recruited in this study (aged from 11 to 18 years with a mean value of 14.2 yr ± 1.16, with no significant difference on sex-based comparison). Females formed 51.0% of participants. Overweight was reported among 13% and obesity proportion was 7.8%. Waist cutoff for overweight/obesity with maximum sensitivity; 89.0%, was recorded among male-adolescents aged 16+ yr and maximum specificity; 87.0%, was recorded among male-adolescents aged ≥ 13yr and < 16yr. Estimated frequencies for male adolescents at risk followed closely the 75th percentile of British data reference while those for female were midway between 75th percentile of British and American data references.

Conclusions: WC as a screening measurement for central obesity with using of BMI as a golden standard test can be relied upon to some extent among adolescents as age advances.

Key words: Central obesity, waist circumference, ROC curve

PO2611

ASSOCIATION BETWEEN DIETARY DIVERSITY AND PERCEPTION BASED MEASURES OF FOOD INSECURITY: DOES SEASONALITY AND FOOD PRICE CHANGE THE RELATIONSHIP?

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Background and objectives: Dietary diversity has been shown to be closely correlated with both household wealth and calorie and micronutrient adequacy. However changes in seasonal dietary patterns and differences between populations with divergent culturally-based food patterns can complicate the interpretation of this indicator. The relationship between dietary diversity and perception based measures of food security has not been fully examined.

Methods: Seasonal, cross-sectional data from two years of the Food Security and Nutrition Surveillance Project was aggregated (six surveillance rounds), resulting in a data set of 53,515 households. The relationship between perception based food security indicators and individual dietary diversity and household food frequency measures was examined.

Results: Notably, as the price of rice fell over the time periods covered by the dataset, diets grew slightly less diverse even as reports of food insecurity fell. Additionally, seasonal variation in estimates of household food insecurity differed depending on if the indicators were based on dietary diversity of households and adult women or based on behavioral responses to food insecurity. Household food frequency scores were highly correlated with the Household Food Insecurity Access Scale, but this relationship differed by season and was greater during the monsoon season. This same pattern was observed for women's dietary diversity scores.

Conclusions: Dietary diversity and food frequency measures are important indicators of food security, but they should be interpreted in light of seasonal and cultural norms in the area under consideration.

Key words: Food security, dietary diversity, food frequency

PO2612

ANTHROPOMETRIC MEASURES, NUTRITIONAL STATUS, COGNITIVE RESTRAINT AND EMOTIONAL EATING PATTERNS IN FEMALE UNIVERSITY STUDENTS

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Background and objectives: Cognitive restraint and emotional eating involved in eating behaviors, may modify body composition and the nutritional status. The aims of this study were to assess the nutritional status and body composition of university students, and to analyze the possible links between measured cognitive restraint (CR) and emotional eating (EE) and nutritional reserves derived from anthropometric fractionation of body mass.

Methods: 175 females (24.57 ± 3.54 years), undergraduate students at the Medical School of Nutrition and Faculty of Pharmacy and Biochemistry of the University of Buenos Aires, were involved. Body composition was determined by the anthropometric fractionation method, consisting of 25 surface measurements (eight bone diameters, seven fat folds, eight muscle perimeters, seated and standing height). Caloric (CRv) and proteic (PRv) reserves were derived from fat/skeletal mass ratio and muscle/skeletal mass ratio, respectively. From the three factor eating questionnaire, the CR subscale (6 items) and EE (3 items) were assessed to know eating behaviors. They have Cronbach`s alphas of 0.75. Correlation analysis, cluster analysis and analysis of variance (ANOVA) were performed.

Results: Both CRv and PRv normal values were shown in 41.1% of the cases (n=72), while 35.4% presented only normal CRv, 13.1% showed only normal PRv and a 10,3% showed both reserves out of standards. Thus, four clusters explained distributions of nutritional status. CRv was significantly correlated with both CR and EE scores ($p<0.01$) and PRv only showed a slight correlation with CR scores ($p<0.05$). ANOVA and post-hoc LSD comparisons support the effects of both EE and CR on anthropometric measures.

Conclusions: Emotional and restraint behaviors under study are related mainly to CRv and very slightly to the PRv, we believe that diminished proteic reserve could be associated with poor food intake and/or sedentary life style.

Key words: Body composition, young females, eating behaviors, caloric reserve, proteic reserve

PO2613

ADOPTING STANDARDIZED EUROPEAN DIETARY METHODOLOGY (EPIC-SOFT) FOR RESEARCH AND DIETARY SURVEILLANCE IN KOREA

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Background and objectives: During the past three decades, the economy has grown with great rapidity and a parallel rapid nutritional transition has been observed in Korea. In order to better understand dietary patterns in Korean population and its association with cancer and other non-communicable diseases, well-established dietary methodologies to guarantee standardization in the procedures are required. We therefore aimed to develop a Korean version of the computerized 24-hour dietary recall (EPIC-Soft) and its complementary tools and facilities, developed at the International Agency for Research on Cancer (World Health Organization).

Methods: The creation of about 70 interrelated databases on foods, recipes, dietary supplements, quantification methods and coefficients was needed. Parts of these databases were classified as common databases (i.e backbone to standardize data within and between countries). The other part was country specific (i.e structured databases that have flexibility for capturing the difference in diet across countries) and additional work was done to input the databases, usually based on the data available in Korea. Furthermore, an adapted version of the EPIC-Soft picture book was made, with inclusion of new pictures and portion sizes.

Results: This work provides the first Asian version of the EPIC-Soft with over 70 databases being customised and translated. **Conclusions:** The EPIC-Soft Korean version will be available for the future research and dietary surveillance in Korea. Ultimately, we will have an opportunity to evaluate the feasibility of expanding the EPIC-Soft methodology to other Asian countries. This could offer a unique opportunity to provide a common dietary methodology and increase data comparability across Asian countries where the rapid nutritional transitions have occurred.

Key words: EPIC-Soft, computerized dietary assessment, 24-HDR

PO2614

PROTEIN QUALITY OF PROCESSED CONOPHOR NUT USING RAT BIO-ASSAY

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Background and objectives: The objective of this study was to evaluate the quality of the protein from differently processed conophor nut (Tetracarpidium conophorum Mull. Arg.) which is known to be rich in proteins.

Methods: Mature conophor nuts were divided into four portions. A portion was deshelled and milled raw while the other three portions were fermented, cooked and roasted respectively before milling. 36 weanling male albino rats were divided into six groups of six rats each on the basis of initial body weight. The animals were fed for 28 days on separate diets containing 10% protein by weight of casein (control), raw, cooked, fermented, roasted conophor nut and a nitrogen-free (basal) diet. Daily records of food consumed and weight changes were kept. Faeces and urine were collected in the last week for nitrogen analysis.

Results: Rats fed on the raw, cooked and fermented conophor nut-based diets had protein efficiency ratios (PER) of 2.24, 2.43 and 2.35, respectively, which were not significantly ($p>0.05$) different from the 2.74 obtained for casein (control) when subjected to one way ANOVA and LSD test. However, animals in the roasted category recorded significantly ($p<0.05$) lower PER of 2.01. Animals in this group also showed a significantly ($p<0.05$) lower biological value of 67.82% compared to the 70.12%, 75.31%, 72.40% and 78.05% obtained for the raw, cooked, fermented conophor and casein diets respectively. Protein digestibility was also lower in the roasted conophor-based diet. However, there were no significant ($p>0.05$) differences in the net protein utilization values.

Conclusions: The quality of conophor nut protein was reduced by roasting.

Key words: Conophor nut, protein quality, casein

PO2615

DIETARY SELENIUM/VITAMIN E AT SUPRANUTRITIONAL DOSES AMELIORATE EFFECT OF HEAT STRESS ON PHYSIOLOGICAL PARAMETERES AND ACID BASE BALANCE IN SHEEP

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Background and objectives: Heat stress (HS) affects the physiological and biochemical processes of the animal and can create acid-base imbalance. The objective of this study was to elucidate the potential of supranutritional doses of selenium (Se) and vitamin E to ameliorate the effect of HS on physiological parameters and acid-base balance of sheep.

Methods: Thirty two Merino x Poll Dorset ewes were housed in one of 2 climatic chambers maintained at either thermoneutral (TN) (18-21°C and 40-50% relative humidity (RH)) or HS (28-40°C and 30-40% RH) conditions. Sheep were allocated in 2x2 factorial design to different levels of Se (0.24 (LS) and 1.20 (HS) mg Se (as SelPlex™) kg-1 DM) and vitamin E (10 (LV) and 100 (HV) I.U. vitamin E kg-1 DM). Physiological parameters were recorded three times a day (0900, 1300 and 1700 h), blood samples collected on day 1 and 7 of treatment.

Results: Average respiration rate (169 vs. 78 breaths/min) and rectal temperature (40.10 vs. 39.47°C) were increased ($p<0.001$) during HS. Although there were no overall effects of vitamin E on physiological parameters, there were interactions ($p<0.001$) between vitamin E and temperature such that vitamin E decreased respiration rate (157 vs. 182 breaths/min) and rectal temperature (40.26 vs. 40.54°C) during HS but not TN conditions. Se decreased respiration rate (165 vs. 174 breaths/min) during HS but not TN. Ewes given HSHV diet had a lower respiration rate (191 vs. 232 breaths/min, $p=0.012$) and rectal temperature (40.33 vs. 40.58°C, $p=0.039$) under peak HS (1300 and 1700h) compared to those on the LSLV diet. Blood pH was elevated ($p=0.007$) and bicarbonate reduced ($p=0.049$) under HS in LSLV but not in HSHV.

Conclusions: These data demonstrate that effects of HS on physiological parameters and acid-base balance are ameliorated by high levels of Se and vitamin E.

Key words: Heat stress, antioxidant, sheep

PO2616

NUTRITIONAL CHARACTERISTICS IN A MEDITERRANEAN COMMUNITY AMONG PROCREATING MOROCCAN WOMEN

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Background and objectives: To assess and describe the dietary intake levels and major food sources of energy and nutrients for selected women from an agricultural region of Morocco.

Methods: A total of 191 adult women subjects aged 18–55 years resident in urban areas in the province of El Jadida. Dietary habits were assessed by means of 24-h recall during 3 non consecutive days and a semi quantitative food-frequency questionnaire.

Results: Alimentary habits were characterized by a large consumption of cereals, meat and poultry, fish and sea foods, eggs, fruits and vegetables, but a low intake of olive oil. We observed an excess of total calories not balanced by a high degree of physical activity levels, a low calories from lipids intake but high in saturated fat (39 %). This result is reflected in the higher PUFA/SFA ratio (0.76 ± 0.62), a high consumption of total carbohydrates (61 % of daily energy) although this is accompanied by a lower fiber intake 18.07 ± 11.44 g. Furthermore we found a significant higher saturated and monounsaturated fat in the youngest individuals and in people with higher educational levels. Except intake of phosphorus and sodium, all minerals and vitamins assessed are below or close to the recommended dietary allowance (RDA) while all vitamins are consumed at rates below two-third of RDA by a high percentage of women.

Conclusions: Examination of available data revealed a shift of dietary habits from traditional Mediterranean diet to industrial food; a change in lifestyle, recent urbanization could explain, in part, the nutritional and metabolic disorders reported in this population. Adoption of preventive measures by educating women in terms of nutrition are to be undertaken to reverse this picture and avoid health consequences.

Key words: 24h recall, food frequency, Mediterranean diet, nutrients, Morocco

PO2617

IDENTIFICATION OF PROBLEMS OF NUTRITIONISTS IN USING EXISTING FOOD COMPOSITION TABLE AND DEVELOPMENT OF NEW FOOD COMPOSITION TABLE FOR PAKISTAN

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Background and objectives: Nutritionists in Pakistan are not satisfied with the current Pakistan's Food Composition Table (FCT) because of limited nutritional information on limited foods and use foreign FCT for the nutrient intake assessment and face a number of problems. The objective of the study was to determine the views and expectations of nutritionists about existing and upcoming FCT respectively to develop a new FCT for Pakistan.

Methods: Cooked foods, to be included in the upcoming FCT, were identified from previous research studies with their standardized recipes. The ingredients with quantities in each food were fed on Microsoft Excel to determine the nutritive value of whole cooked food. Data were gathered from forty-eight nutritionists through interview-cum-questionnaire method regarding their view and expectations about FCTs and were analyzed statistically using SPSS 11.0 version.

Results: United States Department of Agriculture (USDA) FCT was the most preferable FCT because of its authentic and updated data and easy online access followed by Pakistan's FCT, Indian FCT and then International Nutrient Databank. Nutritionists were not satisfied with nutritive values, given per 100 grams of edible food portion, limited nutritional data on locally consumed foods, infant foods and nutritional supplements. Nutritionists expected to have soft and hard copy of FCT with authentic nutritive values on regional and ethnic dishes with different fat versions and consistencies in portion sizes or metric measures. Urdu names of food items were expected to be mentioned. Revision of FCT was expected to be done after every three years. All nutrients along with types of fats, fiber, oxalate, caffeine, amino acid and fatty acid content in food were expected to be present in the upcoming FCT.

Conclusions: Nutritionists need an updated and customized FCT for accurate nutrient intake assessment of population in Pakistan.

Key words: Food composition table, nutritionist, assessment, nutrient

PO2618

SALT PREFERENCE AND SODIUM INTAKE OF KOREAN NORMOTENSIVE FEMALE ADULTS

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Background and objectives: This study was done to explore the correlation between Korean female adult's salt preference and their sodium intake.

Methods: 156 young women and 77 middle-aged women without hypertension or any current medication were recruited. Body mass index, waist hip ratio and blood pressure were measured from each subject. Salt usage behaviors were surveyed with questionnaire, sodium intake with 24-hr recall method, and sodium excretion with spot urine. Salt preference and sodium intake were analyzed to compare the difference between young and middle-aged women.

Results: Middle-aged women were more obese than young women according to body mass index and waist hip ratio. Blood pressure was significantly higher for the middle-aged. Young women consumed more fats and middle-aged women more carbohydrates. Middle-aged women consumed more sodium and potassium, and excreted more sodium. Among questionnaire items, kimchi, soup or pot stew, or salted vegetables were found to be related with high sodium diet. Salted vegetables and salted nuts and potato chips were significantly correlated with young women's high sodium diet, while soy sauce on fried food, kimchi, salted vegetables accounted for middle-aged women's high sodium diet.

Conclusions: Middle-aged women had higher risk of metabolic syndrome, such as higher BMI, WHR and blood pressure. It was correlated with higher sodium intake of middle-aged women. As women goes aging, reducing sodium intake and maintaining normal BMI and WHR becomes more important to support their health.

Key words: Sodium intake, middle-aged women, blood pressure, salt preference

PO2619

PREVALENCE OF VITAMIN B12 AND FOLATE DEFICIENCY IN LATIN AMERICA AND THE CARIBBEAN

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Background and objectives: There is no systematic review examining the pre-post era of folic acid (FA) fortification on B12 and folate deficiency prevalence in Latin America and the Caribbean (LAC). Our objective was to examine prevalence data on B12 and folate deficiency in LAC since 1990.

Methods: A systematic review was conducted in 2012. Studies using biochemical biomarkers and conducted in apparently healthy individuals were included.

Results: A total of 817 studies were identified. The final numbers of selected studies were 46. The prevalence of B12 deficiency in nationally representative samples was: in Argentina (prevalence 12% adult women, 18% in pregnant; plasma B12<111 pmol/l), Chile (9% elderly; plasma B12<148 pmol/l), Colombia (0%, 3%, 13%, 19% for infants, school-children, adult women and pregnant, respectively; plasma B12<148 pmol/l), Costa Rica (5% lactating women; plasma B12<148 pmol/l), Mexico (7.7% 1-6y; plasma B12 <149 pmol/l) and Venezuela (11% <7y; plasma B12<148 pmol/l). For folate deficiency there are national samples indicating its prevalence before FA fortification in Chile (11% adult women; RBC folate <181 nmol/l), Costa Rica (4% adult women, 2% <6y, 49% lactating women; serum folate <6.8 nmol/l), Venezuela (31% 6m-7y, 36% <14y Gran Caracas; serum folate <6.79 nmol/l) and Mexico (10% <4y, 5% 4-11y, 5% adult women, respectively, serum folate <5.8 nmol/l); and after FA fortification in Argentina (1% adult women, 3% pregnant; serum folate <6.79 nmol/l), Chile (<1%, >65y; serum folate 12 nmol/l, 0% adult women; serum folate <3.2 nmol/l) and Mexico (3.2%, 1-6y; <9.0 nmol/l).

Conclusions: B12 deficiency appears to be mild to moderate public health problem, while folate deficiency is not a public health problem (<5%) in any of the Latin American countries with nationally representative samples available after FA fortification.

Key words: Vitamin B12, folate, folic acid, prevalence, Latin America

PO2620

SELENIUM CONTENT IN COWPEA (VIGNA UNGUICULATA) IN THE STATE OF CEARÁ - BRAZIL

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Background and objectives: The mineral selenium (Se) is part of the enzyme glutathione peroxidase (selenoenzyme), which participates in the antioxidant defense system of cells. Depending on geological factors Se is distributed by land surface. The geochemical distribution of Se makes vulnerable the studies of food consumption in all parts of the world, because the soil at each site determines the concentration of this mineral in foods. The state of Ceara (Brazil) has been prominent regarding the amount of selenium in its soil which is higher than the states in the Midwest, Southeast and South. The aim of this study was to determine the concentration of Se in cowpea (Vigna unguiculata) produced in different geographical regions of the state of Ceará (Brazil).

Methods: The cowpea was chosen because it is a food typical and widely consumed in the state. The method selected for determining the concentration of selenium was atomic absorption spectrophotometry for the generation of hydrides coupled quartz cell (HGQTAAS). Samples were collected from seven geographical regions of the state, harvests in 2010, 2011 and 2012.

Results: The average Se cowpea from around the state was 23,71 mcg Se/100 g of raw food, ranging from 5,70 mcg Se/100 g to 56,44 mcg Se/100 g. We perceive the upper middle of Se in bean comparing our state to the value of Se in beans marketed in other Brazilian cities where the average was 1 mcg Se/100 g of raw food.

Conclusions: We conclude that the cowpea can be an ally to the contribution of the supply of Se in the diet of Ceará.

Key words: Selenium, soil, Brazil, beans

PO2621

TOTAL AND HAEM IRON IN FRESH ANGUS STEERS MEAT FROM NATURAL PASTURES TO CONCENTRATED-BASED FEEDING SYSTEMS IN URUGUAY

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Background and objectives: Iron deficiency, a important health problem related to the diet, causes anemia and impairs cognitive performance in children. Bovine meat, an expensive food, is a key source of iron and haem iron, a biologically important iron containing compound, but content could vary with animals diet, breed and muscle type. In this work we determine the content of total and haem iron in bovine meat produced in different feeding systems, pasture, pasture and grains and concentrated-based, in three muscles of high (h), middle (m) and low (l) commercial value.

Methods: Fresh muscles Longissimus dorsi (LD; h), Biceps femoris (BF; m) and Triceps brachi (TB; l) from Angus steers fed with pastures, pastures and grains or concentrated (10 steers each one). Iron was determinated by flame atomic absorption spectrophotometer in samples previously dried, ashed and solubilized. Total haem pigments were determined as hemin after extraction with acidified acetone, quantified in a spectrophotometer at 640 nm and haem iron content calculated (0.0882 g iron / g hematin). Data were analyzed by GLM procedure for feeding system and muscle type as mains effects followed by Tukey-Kramer test ($p<0.05$).

Results: Meat from pasture-based feeding systems has a significantly higher iron content (26 ppm; $p<0.05$) than meat from concentrated-based feeding systems (21 ppm). BF and TB iron was significantly higher (25 ppm; $p<0.05$) than LD (21 ppm). Meat from pasture or pasture and grains-based feeding systems has a significantly higher haem iron content ($p<0.05$) related to concentrated-based feeding (20,9; 20,7 y 16.5 ppm, respectively). TB has a high haem iron content (21.8 ppm) as LD (20.3 ppm) but haem/iron is 87% for TB and 96% for LD.

Conclusions: We conclude that pasture meat or a low cost cut as TB are nutritionally valuable source of haem/iron.

Key words: Haem iron, bovine meat, pasture-based meat

PO2622

SELENIUM, ZINC, COPPER AND MANGANESE IN FRESH ANGUS STEERS MEAT FROM PASTURES TO CONCENTRATED-BASED FEEDING SYSTEMS IN URUGUAY

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Background and objectives: Minerals deficiencies in humans are common world-wide and there are evidences which suggest that deficiencies may play a negative role in children's development, pregnancy and elderly health. Se, Cu, Zn and Mn are keys for the enzymatic system that counteract the free radicals in the organism. Red meat is a major source of essential minerals, of high bioavailability to human nutrition and its consumption can be a good way to respond qualitatively and quantitatively to the mineral requirements. The objective of this work was to asses the mineral content in bovine meat produced in pasture, pasture and grains and concentrated-based systems, in three muscles of high, medium and low commercial value.

Methods: Fresh muscles, Longissimus dorsi, Biceps femoris and Triceps brachii from Angus steers fed with pastures, pastures and grains or concentrated (10 steers each one) were used. Determination of Cu, Zn, and Mn were performed by flame atomic absorption spectrophotometer and Se was analyzed by graphite furnace atomic absorption. Data were analyzed by GLM procedure for feeding system and muscle type as mains effects followed by Tukey-Kramer test ($p<0.05$).

Results: Se and Mn content in pasture-based meat was significantly higher ($p<0.05$) than pasture and grains and concentrated-based meat. Meat from pasture and pasture and grains systems was more rich ($p<0.05$) in Zn than the intensive system. Feeding system has not effect on the Cu level in meat, but Triceps brachii accumulated significantly more Cu ($p<0.05$) than the other muscles. A high cost muscle as Longissimus dorsi is more rich ($p<0.05$) in Zn than the Biceps or Triceps muscles. Medium and low cost muscles as Biceps femoris and Triceps brachii, have higher content of Se ($p<0.05$) than Longissimus independently of feeding diet.

Conclusions: Bovine meat from pasture based-system contain high levels of Se, Mn and Zn but its varies with the muscle type.

Key words: Minerals, selenium, bovine meat, pasture-based meat

PO2623

FATTY ACID COMPOSITION OF MEAT FROM HEREFORD AND BRAFORD BREED PRODUCED ON PASTURE IN URUGUAY

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Background and objectives: In Uruguay, meat production is principally based on extensive system which includes pasture as food. The Uruguayan herd is constituted principally by Hereford (H). However, nowadays new breed are considered in way to enhance the rusticity of H animals. In this sense, the crossing between H and Brahman, called Braford (B), is considered promising. In regard to the health concerns associated to the type of fatty acids present in meat, it's important to consider this point when new meat products are offered to consumers.

Methods: Fatty acid composition of H (n=12) and B (n=12) Longissimus dorsi muscle, before and after ageing during 14 days at 2°C in vacuum, was compared in animals (steers, 24-26 months of age) fed exclusively pasture. The fatty acids were determined by GC/FID using a CLARUS 500 and capillary column cpsil-88 equipment.

Results: Based on GLM statistical comparison, the saturated fatty acids (SAT), principally palmitic and stearic acids, showed neither breed nor ageing main effect. The monounsaturated fatty acids, principally oleic acid, showed a main breed effect ($p<0.01$; H>B) but not an ageing effect. For polyunsaturated fatty acids (PUFA), principally linoleic and linolenic acids, a main breed effect was observed ($p<0.05$; H 0.40).

Conclusions: The meat from B could be considered as very interesting in regard to the fatty acid composition and the PUFA/SAT health indices. The crossing between H breed and Brahman breed could be considered as advantageous, and a way to obtain a healthy meat for consumers.

Key words: Bovine meat, fatty acids, pasture, health indices

PO2624

EVALUATION OF NUTRITIONAL QUALITY IN THE POPULATION AT HIGHEST RISK OF POVERTY IN SERBIA

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Background and objectives: Nutritional criticalities in population at the highest risk of poverty (PHRP) have not been evaluated in Serbia. The objective of this comprehensive study was to identify this population group/s in Serbia, to define nutritional criticalities and analyze the nutrition quality.

Methods: To identify the population in the highest risk of poverty (PHRP), indicators were used and data analyzed based on EUROSTAT publication. Population specific nutritional criticalities were identified by systematic review (SR) of literature from Medline and Web of Science (WoS) databases and from the grey literature sources. Food intake was assesed by use of two days 24h recall and FFQ in 500 participants. Intake was studied by the use of nutritional software DietAsses and Serbian food composition data base.

Results: Adults aged 25-65 years and young adults (18-25 years) were identified as populatons at the highest risk of poverty in Serbia. The results of SR indicated lower intake of fruit and vegetables in this groups, especialy in the group of young male adults as was confirmed by intake analysis. In general, PHRP groups consume more than 15% less fruits than recommended by the WHO. Also, the contribution of dairy products to total energy intake is lower, which reflects an insufficient calcium and fat soluble vitamins intake in these population groups. Besides adequate protein intake, low intake of fiber was also detected. In contrast, total fat intake is excessive and contributes 8% more to total energy intake (TE) than recommended by the WHO.

Conclusions: In identified PHRP groups in Serbia the main nutrition criticalities are the high intake of total fat, lower intake of dairy product, fruit, fibre and complex carbohydrates and contribute to development of diet-related diseases.

Key words: Risk of poverty, nutrition criticalities, nutrient intake

PO2625

NUTRITION ASSESSMENT OF DOWN'S SYNDROME CHILDREN IN EGYPT

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Background and objectives: Down's syndrome (DS) is the most common chromosomal disorder. The aim of this study was to evaluate the nutritional status of DS children.

Methods: The study was conducted on 241 children with DS. Their age ranged from 6-18 years old, from six governorates in Egypt. All children were subjected to clinical examination, anthropometric assessment and sub sample was taken for laboratory tests. Food history was taken using 24 h recall method for about 50% of the sample.

Results: The mean of hemoglobin concentration for the sample was 12.2%, the prevalence of anemia was found among 61.3%. Plasma estimation for micronutrients indicated that 36.4% had low Mg and 33% had low Cu. Approximately 40% of the sample had insufficient energy. The mean intakes for calcium (Ca) and iodine (I) were around half the requirements (53.3% and 48.39% of RDI values respectively), while 84.2% and 83.2% of the total sample had insufficient Ca and I intakes. The mean intake of Vit A was 74% of the RDIs while about half of the sample (45.54%) had insufficient Vit A intake. The other micronutrients (Fe, Cu, Vit B1, B2 and Vit C) had mean intakes over the RDIs.

Conclusions: Re- planning the daily diets to contain more carbohydrates, calcium, zinc, iodine and iron according to RDIs. The suggested dietary sources are legumes, cereals, milk and dairy products, and intake the iodized salt.

Key words: Down's, anthropometry, anemia, diet intake

PO2626

EFFECTS OF FORTIFIED FLOUR CONSUMPTION ON SERUM FOLATE AND HOMOCYSTEINE IN CHILDBEARING-AGED WOMEN IN HIGH PREVALENCE REGIONS OF NEUROTUBE DEFECT

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Background and objectives: To observe the effects of fortified flour consumption on serum folate and homocysteine levels in high prevalence regions of neurotube defect.

Methods: 218 childbearing aged women, aged from 18-39, were voluntarily selected as subjects from 13 townships in Lvliang cities, Shanxi province. Intervention group with 155 subjects had been supplied with fortified flour for 20 months while control group with 63 subjects consumed no fortified flour. Fasting venous blood samples were collected after the intervention and contents of serum folate and homocysteine were measured. According to the different consumption of fortified flour, intervention group was divided into three subgroups: group 1 (less than 200 g/d), group 2 (200-300 g/d) and group 3 (more than 300 g/d).

Results: The fortified flour consumption of group 1, 2 and 3 were 170.2 ± 29.3 g/d, 278.4 ± 25.0 g/d and 389.0 ± 54.2 g/d, respectively. Levels of serum folate and homocysteine were significantly different from intervention and control groups ($p<0.05$). Serum folate levels in control group, intervention group 1, group 2 and 3 were 8.1 ± 2.1 ng/ml, 10.6 ± 3.6 ng/ml, 11.7 ± 3.3 ng/ml, 11.3 ± 3.5 ng/ml, and serum homocysteine levels were 21.77 ± 11.93 mol/l, 15.69 ± 9.87 mol/l, 12.21 ± 7.00 mol/l, 10.44 ± 4.28 mol/l. Prevalence of folate deficiency and high homocysteine in control group, intervention group 1, group 2 and 3 were 12.9% and 68.9%, 9.5% and 35.7%, 3.0% and 20.0%, 2.4% and 17.1%, respectively.

Conclusions: The study showed that folic acid fortified flour can significantly improve the folate status of childbearing aged women, and presented the consumption-effect relationship.

Key words: Fortified flour, serum folate, serum homocycteine, childbearing aged women, neurotube defect

PO2627

ENRICHMENT OF BOVINE MEAT BY ORGANIC SELENIUM

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Background and objectives: Meat is an important source of nutrients which improve and maintain health. On the other hand, selenium is a versatile mineral which acts as cofactor in physiological functions, for example as cofactor for enzyme glutathione peroxidase (GPx), a firewall against the oxidative stress caused by free radicals. Meat could be enriched in selenium by feeding the animals with an adequate source of selenium. In this sense, the use of selenium-enriched yeast could be an interesting way to improve its content in selenium. Furthermore, the selenium acts as a component which protects meat from lipids oxidation, which increase the lifetime and quality of the product to be consumed.

Methods: In the present investigation Aberdeen Angus steers (n=20; 24-26 months aged) were fed during 90 days a concentrate diet without added selenium (CG; 0.1 mg Se/kg dry matter) or supplemented (SG) with selenium-enriched yeast contained 0.3 mg selenium/kg dry matter. The content of selenium was determined in fresh meat by atomic absorption spectrophotometer (Analyst 300, Perkin Elmer) in Longissimus dorsi (LD) and Psoas major (PM) muscles. Also, lipids oxidation (TBARs) and the GPx activity were determined during the usual ageing of meat. This process consisted in the conservation of meat at 2°C in vacuum during a time between 14-60 days before consumption. In the present work the lipids oxidation and the activity of GPx were determined after 14, 21, 28 and 60 days of ageing.

Results: SG showed more selenium ($p<0.001$) incorporation than CG and a muscle main effect ($p<0.003$; PM>LD). Also, a reduced lipids oxidation was observed in SG ($p<0.05$) and showed a main muscles effect ($p<0.05$; PM>LD). GPx activity was similar in both muscles.

Conclusions: The enrichment of meat in selenium has been obtained and was accompanied by a reduction of lipids oxidation.

Key words: Meat, selenium, oxidation, GPx

PO2628

NUTRITIONAL POTENTIALITY OF THREE PARTS OF YAM (DIOSCOREA SPP.) TUBER DURING THE GROWTH PERIOD

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Background and objectives: Yam (Dioscorea spp.) is a staple food for developing countries. It meets the assent of the population for its good taste and technological aptitude favorable for traditional feed. Yam tuber presents a longitudinal gradient of maturity in which the distal part is less firm than the median and proximal sections. Also the harvest period of the tuber, done after the leaves drying did not generally correspond to the high level of nutriment content. So, the aim of this investigation is to show the nutritional importance of yam tuber parts during the growth time.

Methods: Two varieties of Dioscorea cayenensis: kponan and kangba were cultivated in experiment farm of Abobo-adjamé University (Abidjan, Côte d'Ivoire). Tuber pieces about 754 g were planted in nursery gardener sachet (40 cm x 40 cm) filled up with forest soil then enriched with droppings and arranged (1 m x 0.5 m). Six tubers were harvested randomly at 16, 18, 20, 22, 24 and 26 weeks after planting date. Each tuber was measured and sectioned into three parts (proximal, middle and distal). The batch of tuber part was transformed into flour. Crude protein content and simple sugars were determined respectively by kjeldhal and enzymatic (Kit Magazyme) methods.

Results: The crude protein of tuber sections varied weakly during the maturity period with a decreasing at 20 to 24 weeks after the planting date. Protein content of the distal (6.52 %) part was higher than the two over parts (4.91 %) ($p<0.05$). It decreased during the tuber maturity. Glucose, fructose and sucrose content decreased considerably during the tuber maturity. At maturity the median and distal parts contained high glucose and low fructose ($p<0.05$).

Conclusions: The nutritional compounds (glucose, fructose and sucrose) of yam tuber were appreciable at early stage of tuberization. The distal part contained appreciable amount of protein at maturity and must be considered as the two over parts.

Key words: Flour, tuber parts, growth period, yam.

PO2629

MICRONUTRIENT POWDER DISTRIBUTION TO YOUNG CHILDREN: SECONDARY ANALYSIS OF ANAEMIA DATA AND PROGRAMMATIC EXPERIENCE IN HIGH ANAEMIA BURDEN REFUGEE SETTING

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Background and objectives: Anaemia measured as a proxy for micronutrient malnutrition is a persistent public health problem in refugee populations. Blanket micronutrient powder (MNP) distribution to children 6-59 m was initiated in August 2008 in the two Rohingya refugee camps in Bangladesh managed by UNHCR. This secondary analysis aimed to assess trends in anaemia prevalence from 2008-2012 and to review the MNP programme experience.

Methods: Prevalence of total anaemia, anaemia categories and mean haemoglobin (Hb) from yearly, routine cross-sectional nutrition surveys were analysed in children 6-59 m and disaggregated by age (6-23, 24-59). Monthly coverage and consumption at the household level were reviewed. The MNP programme strengths and challenges were assessed.

Results: The combined camp anaemia prevalence results using Hb<11 g/dl and Hb<10 g/dl were 47.5% and 23.2% in Fe-

bruary 2008, 28.9% and 9.6% in May 2009, 50.2% and 11.3% in April-May 2010, 36.1% and 8.9% in May 2011, and 29.8% and 4.9% in May 2012, respectively in children 6-59 m. Anaemia levels were significantly higher among children 6-23 m compared to those 24-59 m in most years. Coverage was consistently high while consumption at the household level fluctuated and reached low levels at times. The main strength was the monitoring data collection process. The three most important challenges were: community acceptability of the product, supply issues, and a short-term switch of product from August 2009-January 2010 for children 6-35 m replacing MNP to a lipid-based nutrient supplement.

Conclusions: MNP distribution appears to be associated with a reduction in anaemia, especially in its more severe forms, in children 6-59 m. Additional efforts are needed to further reduce anaemia in children 6-23 m. These results need to be interpreted in consideration of the challenges encountered and the other anaemia reduction activities implemented between 2008-2012. MNP programme implementation is a demanding process for field staff.

Key words: Micronutrient powder, micronutrient malnutrition, anaemia

PO2630

PREVALENCE OF INADEQUATE INTAKE OF ANTIOXIDANT NUTRIENTS FOR PATIENTS UNDERGOING DIALYSIS TREATMENT AT A CLINIC IN FORTALEZA, BRAZIL.

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Background and objectives: The oxidative stress can be associated with chronic renal patients on hemodialysis (HD) as a result of increased pro-oxidant activity and reduced antioxidant systems. Thus, the objective of this study was to analyze the prevalence of inadequate intake of antioxidant nutrients in patients undergoing dialysis treatment at a clinic in Fortaleza, Brazil.

Methods: The study was done with 36 patients on hemodialysis, aged 18 years and not suffering from other chronic diseases, all insured at a specialist clinic. All participants signed a consent form. For food intake assessment 24 hours recall method was used, being collected in two non-consecutive weekdays and one weekend day. We analyzed the nutrient selenium, zinc and vitamins A, C and E through NutWin program, version 2.5. The database software was fed with data from the National Database for Standard Reference Nutrient Department of Agriculture of the United States.

Results: Analysis of the data showed that the mean consumption of selenium was 77,24 ± 31,22 ìg and 16,66% of patients had intake below the EAR, the average zinc was 7,38 ± 3,22 mg, with 61,11% of inadequacy, vitamin A, on average 471,67 ± 671,58 µg, with 80,55% of inadequacy, vitamin E, on average 4,6 ± 2,14 mg, 100% and average mismatch of vitamin C was 169,49 ± 680,45 mg, with 72.22% of inadequacy. The study of Sahni et. al. (2012), who analyzed the intake of zinc, vitamin A and C in patients with severe renal disease found intake of 5,42 ± 1,74 mg zinc, 190,31 ± 63,69 ìg of vitamin A and 17,9 ± 10,6 mg of vitamin C, below the results found in this study.

Conclusions: The data obtained show that the risk of inadequate consumption of antioxidant nutrients by these patients is high and that the diet should be implemented.

Key words: Intake, antioxidant nutrients, dyalisis

PO2631

PREVALENCE OF VITAMIN A DEFICIENCY IN LATIN AMERICA AND THE CARIBBEAN: A SYSTEMATIC REVIEW UPDATE

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Background and objectives: A significant effort has been made in Latin America and the Caribbean (LAC) to control and prevent vitamin A deficiency (VAD). Therefore, updating the prevalence data available on VAD is necessary. Objective: To examine available data on the prevalence of VAD in LAC since 2000.

Methods: A systematic review was conducted using Pubmed, LILACS, SciELO and also WHO, Nutrinet and websites of Health Ministries. Studies that biochemically measured VA status were included. VAD was defined as serum VA<20µg/dl. The public health problem (PHP) magnitude was defined in accordance with IVACG/WHO criteria.

Results: Twelve countries with National Representative Survey (NRS) of VAD in preschoolers (<6y) were found. Guatemala-(<1%) does not have PHP in VA, Costa Rica-(3%), Cuba-(4%), Guyana-(4%), Nicaragua-(9%), and Panama-(9%) have a mild-(≥2–<10%) PHP; Honduras-(14%), Peru-(13%), Brazil-(16%) and Argentina-(14%) have a moderate-(≥10–<20%) PHP; Colombia-(24%) and Haiti-(32%) have a severe PHP-(≥20%). A NRS indicated 22% VAD in Mexican children aged <12y. Moreover, some countries showed moderate VAD in pregnant women, such as Peru-(10%), Brazil-(12%) and Nicaragua-(11%).

Conclusion: The available NRS suggests that the magnitude of VAD fluctuates from mild to moderate in preschoolers and pregnant women. Alarming figures were reported in Colombian and Haitian young children and in Mexican children and adolescents. Although this information indicates that VAD is still a PHP in some countries, no regional extrapolations to the entire LAC should be done due to lack of NRS in several countries. Funded by DSM Nutritional products.

Key words: Vitamin A deficiency, Latin America and the Caribbean, Micronutrients

PO2632

EFFECT OF SHIFT WORK ON THE FEEDING PRACTICES OF CHILDREN (0-24 MONTHS).

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Background and objectives: For many women today, work is essential for the economic survival of their families while they also fulfill their role of providing optimum nutrition to their babies. This study examines the effect of shift work on the feeding practices for children aged 0-24 months.

Methods: Using stratified random sampling, 110 women, shift workers (nurses) and non-shift workers (artisans) were interviewed from Ile-Ife Central LGA, Osun State, Nigeria about breastfeeding and complementary feeding practices. Data was analyzed using descriptive and inferential analysis.

Results: Shift workers (69.1%) spent 8 hours at their workplace while non-shift workers (89.1%) spent 5-10 hours. 27.3% of the women started breastfeeding immediately after delivery while 30.9% started after 1-2 hours and only 10% (shift workers) of the women practiced exclusive breastfeeding. Non-shift workers (32.5%) and shift workers (50.9%) planned to terminate breastfeeding between 6-12 months and 13-18 months respectively. Complementary foods were introduced between 4-6 months for non-shift workers (36.4%) and shift workers (48.2%). Out of the 48.2% women that used infant formula, 34.5% used feeding bottles, 3.6% used cup and spoon and 10% used both for feeding. Home-made complementary foods were given by the mothers, non-shift workers (45.5%) and shift workers (58.2%).

Conclusions: The shift work of the mothers had no effect on the feeding practices of their children. Health workers, including doctors, nurses and nutritionists should emphasize the importance of breastfeeding and complementary feeding to mothers during antenatal and postnatal period.

Key words: Shift work, breastfeeding, complementary feeding

PO2634

ASSESSMENT OF MAXIMAL OXYGEN UPTAKE IN IRON-DEFICIENT RWANDAN WOMEN

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Background and objectives: Iron-deficiency has been shown to impair physical performance beyond its effects on hemoglobin (Hb) and oxygen-carrying capacity (VO2). As part of a larger study to analyze the efficacy of biofortified beans on improving iron status in iron-deficient Rwandan women, baseline blood and physical performance data were collected. The objective of the current analysis is to describe the relationship between iron status and physical performance of iron-depleted Rwandan women. We hypothesize that the women with the poorest iron status will have lower maximum oxygen uptake (VO2max).

Methods: A sample of 158 female Rwandan university students (18-27yrs) provided venous blood samples and completed submaximal physical performance test on a cycle ergometer. Heart rate and VO2 were measured by the breath-by-breath Cosmed K4B2 system. Iron status was assessed by plasma ferritin (Fer), transferrin receptor (TfR), and hemoglobin (Hb). VO2max was predicted from extrapolation of VO2 to predicted maximum HR (220 bpm-age) and compared with various classifications of iron status.

Results: 135 subjects were iron-depleted (Fer<20 μg/l) and 23 were iron-replete. For subjects who were iron depleted, 27% were anemic and 41% had TfR>8.3 mg/l. Predicted VO2max was marginally lower in iron-depleted subjects compared to iron-replete subjects (31.4 ml O2/kg/min and 33.7ml O2/kg/min, respectively; p=0.10). Iron-depleted anemic subjects had lower VO2max compared with iron-depleted non-anemic subjects (29.4 ml O2/kg/min versus 32.2 ml O2/kg/min; p=0.02). Tissue iron-deficient subjects (TfR>8.3 mg/l) had lower predicted VO2max than subjects with TfR<8.3 mg/l though the difference was not significant (30.4 ml O2/kg/min versus 32.2 ml O2/kg/min; p=0.08).

Conclusions: For Rwandan university women, VO2max was compromised by iron deficiency anemia and to a lesser degree by iron depletion without anemia.

Key words: Iron-deficiency, Rwanda, physical performance

PO2635

CALCIUM INTAKE AND BONE MINERAL DENSITY IN YOUNG MEN WITH DIFFERENT LEVELS OF PHYSICAL ACTIVITY

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Background and objectives: Calcium is the most abundant mineral in the body. Being very important for skeletal structure and strength, most calcium (99%) is stored in the skeleton. Continuous low calcium intake weakens bones, makes them fragile, and can lead to osteoporosis. The aim of the present study was to evaluate the calcium nutritional state in young men with different physical activity levels, through calcium intake and mineral density estimation, in order to make recommendations that could reduce the risk of developing osteoporosis.

Methods: A cross-sectional study was designed with 80 men aged from 25 to 50 years and with different levels of physical activity. Bone mineral density (BMD) was estimated through DEXA densitometry (Dual Energy X-ray Absorptiometry). A semi-quantitative food frequency questionnaire was designed to assess calcium intake. Physical activity levels were evaluated through IPAQ (International Physical Activity Questionnaire).

Results: 84% of the participants reported appropriate calcium intake. Major calcium consumption was observed among individual with high physical activity levels. 24% of the participants reported BMD values below the expectancy to their age and gender. BMD was positively associated with calcium intake and negatively with age. No association was found between BMD and physical activity level.

Conclusions: Low values of bone density found in the population under study suggest that it may be important to evaluate risk factors associated with lifestyle, such as calcium intake and the physical activity.

Key words: Bone mineral density (BMD), calcium, men, physical activity, osteoporosis

PO2636

EARLY PEAK HEIGHT VELOCITY IS ASSOCIATED WITH CARDIOVASCULAR DISEASE MORTALITY IN A COHORT OF ICELANDIC WOMEN

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Background and objectives: Among girls, early puberty has been associated with increased risk of markers for cardiovascular disease. The aim of this study was to quantify the associations between timing of peak height velocity (PHV), derived from growth measures, and cardiovascular disease (CVD) mortality.

Methods: Prospective population based cohort study of 973 Icelandic women born 1921-1935. Childhood growth measures were collected in regular intervals from ages 8 to 13 and subjects were later recruited into the Icelandic Heart Association longitudinal Reykjavik study from 1968-1991. We used Cox proportional hazard model to estimated hazard ratios of cardiovascular disease mortality from recruitment until 31 December 2009.

Results: A total of 86 women died from CVD, of which 42 deaths were from coronary heart disease (CHD). Compared to girls with PHV after age 12, those with PHV identified prior to age 11 and between ages 11 to 12 years were at greater risk of overall CVD mortality (hazard ratio 1.93, 95% confidence interval 1.11 to 3.36) and (2.61, 1.56 to 4.39), respectively. Comparable associations were observed when restricting the analyses to CHD cases (2.47, 1.27 to 4.78) as well as non-CHD CVD cases (2.22, 1.17 to 4.20) when comparing girls with PHV after vs. prior to age 12. Timing of PHV was not associated with traditional CVD risk factors in mid-life including body mass index and adverse lipid profiles.

Conclusions: Earlier timing of PHV in girls may increase the lifetime risk of CVD mortality with slightly stronger associations with CHD mortality. Our results suggest that early height acceleration among girls may be an important determinant for later cardiovascular health.

Key words: cardiovascular diseases, coronary disease, epidemiology, mortality, risk factors

PO2637

OVERALL PLATE WASTE DETERMINATIONS AT PRIMARY SCHOOLS' CANTEENS: A COMPARISON OF TWO METHODS

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Background and objectives: Schools have been concerned about nutritional, economic, environmental and social impact of plate waste. Physical measurements have been used to evaluate plate waste at schools, however the logistic disadvantages of this method leads to indirect alternatives such as the visual method. The present study aims to evaluate accuracy of visual estimation in comparison with weighing on food waste determination considering meals served at school canteens.

Methods: Plate waste at school lunch was collected for 484 individual servings distributed by 10 menus (mixed and non-mixed), using two different methodologies: weighing and visual estimation. Weighing of individual meals and leftovers was performed and plate waste was calculated by the ratio of food discarded to food served. At the same time, a six-point visual estimation scale developed by Comstock (1981) was used to determine plate waste. Scores on the Comstock scale were converted into weights of plate waste for all servings evaluated based on initial weights. Pearson correlations were computed between the plate weighing and visual determinations of meal waste for total food and for each menu.

Results: Mean plate waste was 50.0 g for weighing method and 59.2 g for visual estimation, and global correlation between them showed a strong association ($r=0.86$, $p<0.01$). Furthermore, when comparing those methodologies with different menus, correlation values ranged from 0.54 to 0.95, all significant at a 99% confidence level, being the mixed meals those with higher values. This indicates that visual estimation could be misleading for non-mixed meals since weaker associations between the two methods were found.

Conclusions: Weighing of food waste seems to be a more sensitive instrument for plate waste determinations. However, lower cost and greater convenience of visual estimation is a determinant for using this method, when plate waste evaluation of a greater number of meals is required.

Key words: Plate waste, school lunch, visual estimation, weighing

PO2638

PREDICTING POTENTIAL BENEFIT FROM IRON INTERVENTIONS: RESULTS OF A RANDOMIZED CONTROLLED TRIAL OF DOUBLE-FORTIFIED SALT IN FEMALE INDIAN TEA PLUCKERS

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Background and objectives: Iron deficiency (ID) primarily affects infants, children, and women of reproductive age. ID is the most common micronutrient deficiency in the world, and is especially prevalent in India. A randomized, double-blinded, placebo controlled trial was conducted in female tea pluckers on a tea estate in West Bengal, India to test the efficacy of double-fortified salt (DFS) as a vehicle of iron delivery. The present analyses examine predictors of response to the intervention.

Methods: Mixed models were used to assess the effect of DFS on the change in iron indicators (hemoglobin, serum ferritin, soluble transferrin receptor, total body iron) and other micronutrient indicators (urinary iodine, serum folate, serum vitamin B12). Predictors of ID resolution were identified using logistic regression models.

Results: Changes in ferritin and body iron were significantly ($p<0.05$) higher, whereas changes in transferrin receptor were significantly lower in the DFS group versus controls. Hemoglobin was only marginally increased by DFS, and DFS did not affect urinary iodine, serum folate, or serum vitamin B12. Resolution of ID and/or moderate ID was predicted by age, height, urinary iodine, and vitamin B12 status, in addition to baseline iron status (hemoglobin, transferrin receptor, and body iron) and treatment group.

Conclusions: DFS improves iron status in female Indian tea pluckers and does not affect the status of other micronutrients, including iodine, folate, and vitamin B12. The potential to benefit from an iron intervention with DFS (i.e. ID resolution and prevention) can be predicted by baseline iron status, as well as age and height. These results may help identify populations likely to respond to future efficacy and effectiveness trials of dietary iron interventions.

Key words: Iron deficiency, dietary intervention, India

PO2639

BODY FAT PERCENTAGE AND BODY MASS INDEX RELATIONSHIP IN A SAMPLE OF ADULTS FROM NITERÓI, RIO DE JANEIRO, BRAZIL

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Background and objectives: Despite its universal use, body mass index (BMI) cut-offs to identify obesity or its risks for associated complications have been shown to be population specific in part due to the difference in its relationship to percentage body fat (%BF) across populations. Our aim was to examine the relationship between BMI and %BF in a sample of Brazilian adults from Niterói, Rio de Janeiro and to validate sex-specific %BF predictive equations based on the inverse of BMI (Inv_BMI) developed with data from a household survey in this population in 2003.

Methods: Body fat (dual-energy X-ray absorptiometry - Lunar iDXA, GE Health Care), body mass and stature were measured in a convenient sample of 674 adult (20.1-91.7 years) subjects (423 women) from Niterói with BMI > 18.5 kg/m2. Published predicted %BF equations were: Males, 73.22-(1250.9*Inv_BMI) and Females, 73.72-(876.88*Inv_BMI).

Results: Mean (95% CI) BMI was 26.4 (25.9;27.0) and 28.5 (27.9;29.0) for males and females, respectively. Mean measured %BF was significantly higher than predicted %BF in men (27.9,27.0;28.8 and 24.8,23.8;25.7%) but not different in women (41.4,40.8;42.0 and 41.7,41.1;42.3%). The estimated %BF values for the BMI cut-off values of overweight and obesity (25 and 30 kg/m2, respectively) for women (39 and 44) and men (26.8 and 32.8) were somewhat greater than what has been suggested for the American population but resembles, particularly in women, the values previously documented for the adult population of Niterói.

Conclusions: The obesity cut-off values of BMI currently suggested for international use may not be appropriate for the Brazilian population living in Niterói based on the BMI-%BF relationship. The published %BF predictive equations may be appropriate for women of Niterói.

Key words: Body composition, Brazil, BMI

PO2640

CONTRIBUTION TO IMPROVEMENT? POTENTIAL OF NON-TIMBER FOREST PRODUCTS EXTRACTION IN PERIPHERAL AREAS OF PERUVIAN AMAZON.

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Background and objectives: Livelihood of indigenous and traditional communities in remote areas rely primarily on agriculture and non-timber forest products extraction which represents major sources of livelihood and income for some households. High rates of degradation and deforestation of tropical rainforest could threaten rural communities. The aim of the study is to identify collected non-timber forest products, economic potential, role of these products and diversity of collected NTFPs for two different ethnic groups – Shipibo-Conibo and "mestizo".

Methods: This study presents collection, utilization and market potential of non-timber forest products (NTFPs) used by rural populations from the Peruvian Amazon. Data were collected during September - October 2011 through interviews, semi-structured questionnaires and direct observation. Significance of used NTFPs were determined by cultural and economic values. The inventorial study was conducted with 40 randomly selected ethnic households in three villages of the Abujao river basin.

Results: During the survey, 57 plant-based and 20 animal-based NTFPs were identified. Results show that the Shipibo-Conibo collect higher number of NTFPs, in comparison to the "mestizo" households. Shipibo-Conibo harvests NTFPs particularly for subsistence (64.18%). In contrast, "mestizo" households use 73.77% for auto-consumption. The calculation of cultural and economic values showed higher cultural importance of NTFPs for the Shipibo-Conibo (62.69%) while for "mestizo" households NTFPs are important from the economic point of view (59.02%).

Conclusions: NTFPs gathering represent a daily activity for most households; however, a commercial participation is unachievable for most of them. During the survey it was found out that communities in remote areas have limited access to markets however improvement and availability is desired for most of rural people.

Key words: Commercial potential, cultural value, economic value, Shipibo-Conibo

PO2641

REFERENCES FOR WAIST CIRCUMFERENCE FOR PORTUGUESE ADOLESCENTS

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Background and objectives: Waist circumference (WC) is an important parameter to evaluate health conditions and it is essential in the prognostic of the risk of disease not only for adults but also for youngsters. Until 2011 no WC references for the Portuguese adolescents had been developed which constituted a limitation for health assessment. The aim of this study was to analyse and compare the recently developed WC references for age and gender in Portuguese adolescents population in the three main regions: mainland Portugal, Autonomous regions of Madeira (RAM) and of Azores (RAA).

Methods: The references for the Autonomous Region of Madeira (10 to 18 year-old) (Sousa et al, 2011), the references for mainland Portugal (10 to 18 year-old) (Sardinha et al, 2011) and the references for the Autonomous Region of Azores (15 to 18 year-old) (Santos et al, 2011) were compared to identify possible differences between the smoothed percentile curves (P5, P50, P90 and P95) by age and gender.

Results: The references of RAM are similar to those of mainland Portugal but the RAA have much higher values. The differences can sometimes exceed 10 cm, which may lead to different diagnoses, depending on the anthropometric reference which is used. These disparities may be related to the increasing number of overweight subjects in RAA or due to this islander population characteristics as a result of the interactions between genetic and environmental factors.

Conclusions: These WC references constitute a new tool to assess the health and nutritional status of Portuguese adolescents as well as their cardiometabolic risk. However each reference should be used on its own population, namely in the case of the RAA references.

Key words: Waist circumference, references, adolescents

PO2642

INTER-METHOD AGREEMENT OF TWO DIFFERENT ASSESSMENT TOOLS FOR CALCIUM INTAKE REGISTRATION IN ADOLESCENT SWIMMERS

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Background and objectives: Food frequency questionnaire and 24-hour recall are some of the frequent used methods to register calcium (Ca) intake. The aim of this study was to assess the agreement of two different assessment tools, a 24-hour recall [the Helena-DIAT (Dietary Assessment Tool)] and a self-designed calcium frequency questionnaire (CaFQ), which included the main Ca rich foods.

Methods: Ca intake was evaluated in a total of 22 swimmers (11 females; 14.68 ± 1.73 y). Mean difference, random error and heteroscedasticity were assessed to study the inter-method reliability. For Ca intake estimation, the agreement between the Helena-DIAT and CaFQ was graphically examined by plotting the difference (Helena-DIAT minus CaFQ) against the mean according to the method suggested by Bland and Altman (Bland & Altman, 1986). Difference between Ca intake estimations with Helena-DIAT and CaFQ was analysed with Student's t test. Random error was established as the limits of agreement for the tests, computed as mean difference ± 1.96 standard deviations (of the inter-methods differences). The presence of heteroscedasticity was studied by linear regression analysis.

Results: No significant inter-method difference was found between Helena-DIAT and CaFQ (870.41 ± 355.02 vs. 1009.70 ± 502.29; p=0.3) showing a mean difference of 139.3 mg. The random error was 1025.3 mg. Heteroscedasticity was not detected within the graph (p=0.129) suggesting that relationship between both tools do not change independently of the magnitude of Ca measured.

Conclusions: Although neither significant difference between means nor heteroscedasticity was detected within the plot, the random error resulted high, suggesting that differences between methods present a high variation depending on individual bases. In the case of Ca intake estimation, small changes in food portion reported may be translated in huge differences in Ca calculation. References 1- Bland JM, Altman DG. (1986). Lancet, 1, 307-310.

Key words: Registration, calcium intake, assessment

PO2643

DAILY INTAKE OF VITAMIN D AND ITS INFLUENCE ON BONE MASS IN ADOLESCENT SWIMMERS. PRELIMINARY RESULTS

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Background and objectives: Swimming is a non-osteogenic sport that could not be beneficial for bone adquisition in childhood and adolescence (1). Vitamin D (VitD) insufficiency may have long-term skeletal consequences as VitD affects calcium absorption, bone mineralization and bone mass attainment (2). Therefore, we aimed to describe the VitD intake of a group adolescent swimmers and study its influence on bone mass.

Methods: 22 adolescent swimmers (11 females; 14.68 ± 1.73 y) were evaluated by the Helena-DIAT (Dietary Assessment Tool) to register their daily VitD intake. Dual energy X-ray absorptiometry (DXA) was used to evaluate bone mineral content (BMC) and density (BMD) at subtotal (whole body less head), trochanter, interthrocanter, femoral neck, Wards triangle, total hip and lumbar spine sites. Relationships between VitD intake and bone-related variables were examined by partial correlation analyses after controlling for age, height and subtotal lean mass.

Results: None of the adolescent swimmers reached the daily VitD recommendations (15 μg). The total daily average VitD intake was 2.43 ± 2.36 μg. No significant correlations were found between VitD intake and bone-related variables.

Conclusions: Swimmers did not meet VitD intake recommendations. No correlation have been found between VitD and bone related variables in this specific group. It may be due to the fact that adolescent swimmers did not reach the VitD daily intake. Thus, other factors such as genetic, hormonal balance and other environmental factors like physical activity and daily sun exposure could have an important role on bone acquisition. Further studies should be focused on consequences of a poor VitD intake in performance and health of adolescent swimmers and the design of interventions to achieve dietary guidelines. References 1-Scofield KL et al. (2012). Curr Sports Med Rep, 11, 328-342-Pekkinen M et al. (2012Plos One, 7.

Key words: Adolescent swimmers, daily intake, vitamin D

PO2647

ASSESSMENT OF BONE BUILDING MINERALS AMONG STUNTED AND NORMAL CHILDREN

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Background and objectives: Linear growth in children is regulated by complex interaction between an individual's genetic potential, environmental influences and nutrition. The aim of this study was to access the bone building minerals in stunted and normal children.

Methods: The present study is a case control study including one hundred children with delayed linear growth aged 6-12 years old and one hundred age matched children with normal growth randomly assigned. These groups were subjected to medical history, anthropometric measurements and dietary intakes using 24 hours recall method. Laboratory assessment was done for a sub-sample of 50 cases and their control which include serum calcium, phosphorus, magnesium and alkaline phosphatase.

Results: The dietary results showed highly statistical significant differences for energy, protein, calcium and magnesium adequacy between both groups, where their intakes were higher among the normal children. The mean ± standard deviation of serum calcium, phosphorus, magnesium of stunted group were 7.5 ± 1.5 units, 5.6 ± 0.8 units and 2.2 ± 0.2 units respectively compared to 8.7 ± 1.3 units, 5.5 ± 1.1 units and 2.4 ± SD value lacking for the control group respectively with statistical significant difference.

Conclusions: It was concluded that bone building requires adequate intake of protein and micronutrients such as calcium, phosphorus and magnesium since early life to develop normally and to maintain itself after growth.

Key words: Linear growth, bone building mineral, stunted children, 24h recall method

PO2648

EVALUATION OF SOCIODEMOGRAPHIC FACTORS AFFECTING FREQUENCY OF VISITING MATERNAL AND CHILD HEALTH SERVICES AT A WEST AFRICAN CAPITAL (LIBREVILLE) .

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Background and objectives: Access to comprehensive, quality health care services is important for the achievement of health equity and for increasing the quality of a healthy life for everyone (Rose et al 2006).

Methods: The Maternal and Child Health Services (MCHC) of Awendje has received 1417 infants. The group (A) was formed of infants having 9 visits or more (257 infants), the group (B) having less then 4 visits (109 infants). The rest of the cases form group (C) (1056 infants) having a number of visits ranging from 4-9 visits. The study had two components: (i) Comparison of anthropometric measurements of weight and length of enrolled infants by frequency of utilization of maternal and child healthcare services, and (ii) Comparison of demographic factors that promote and prevent the use of the health care services provided by MCHC.

Results: Group A: All infants had weight per age (weight per age z- score ± 2 SD). The follow up of the group (A) show that 239 infants (93%) have normal linear growth for age the resting , 14 infants Group (B) where the majority 99 infants (91%) had a retarded growth. Only 10 infants (9%) of group (B) has normal linear growth for age. With significant statically difference (p=0.00).

Conclusions: The sociodemographic factors have an important impact on the health of the studied infants.

Key words: Anthropometric measurements, demographic factors, MCHC, linear growth

PO2649

QUANTIFICATION OF VITAMIN E IN DEHYDRATED BEE POLLEN OF SOUTHERN BRAZIL

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Background and objectives: Bee pollen has become another option for nutritional supplementation in food. From the 90s, studies were initiated for the analysis and verification of therapeutic potential of pollen, with the primary difference being a source of proteins, lipids, minerals and vitamins. Among the vitamins, α-tocopherol (vitamin E) highlights, having the ability to stabilize free radicals responsible for many degenerative diseases characteristic of the aging, which can be either from the outside environment or as a result of natural human metabolism. The southern region of Brazil has a subtropical climate unlike the rest of the country and has different botanical origins not found in other regions. The aim of this study was to obtain analytical data on vitamin E in dried bee pollen from southern Brazil, in order to obtain new information about this product, since the literature data are scarce and mostly from other countries.

Methods: We analyzed 21 samples of dried bee pollen collected in apiaries located in the southern Brazil. The technique used for the analysis of vitamin E was high performance liquid chromatography (HPLC) as described by Presoto, Rivers and Almeida -Muradian (2000) and Melo (2010).

Results and conclusions: Of the 21 samples analyzed the values of vitamin E ranged from 0.15 to 42.66 μg/g of dehydrated bee pollen. According to the IDR (2000), the recommended daily intake is 15000 μg/day of vitamin E for adults, so the samples were not a source of vitamin E in the range of 25 g a day under the rules of DRI (2000), but other work that includes new botanical sources should be performed to verify the presence of this vitamin in larger quantities.

Key words: Vitamin E, bee pollen, food supplement

PO2650

CLINICAL CASE: SYNDROME WITH MAXILLARY CENTRAL INCISOR UNIQUE MEDIUM WITH LOW WEIGHT AND FEEDING DIFFICULTIES

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Background and objectives: The medial maxilary central incisive is a complex syndrome consisting of multiple development disorders, primary of the middle line. They are a result of unknown factors and uncertain ethiology. Frecuently it is followed by a gross anomaly, holoprosencephaly, as well as: cardiac pathology, lip fissure, hypopituitarism, growth hormone deficiency, hypothiroidism, small penis, slow development and short stature. Assesment and treatment are pillars to ensure nutritional needs for a proper growth. Therefore to be excluded as a risk factor for the failure to thrive.

Methods: A good medical history, nutritional assesment, energy intake evaluation and frecuency, nutritional habits, activity and sleep pattern before and after intervention. A nutritional plan was established to cover energetic needs, with a proper macronutrients balance, as well as nutritional suplements to cover energy and micronutrients load. Nutritional education was offered, habits around the table were explained, the child was involved at cooking, and tips were given to introduce solids.

Results: A 8,8% weight gain increased was noticed since the beginning of treatment (eight weeks) comparing to previous periods of time. Better distribution of nutrients was obtained, 50% energy intake increase and a good progress regarding normal feeding habits, gradually accepting more consistent food, solids and a distraction free enviroment.

Conclusions: Nutritional status assesment, nutrients energy intake study and nutritional education throughout a family context is compulsory to ensure nutritional needs and to exclude it as a risk factor in failure to thrive syndromes.

Key words: Medial maxilary, syndrome, nutritional intervention

PO2651

VITAMIN D INSUFFICIENCY IN RURAL WOMEN LIVING NEAR THE EQUATOR IN SOUTHERN ETHIOPIA

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Background and objectives: Although the photosynthesis and bioavailability of vitamin D are influenced by various factors, vitamin D is produced in the skin by ultraviolet B (UVB) radiation from sunlight. However vitamin D deficiency is being recognized as a common problem even in areas with abundant sunshine. This study assessed serum 25(OH)D concentrations of rural women in southern Ethiopia living in the Rift Valley at 70 3' N latitude.

Methods: Non-pregnant women (n=202) living in three adjacent rural communities volunteered to participate in this cross-sectional study. Demographic, socioeconomic, health, and food frequency data were acquired by questionnaire. Anthropometric measurements and a fasting venipuncture blood sample were obtained by qualified professionals. Body mass index (BMI) was calculated. ELISA kits from Immuno-Diagnostic Systems were used to determine concentrations of 25(OH) vitamin D with external quality control standards from UTAK Laboratories.

Results: The self-reported mean ± SD age was 30.8 ± 7.8 years. The mean number of pregnancies was 4.7 ± 2.7, household size was 6.0 ± 2.6 and BMI was 20.0 ± 2.2. None of the participants reported ever consuming vitamin D rich foods, fortified foods or dietary supplements. Of the participants 96.7% had 25(OH)D below 75 nmol/l and 76.9% were below 50 nmol/l. All reported substantive sunlight exposure.

Conclusions: Vitamin D insufficiency is a serious problem in the study population, and living near the equator does not assure adequate vitamin D status.

Key words: 25(OH)D, vitamin D status, sunshine, Ethiopia

PO2652

VALIDITY OF INSTRUCTION LEAFLETS FOR PARENTS TO MEASURE THEIR CHILD'S WEIGHT AND HEIGHT AT HOME

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Background and objectives: Previous research has raised concerns about the validity of parental weight and height reports. Therefore, the authors developed instruction leaflets to instruct the parents how to measure their child's weight and height at home. The aim of this study was to compare the validity of parent-reported height, weight and BMI values of children (4-10 y-old), when measured at home by means of the instruction leaflets in comparison with simple estimated parental reports.

Methods: The subjects were 164 Belgian children (53% male; participation rate 62%). Parents completed a questionnaire including questions about the height and weight of their child. Parents included in the intervention group received instruction leaflets to measure their child's weight and height at home. Classes were randomly allocated to the intervention and control groups. Nurses measured height and weight following standardised procedures. International age- and sex-specific BMI cut-offs were employed to determine BMI categories.

Results: On the group level, small differences in accuracy of reported weight and BMI were identified between parent-reported values, with higher mean differences for the intervention compared to the control group. However, for all 3 parameters, the correlations between parental reports and nurse measurements were higher in the intervention group. Sensitivity for underweight and overweight/obesity were respectively 75% and 60% in the intervention group, and 67% and 43% in the control group. Weighed kappa for classifying children in

the correct BMI category was 0.30 in the control group while 0.51 in the intervention group.

Conclusions: Diagnostic measures were more accurate when parents measured their child's weight and height at home using the instruction leaflets than parental reports without instructions. Therefore, the accuracy of parent-reported weight and height could be improved by encouraging the parents to measure weight and height of their children at home by means of instruction leaflets.

Key words: Instruction folder, BMI, validity, children, parent reports.

PO2653

(E-)TRAINING: A VITAL COMPONENT IN THE STANDARDIZATION OF INTERNATIONAL NUTRITION STUDIES

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Background and objectives: Although the EPIC-Soft® 24-h dietary recall (24-HDR) programme, used as reference methodology in EPIC and recommended for pan-European dietary surveys, maximizes a structured and standardized recall approach, trained/experienced interviewers are needed to ensure good quality of open-ended interviews. The purpose of this presentation is to report on the experiences of training the trainers for conducting standardized repeated EPIC-Soft 24-HDRs and to notify the importance of e-training tools to facilitate/support such trainings.

Methods: Staff members (in charge of the local EPIC-soft training) of different countries (Bulgaria, Finland, Hungary, Poland and Portugal, Switzerland, Belgium and France) attended the 3-day train-the-trainers course at IARC and/or via an e-training approach using the GoToWebinar system.

Results: Although three training days were the minimum requirement to train-the-trainers who need to organize their local EPIC-soft training in a standardized way, suggestions were made to decrease cost and burden for attendees and course organizers. The e-training system was evaluated positively by all attendees and recommended for future train-the-trainer courses. Via the e-training, attendees were able to access and follow the presentations and make exercises at their own convenience and place. Results obtained via evaluation questionnaires concerning both, the train-the-trainers course at IARC and its e-training approach, will be presented.

Conclusions: The EPIC-soft train-the-trainers course underlined the importance of the e-learning module for future pan-European dietary surveys. More details on limitations and opportunities of the e-training module experienced during the train-the-trainer course will be presented during the presentation.

Key words: Training, dietary assessment, EPIC-Soft

PO2654

NUTRITIONAL ASSESSMENT OF CHILDREN AND TEENAGERS WITH OVERWEIGHT AND/OR OBESITY TO METABOLIC SYNDROME PREDISPOSITION

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Background and objectives: The prevalence of metabolic syndrome is increasing worldwide, and has followed the global trend to obesity. It is essential to identify and control all the factors that make up metabolic syndrome both in adolescents and in children for the prevention of cardiovascular disease in adulthood. The aim of the study was to assess the nutritional status of children and adolescents who are overweight and/or obese and their predisposition to metabolic syndrome.

Methods: We evaluated 100 patients, age 5 to 18 years, of both genders, in routine clinical care and that were diagnosed with overweight (BMI p 85-95) or obese (BMI p 95) second WHO/2007. We carried out anthropometric measurements, biochemical tests and questionnaires with the mothers.

Results: The study showed that 87% had family history of disease related to nutritional status like hypercholesterolemia, diabetes mellitus and overweight/obesity; 42% started the overweight/obesity under the age of 5 years; 72% don't make any treatment for weight control; 32% eat their meals everyday in front of TV/computer, of these, 45% for more than 4 hours daily; 69% do not do any kind of physical activity outside of school; 57% of the population has no control food intake, consuming them anytime even without being hungry, and 38% eats until feeling sick; 11% have a habit of vomiting inducing after meals showing signs of eating disorders; 39% have high daily consumption of sweets; 74% have cholesterol levels increased considering that this is a population of minors and that many factors are present characteristic of the metabolic syndrome.

Conclusions: To improve the health and nutritional status of children and adolescents is necessary to develop strategies and activities that promote nutrition education, good eating habits and encourage regular physical activity. These actions contribute to the reduction of risk factors for metabolic syndrome.

Key words: Metabolic syndrome

PO2655

THE EFFECT OF TEA CONSUMPTION ON NONHEME IRON ABSORPTION FROM A COMPLETE DIET

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Background and objectives: This study was conducted to investigate the effect of tea or coffee consumption on absorption of nonheme iron from a complete diet.

Methods: Four different iron absorption tests were performed in 13 healthy adults (4 males and 9 females) of 19-36y age. Each subject was fed a standard hamburger meal and 3 test diets and nonheme iron absorption was measured using sequential dual radiolabelling method. The 3 tests diets were a typical/usual diet, a diet without tea or coffee, and a diet with maximal intake of tea or coffee and consumed for a 5-day period.

Results: Mean intakes of nonheme iron for the 3 dietary periods were 13.0, 10.8 and 9.7 mg for typical, high tea and no tea diets, respectively. For the high tea period average daily tea consumption was equivalent to 692 mg polyphenols compared to 78 mg with the typical diet. ANOVA showed a significant difference in nonheme iron absorption among the 3 different dietary periods ($p<0.02$). Mean absorption values were very similar for the typical and high tea/coffee diet (2.99 and 3.37%), but significantly higher for the no tea diet (6.13%).

Conclusions: The results suggest that small amount of tea consumption that was observed in a typical diet can reduce nonheme iron absorption significantly from a complete diet.

Key words: nonheme, absorption, tea, complete diet

PO2656

CUTOFF POINTS FOR THIGH CIRCUMFERENCE TO IDENTIFY OBESITY IN ADOLESCENTS

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Background and objectives: Excess fat in the central region is associated with the development of various diseases. The aim of this study was to determine the sensitivity and specificity of cutoff points Thigh Circumference (TC) that identify obesity in adolescents.

Methods: Cross-sectional study that assessed adolescents from 10 to 17 years. Trained researchers took all anthropometric measurements, weight and height to calculate BMI, and TC. The study considered obese adolescents ranked above +2 z-score of BMI according to the World Health Organization, 2007. To compare the variables between the sexes the Mann-Whitney test was used. For comparative analysis of the circumference with age, the Kruskal-Wallis test was used. Significance was set at $p<0.001$. The cutoff points for TC were determined by the Receiver Operating Characteristic curves.

Results: A total of 1668 adolescents, 45.08% male. Obesity was present in 7.56% of girls and 10.51% boys. The mean values of TC (cm) were 48.32 for females and 46.14 for males ($p<0.001$). The cutoff points of TC identifying obesity in girls was 52.25 with Area Under the Curve (AUC) of 0.825. For boys, the best cutoff point was 50.75, AUC of 0.833. The cutoff points of TC according to age for males and females were 10-12 years (46.95 and 45.30), 13-15 years (55.85 and 50.85), ≥16 years (57.95 and 55.9). It turned out better sensitivity and specificity with girls and boys aged 13-15 years, AUC (0.895 and 0.961) respectively. The comparative analysis of CT according to age showed that in both sexes there were significant differences between different age groups ($p<0.001$).

Conclusions: TC is a great and simple screening tool for identification obesity in adolescents.

Key words: Thigh circumference, obesity, body fat, teens

PO2657

NUTRITIONAL ASSESSMENT AND COUNSELING IN THE OLDER ADULT TO IMPROVE FOOD HABITS AND GENERATE CHANGES IN THE STYLE OF LIFE

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Introduction: In the process of aging, nutrition modulates the functions of the different bodies, therefore, the aging of the population would be a relevant topic for Peru, from the perspective of the nutrition and public health. In Peru the last census, 2007, the adult population (65 years of age and over), in percentage terms has a significant presence in 19 districts in percentages vary between 7.3 % and 17.2 % of the total population. From these data, it can be inferred, that the number of older adults has increased by 50 % since the previous census for the year 1993.

Currently, in our country, there are some studies in health and nutrition in institutionalized older adults, however, there is a lack of studies in the elderly free-living, according to figures available statistics, would represent approximately 90 % of the total elderly. The present investigation poses, such as purpose to characterize a group of people over 60 years of free-living through an anthropometric and dietary evaluation for the modification of the intake

The objective is to measure the needs of energy intake in function of the gender from the age of 60. Methodology: For the nutritional assessment will be used dietary and anthropometric indicators. The methods of assessment of dietary intake at the individual level, are surveys or interviews or dietary food. Prospective: Food Record. Retrospective: 24-hour recall, memory of three days, frequency of consumption of food, dietary history.

Research allows us to conclude that the older adults can modify eating habits, and thus generate a change in your lifestyle to be able to raise both primary prevention, understood as the identification of risk factors in healthy subjects, such as secondary that refers to an early detection of those signs that show the existence of a disease adjacent.

Key Words: elderly, nutritional status, dietary habits, lifestyles.

PO6233

SELENIUM NUTRITIONAL STATUS IN PATIENTS UNDERGOING DIALYSIS TREATMENT AT A CLINIC IN CEARÁ, BRAZIL

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Background and objectives: The oxidative stress can be associated with chronic renal patients on hemodialysis (HD) as a result of increased prooxidant activity and reduced antioxidant systems. Selenium is an important antioxidant micronutrient. GPx is the main selenoenzyme. Thus, the goal of this study was to analyze nutritional status of selenium in patients undergoing dialysis treatment at a clinic in Ceará, Brazil. Ceará has a seleniferous soil.

Methods: The study was done with 47 patients on hemodialysis, aged 18 years and not suffering from other chronic diseases, all insured at a specialist clinic. All participants signed a consent form. The dosages of selenium plasmatic were performed by ICP-OES. GPx activity was measured according to Paglia & Valentine (1979).

Results: Selenium plasmatic was 57,32 ± 5,72 µg/l in patients and 72,08 ± 10,40 µg/l in control group ($p<0,0001$). GPx activity was 42,75 ± 17,35 U/g Hb in patients and 43,83 ± 15,53 U/g Hb in control group.

Conclusions: The patients are selenium deficient but have normal enzymatic activity.

Key words: Selenium, nutritional status, dyalisis, Brazil

PO3367

YEAST SACCHAROMYCES CEREVISIAE AS A SOURCE OF ZINC AND MAGNESIUM AND POTENTIAL SUPPLEMENT IN NUTRITION

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Background and objectives: The yeast Saccharomyces cerevisiae is the best known microorganism widely used in many branches of industry. It is known as biosorbents, too. Living organisms have always dealt with metals which are very important for enzymatic activities or for proteins structure.

Methods: Experiments were carried out with the yeast Saccharomyces cerevisiae Meyen ex E.C. Hansen. The yeast was grown on YPD medium with Zn(NO3)2, ZnSO4 or ZnCl2 in final concentrations from 25 to 300 mg per 100 mL of medium; or Mg(NO3)2, MgSO4 or MgCl2 in concentrations from 2 to 16 g per 100 mL of medium. After 48 hours cultivation at 30 °C was biomass lyophilized. Zinc and magnesium contents in yeast biomass was analysed by atomic absorption spectrophotometer method.

Results: The highest dose of yeast cells (1.19 g from 100 mL of medium) was obtained by cultivation at 25 mg/100 mL of ZnCl2. The highest amount of zinc in yeast cells (18,5 mg/g of dry biomass) was achieved with Zn(NO3)2 cultivation in concentration of 200 mg/100 mL YPD medium. The cells of yeast Saccharomyces cerevisiae are capable of accumulation of magnesium and can grow in high concentrations of magnesium, up to 16000 mg of MgSO4 in 100 mL of medium. The highest amount of magnesium bound in the yeast cells was 6000 mg/kg when added in the form of Mg(NO3)2.

Conclusions: Biosorption is a cost-effective biotechnology. This ability of Saccharomyces cerevisiae, industry brewer's yeast, is potential way for food-supplements preparations including high quality proteins, B-vitamins, amino acids and various elements, i.e. Zn and Mg. Acknowledgements: The paper was supported by project: Development of International Cooperation for the Purpose of the Transfer and Implementation of Research and Development in Educational Programs conducted by the Operational program: Education, ITMS code: 26110230085.

Key words: Micronutrients, Saccharomyces cerevisae.

PO3368

BREASTMILK B-VITAMINS CONCENTRATIONS IN HIV-INFECTED MALAWIAN WOMEN ARE INCREASED BY LIPID-BASED NUTRIENT SUPPLEMENTS AND REDUCED BY ANTIRETROVIRAL PROPHYLAXIS

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Background and objectives: B-vitamins are important for infant growth and development but the infant may become deficient if the mother has low intake or status. Maternal supplementation during lactation may improve the micronutrient status of exclusively breastfed infants. The effect of antiretroviral (ARV) treatments on the micronutrient content of the breast milk is unknown. The objective was to evaluate the effect of Lipid-based Nutrient Supplements (LNS) on breastmilk (BM) B-vitamins in HIV- infected women on ARV prophylaxis vs. control.

Methods: HIV+ mothers in the Breastfeeding, Antiretrovirals and Nutrition Study (BAN) were randomized to LNS, ARV, ARV/LNS and control from 0-28 wk. LNS contained 1 RDA of B-vitamins for lactation. BM samples (n=538) were collected at 2 or 6 and 24 wk postpartum and analyzed for free thiamin, riboflavin, flavin adenine dinucleotide, nicotinamide, pyridoxal, and vitamin-B12. Generalized linear models were used to compare means at 24 wk controlling for 2 and 6 wk values and to test for an LNS-ARV interaction.

Results: At 24 wk, women receiving LNS had higher concentrations of riboflavin, niacin, and pyridoxal and lower concentrations of B12 than the control (All $p<0.05$). Women receiving ARV had significantly lower concentrations of B12 than the control ($p<0.05$). ARV also lowered riboflavin and niacin, but ARV/LNS mitigated the decrease in riboflavin. BM B-vitamin in the BAN study were 2-50% below the adequate intake (AI) for infants, even in the LNS group.

Conclusion: BM B-vitamin analyses revealed significant differences in concentrations at the end of the lactation period by study arm. The interaction between ARV and LNS indicated that women treated with ARV had lower BM B2 at 24 wk, but LNS mitigates this effect. Overall, the BM B-vitamin concentrations were below the AI, even after maternal supplementation with LNS containing 1 RDA during lactation.

Key words: B-vitamins, lipid-based nutrient supplements, HIV.

PO3369

COMPREHENSIVE APPROACH TO ENSURE THE QUALITY OF URINARY IODINE DETERMINATIONS

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Background and objectives: The accuracy and precision of measurements of iodine is important not only to monitor the status of iodine nutrition of populations around the world, but it is also important for quality assurance to ensure accurate data is collected to document efforts to eliminate Iodine Deficiency Disorders (IDD). Centers for Disease Control and Prevention (CDC), established an External Quality Assurance Scheme (EQAS) program, Ensuring the Quality of Urinary Iodine Procedures (EQUIP) in 2001 to assist laboratories around the world assess the accuracy and precision of their urinary iodine procedures by providing pools of highly characterized urine iodine samples.

Methods: EQUIP urine iodine samples are prepared at CDC and assigned target values using CDC's ICP-MS. Based on the analysis results of the pools and the desired target concentrations, we spike pools using a NIST traceable single element stock standard if necessary, to obtain concentrations ranging from about 10-400µg/L.

Results: Overall participation in this worldwide program is excellent, with 156 reference laboratories from 77 countries. Most of the participating laboratories use spectrophotometric monitoring of the Sandell-Kolthoff reaction with sample digestion accomplished by using either ammonium persulfate or chloric acid. The ICP-MS characterization of the pools provides a measurement standard by which other laboratories can assess accuracy and precision when measuring UI.

Conclusions: Since EQUIP was established, our data shows the program's success, by showing that external quality assurance programs, through inter-laboratory comparisons, are an effective tool for laboratory performance improvement. There have been significant improvements in the quality of data from laboratories measuring urine iodine in different parts of the world as a result of this program. EQUIP will continue to be a tool available to laboratories by encouraging good laboratory practices, providing an assurance of quality data, and also assisting those who are establishing a new laboratory or modernizing old ones.

Key words: Urinary iodine. Iodine Deficiency Disorders. Laboratory Proficiency. Laboratory Methods.

PO3370

INFLUENCE OF VELOCITY OF WEIGHT GAIN IN THE FIRST MONTHS OF LIFE IN THE NUTRITIONAL STATUS OF CHILDREN 4-7 YEARS

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Background and objectives: Risk factors for the development of overweight were identified in different age groups, especially those where there was a greater acceleration of growth, as the beginning of life. There are studies that show a relationship between the growth rate in the first months of life and risk of obesity later in life. Given the above, the aim of the study was to evaluate the influence of velocity of weight gain (VWG) at 4-6 months in the nutritional status of children aged between 4 and 7 years of Viçosa, Minas Gerais, Brazil.

Methods: Retrospective cohort study, whose sample consisted of 257 children 4-7 years old who were accompanied by Lactation Support Program (PROLAC) in the first months of life. The retrospective data of weight gain were obtained from the records of attendance of PROLAC for calculating the VWG. At ages 4 to 7 years were obtained measures weight and height to calculate body mass index for age (BMI / A). Descriptive analysis, simple and multiple linear regression.

Results: Children assessed, 55,2% were male, mean age of 71,5 (SD = 12,5) months. The prevalence of overweight was observed in 24,9%. In multiple linear regression analyzes, after adjusting for control variables, it was found that increasing the VWG 4-6 months explained the occurrence of higher BMI / A (β = 0,10, 95% CI = 0,07 – 0,13, p <0,001).

Conclusions: The association between increased VWG in the first months of life and the occurrence of higher values BMI / A at later ages suggests that this criterion can be used to identify children at higher risk for changes in nutritional status throughout life.

Key words: Child, velocity of weight gain, nutritional status.

Support: FAPEMIG e CNPq

PO3371

ASSOCIATION BETWEEN IRON STORES AT BIRTH AND TIME OF CORD CLAMPING AND ANEMIA IN CHILDREN AT SIX MONTHS

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Background and objectives: Iron deficiency anemia is the most common nutritional deficiency in children 6-24 months of age and, iron reserves at birth and time of cord clamping are the main determinants of this deficiency. The aim of this study was to evaluate the association between iron stores at birth and time of cord clamping on anemia in the sixth month of life. Methods: This is a cohort study conducted in Viçosa, Minas Gerais, Brazil, which were evaluated monthly children from birth to six months. At birth, was measured the time of cord clamping and cord blood collection and in the sixth month, the collection of venous blood. The parameters evaluated were complete blood count, serum ferritin, serum iron and C-reactive protein (CRP). We excluded the results of ferritin in children with abnormal PCR at birth and at six months. The number of children evaluated at birth was 144 and, of these, 64 did the blood collection at six months.

Results: In the sixth month, the incidence of anemia in infants was 56.2% and iron deficiency, 48.4%. Anemic children at six months showed average levels of ferritin at birth lower than non-anemic (p=0.01). Children with ferritin values at birth below the 25th percentile (corresponding to 74.9 mg/L) were two times greater risk of developing anemia at six months than those with values exceeding this percentile (p=0,003). The clamping time greater than 60 seconds was associated with higher levels of ferritin at six months.

Conclusions: It is clear the importance of prevention maternal anemia and gestational aiming better iron stores for the baby, besides the implementation of the time of cord clamping at least 60 seconds in the guidelines of labor.

Acknowledgements: FAPEMIG e CNPq

Key words: Cord clamping, iron stores, anemia, children, neonate.

PO3372

THE EFFECT OF AN INTERVENTION WITH FISH AND SHELLFISH ON MERCURY, ARSENIC, LEAD, AND CADMIUM LEVELS IN BLOOD

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Background and objectives: Fish and shellfish are rich in essential nutrients including selenium and iodine. Conversely, consumption of fish and shellfish may also lead to exposure to heavy metals, a potential health risk. This study aimed to investigate the effects of fish and shellfish intake on mercury, arsenic, lead, and cadmium levels in whole blood.

Methods: In this randomised, controlled dietary intervention study, a total of 102 healthy, non-smoking, men and women aged 50-74 years were randomised to an intervention (n=51) or to control (n=51). Intervention participants received one kg fish and shellfish/week for 26 weeks. Control participants received no intervention. Non-fasting blood samples were collected at baseline and after 13 and 26 weeks' intervention. Whole blood levels of mercury, arsenic, lead, and cadmium were determined by inductively coupled plasma-mass spectrometry (ICP-MS). Mean change (SD) between baseline and week 26 was calculated within the two groups using a two-sample t test. Data was collected in a study, where the primary aim was to investigate the effect of the intervention on selenium status.

Results: Data analysis is ongoing, and the results presented in this abstract are preliminary. In total, 84 persons completed the study (n=42, intervention; n=42, control). Mean change (SD) in the intervention group was: 5.6 µg/L (1.8) for mercury, 5.9 µg/L (4.1) for arsenic, 3.7 µg/L (6.3) for lead, and 0.04 µg/L (0.24) for cadmium. In the control group, the mean change was 0.48 µg/L (1.3) for mercury, -1.2 µg/L (5.3) for arsenic, 0.56 µg/L (6.3) for lead, and 0.05 µg/L (0.23) for cadmium.

Conclusions: The preliminary results indicate that 26 weeks' intervention with fish and shellfish increases mercury, arsenic, and lead blood levels in this population.

Key words: Fish, shellfish, intervention, heavy metals.

PO3373

EVALUATION OF NUTRITIONAL STATUS USING ANTHROPOMETRIC AND BIOCHEMICAL INDICES OF COMMUNITY DWELLING OLDER PERSONS

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Background and objectives: Older persons are on the increase; nutrition and health risks increase with age. Objective: evaluate the nutritional status of community dwelling older persons using anthropometric and biochemical indices.

Methods: Cross sectional study in semi urban and rural communities comprising 600 older community dwellers aged ≥ 65years. Nutritional status was assessed by body mass index (BMI), mid upper arm circumference (MUAC), waist-hip ratio (WHR), waist circumference (WC), calf circumference (CC). Serum haemoglobin (Hb), albumin, ferritin, total cholesterol (TC), low density lipoprotein (LDL), C- Reactive protein (CRP) were assessed for 25% of the subjects using standard procedures and compared with recommended cut-off.

Results: Majority (62.7%) had normal BMI, 21.33% were overweight. 74% were at risk of heart disease with WHR. 75.6% had normal MUAC, 24.33% were malnourished. 69.5% had normal WC and 30.5% had increased risk of abdominal fat adiposity. 56.2% had normal CC, 43.8% were at risk of malnutrition. High prevalence of anaemia as 78% had low Hb. 81% had serum ferritin levels below normal range. About 43.3% had normal albumin level, 56.7% were within abnormal range of either < 35 or > 50g/l. 82.7% were in lower risk category (< 1mg/l) of CRP. 82% had desirable total cholesterol, 53.3% had optimal LDL levels. Age correlated ($p<0.05$) negatively with CC ($r = -0.22$), ($p<0.01$) with MUAC ($r = -0.295$, positively with albumin ($p < 0.05$, $r = 0.214$) in females. Significant relationship ($p<0.01$) existed between Hb and ferritin for males ($r = 0.794$) and females ($r = 0.839$). Negative relationship ($p < 0.05$) noted for Hb and CRP ($r = -0.261$). Positive association ($p< 0.01$) between BMI and CC, MUAC, WC; TC and LDL.

Conclusion: Most had normal BMI; many were at risk of heart disease with WHR. High prevalence of anaemia.

Key words: Nutritional status, anthropometric, older persons.

PO3374

A HEALTHY DIETARY HABITS SCORE IS AN INDICATOR OF DIET QUALITY IN NEW ZEALAND ADOLESCENTS

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Background and objectives: Adoption of optimal dietary habits during adolescence may have a protective effect against chronic diseases later in life. This study aimed to examine whether reporting more healthful dietary habits is associated with a better diet quality in New Zealand (NZ) adolescents.

Methods: A 17-item Healthy Dietary Habits Scores for Adolescents (HDHS-A) was developed based on dietary habits information. Using the 2008/09 NZ Adult Nutrition Survey data, adolescents aged 15 to 18 years (n = 694) who completed a single 24-hour diet recall and dietary habits questions were included in this secondary analysis. Post-hoc trend analyses were used to identify the associations between HDHS-A and nutrient intakes estimated by 24-hour diet recalls.

Results: A higher intake of protein, dietary fibre, polyunsaturated fat and lactose, and a lower intake of sucrose were associated with increasing thirds of HDHS-A. Significant positive associations were also found between HDHS-A and most micronutrients ($P<0.05$).

Conclusions: Reporting of more healthful dietary habits was associated with a more favourable nutrient profile. A healthy dietary habits score may serve as an indicator of diet quality in NZ adolescents.

Key words: Diet quality, adolescents, nutrient intake

PO3375

IODINE STATUS OF NEW ZEALAND ADULTS HAS IMPROVED SINCE MANDATORY FORTIFICATION OF BREAD

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Background and objectives: In 2009, mandatory fortification of bread with iodine was introduced in New Zealand to address the re-emergence of mild iodine deficiency that has occurred over the past two decades. The study aimed to measure iodine status and estimate iodine intake of New Zealand adults 18-64 years of age following mandatory iodine fortification of bread.

Methods: A cross-sectional survey of 301 men and women aged 18-64 years living in Dunedin and Wellington was undertaken during February-November 2012. A 24-hour urine collection, demographic questionnaire and iodine-specific FFQ were completed; and height and weight measured. Urine collections were analysed for iodine and reported as median urinary iodine concentration (UIC) μg/L and median urinary iodine excretion (UIE) μg/day. Iodine intakes, with and without discretionary salt use, were estimated using the FFQ.

Results: The median UIC for adults was 73 μg/L, indicative of mild iodine deficiency according to WHO/UNICEF/ICCIDD population iodine status criteria. The mean urinary volume was 2.0L. The median UIE was 127 μg/day and estimated iodine intake using the FFQ, that included discretionary iodised salt use, was 132μg/day. Iodine intake was significantly associated with the UIC ($p=0.040$) and UIE ($p=0.003$); however bread iodine intake and iodised salt use were not associated with either the UIC or UIE.

Conclusions: The iodine status of New Zealand adults has improved (from 53 to 73 μg/L) since the introduction of mandatory iodine fortification, however not enough to meet the cut-off of >100μg/L. Caution is advised in applying the WHO/UNICEF/ICCIDD criteria to the New Zealand adult population as it is based on healthy school-aged children >6 years with a mean urinary volume half of that found in this study. The UIE is a better estimate of iodine in this population and suggests that the iodine status of New Zealand adults is now adequate.

Key words: Iodine, bread, fortification, adults.

PO3376

TRANS FATTY ACIDS CONSUMPTION LEVELS OF RESIDENTS LIVING IN THE TOKYO REGION

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Background and objectives: There is evidence indicating that consumption of trans fatty acids (TFA) increases the risk of CHD and diabetes. WHO recommends that the average intake level is less than 1% of the total energy intake. Evaluation of TFA intakes of average people is limited in Japan due to partially lack of information on TFA including the Food Composition Table.

Methods: In 2011 a questionnaire was disseminated by internet to consumer monitors in the Tokyo Region. Inclusion criteria for analyses are male and female aged 10s -60s with 200 persons for each category, who completed the questionnaire, resulting in 1464 persons. The questionnaire consists of a food list, intake frequencies and portion sizes. TFA intake levels were calculated by use of information available in published papers and documents including the USDA food composition database. ANOVA and t-test were used to compare means of different groups.

Results: The mean intake for the total study population is 1.45/day (sd1.56 g/day) with a range 0-16.11 g/day. CV% is 107. The mean intake of the female group is higher than that of the male group (t-value 2.615, p=0.009). Levels of three groups, housewives, students and company employees are 1.79 g, 1.47 g and 1.26 g respectively, showing the intake of housewives (ANOVA, p=0.000) was highest. There was no information on total energy intakes. Therefore the energy level 2000 kcal/day was used to calculate TFA intakes % of total energy intakes. In this study population, 7% people would consume > 1% (4.5 g/day) and 19% would consume >2% (2.25 g/day) of the total energy intakes.

Conclusions: Generalizability from the findings is limited due to the sampling method of this study population: however, the findings suggest some groups are exposed to higher levels of TFA than the threshold.

Acknowledgements: Tomoko Kondo and Mika Kondo

Key words: Trans fatty acids, TFA, internet, survey

PO3377

PHYTASE IMPROVES AVAILABILITY OF MINERALS FROM FORTIFIED TODDLER CEREALS – AN IN-VITRO MODEL

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Background and objectives: Iron deficiency anemia is a major public health problem, and infants are particularly vulnerable. Complementary infant foods are typically based on cereals and legumes, both containing valuable minerals, but also phytate, which binds minerals. Phytate-bound minerals are poorly bioavailable for humans. We used Tolerase™ P phytase as a food processing aid to make two toddler cereals based on various crops, and investigated in an in vitro model, how phytate reduction in the cereals was linked to soluble, hence available, minerals in the cereals.

Methods: For estimation of food mineral bioavailability, soluble minerals and total mineral content were measured in an in vitro model of gastric digestion. The amounts of total vs. soluble iron, zinc, calcium and phosphorus were measured in the cereals treated with phytase, and compared to control cereals with the same composition.

Results: Tolerase™ P phytase increased the levels of soluble, hence available, minerals. Soluble iron increased by 9 fold (0.7 to 6.7 mg/kg), phosphorus by 1.6 fold, calcium by 2 fold, and zinc by 3.5 fold.

Conclusions: Tolerase™ P phytase can remarkably improve the amount of soluble minerals in toddler cereals. The data support using phytase to enhance the bioavailability of essential minerals from cereals, and thus to help cover the physiological mineral requirements toddlers need for healthy development.

Key words: Phytase, minerals, bioavailability, cereals, in-vitro.

PO3378

THE EFFECT OF MATERNAL OBESITY ON IRON STATUS, PLACENTAL TRANSFERRIN RECEPTOR EXPRESSION AND PREGNANCY OUTCOME. RESULTS OF PREOBE-STUDY

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Background and objectives: Obesity is associated with decreased iron status, possibly due to a rise in hepcidin, a regulator of iron absorption. Iron deficiency (ID) during pregnancy has deleterious consequences for mothers and offspring. Leptin up-regulates hepcidin expression and might be part of the aberrant iron metabolism in obesity. The aims of this study are: a) does maternal obesity result in reduced iron status? b) is leptin the link between obesity, hepcidin and decreased iron status? and c) can the placenta compensate the decreased iron status by increasing pTfR levels?

Methods: Iron status from pregnant women was estimated by serum transferrin receptor (sTfR) and ferritin levels (Fnt), serum leptin and hepcidin by luminex assays and pTfR by Western-blotting. Normal (BMI<25 kg/m2; n:126) and obese women (BMI≥30 kg/m2; n:43) were classified according to iron status (IS: Iron sufficiency, Hb>110g/L, Fnt>12mg/L; ID without anaemia, Hb>110g/L, Fnt<12mg/L; IDA: ID with anaemia, Hb< 110g/L, Fnt< 12mg/L) measured at 24, 34 weeks of gestation and at delivery.

Results: ID was more common in obese than in controls (Fnt: 16.31±6.64, n=17 vs 25.60±14.38, n=76; p=0.020; sTfR (27.24±11.49, n=18 vs 21.83±6.71, n=67; p=0.022), with inverse correlation between pre-pregnancy BMI and iron status parameters. Hepcidin levels were significantly higher among obese pregnant women at delivery (23.16±9.96, n=18 vs 16.55±9.68, n=62; p=0.034). Statistically significant correlations were found between pre-pregnancy BMI and hepcidin at delivery (r=0.2, p=0.046), leptin levels (r=0.6; r=0.5, r=0.4, p<0.0001) and leptin cord blood (r=0.3, p=0.007). Significantly pTfR expression was inversely related to maternal iron status, independently of BMI, and positively correlated with serum leptin levels.

Conclusions: Although causality cannot be demonstrated, these data imply altered regulation of iron metabolism in obese women. Importantly, these data also demonstrate that iron levels, rather than other regulators, modulate pTfR expression in the placenta.

Key words: Obesity, iron, leptin, hepcidin, placenta.

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PO3379

FOLIC ACID DIETARY STATUS AND B12 DEFICIENCY ARE CRITICAL FACTORS TO EVALUATE HEPATIC AND VASCULAR DAMAGE IN GROWING RATS

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Background and objectives: Vitamin B12 and folic acid (FA) deficient diets may block the methylation route, by reducing S-adenosylmethionine (AdoMet) concentration, accumulating homocysteine (Hcy) and increase of oxidative stress. Moderate FA supplementation under B12 deficiency status, partially reverts. Therefore, deficient diets in both vitamins potentially may result in liver and/or vascular damage. The study was conducted to evaluate the effect of different dietary FA and vitamin B12 levels on hepatic and vascular parameters during growth.

Methods: Six-week male Sprague-Dawley rats (n=50) divided in four groups were fed during 30 days the following diets: Control B12/Control FA (CBCF): 50 μg vitamin B12/ 2 mg FA Deficient B12/Deficient FA (DBDF): 0 μg vitamin B12/ 0 mg FA Deficient B12/Control FA (DBCF): 0 μg vitamin B12/ 2 mg FA Deficient B12/Supplemented FA (DBSF): 0 μg vitamin B12/8 mg FA We evaluated serum lipid profile (total cholesterol (TC), triglycerides, oxidized low density lipoprotein and high density lipoprotein), apolipoprotein (Apo) A and B, angiotensin converting enzyme and liver function biomarkers (transaminases).

Results: Serum folate and vitamin B12 levels varied according to the dietary treatment. Plasma homocysteine was significantly higher in B12 deficient groups, whereas plasma triglyceride was significantly reduced for the DBSF group. Serum lipoproteins, TC, Apo, ACE and transaminases concentration were unmodified. In previous studies we demonstrated that FA deficiency compromises methionine metabolism, whereas supplementation did not show any additional positive effect compared to a control diet even in a critical physiological process such as growth. In addition, B12 and FA deficiencies increased oxidative stress at liver and plasma.

Conclusions: Vitamin B12 status affects the response to different FA levels through changes in liver methionine cycle and oxidative stress, without modification of the lipoprotein profile, neither other liver biomarkers and/or vascular damage.

Key words: Vitamin B12 status; dietary folic acid; oxidative stress; vascular damage.

PO3380

HEALTH RISKS OF TOO LOW AND TOO HIGH INTAKE SHOULD BE EQUALLY CONSIDERED WHEN SETTING MICRONUTRIENT LEVELS IN FOOD

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Background and objectives: Food fortification is a main strategy countries can use to address population-wide vitamin A deficiency. Risk-benefit models can be used to set vitamin A fortification levels. Adverse health consequences of vitamin A intakes below the Estimated Average Requirement (EAR) are very different from those above the Upper Level (UL) both in terms of nature and severity. Risk-benefit methods exist that equally consider the health impact of micronutrient intake at the two ends of the intake spectrum. As example, the net risk-benefit was calculated for country-wide vitamin A-fortification of foods in India among children under five years of age.

Methods: The health impact was calculated for vitamin A fortification (25% of recommended level) of each of following food vehicles: oil, wheat flour and rice, sugar, or milk products. In the first step, current health burden among under-fives was expressed in Disability Life Years (DALYs) lost. In a next step, DALYs to be averted resulting from vitamin A fortification were calculated. The WHO model for calculating DALYs was used. Calculations were built on India's 2010 demographics of under-fives and household intake data. Disability weights for xerophthalmia were used. Relationships between vitamin A intake and xerophthalmia prevalence, mortality rate and possible toxic effects were modeled.

Results: Depending on the food vehicle, up to ~80% of the EAR and ~20% of the dietary gap of under-fives could be met by (25%) vitamin A fortification. The minimal impact would be 10 million DALYs averted. If fortifying all food vehicles at 25%, prevalence of xerophthalmia and mortality could reduce by half with no adverse health effects at the 97th intake percentile.

Conclusion: Estimating the health consequences of vitamin A fortification at both ends of the intake spectrum may assist in making deliberate decisions on food fortification programs.

Key words: Risk-model, fortification, vitamin A, infants.

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T6. Functional Foods and Bioactive Compounds

PO2658

EVALUATION OF DEFATTED SOY BASED FORMULAS PREPARED FOR INFANTS AND YOUNG CHILDREN WITH ACUTE DIARRHEA

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Background and objectives: Recent data supported that diet composition introduced to infants and young children during diarrheal episodes is controversial so it has been the concern of extensive research. Study aimed to formulate and evaluate some proposed formulas for this group during acute diarrhea.

Methods: Six different defatted soy based formulas with yellow carrots, rice, potato starch powder and orange were prepared. Outpatients' infants and young children (140) with acute diarrhea, visiting the Center for Social and Preventive Medicine, Cairo University Children's Hospital, Egypt, were enrolled in the study. Participants were randomly assigned to 7 groups, 20 each. The control group did not receive any dietetic intervention. At the first visit, participant' mother in the other groups randomly received a formula at in a powder form to be dissolved and used at home. Patients were followed up for 2 weeks in two visits (after 5 and 15 days of enrollment) and assessed for diarrhea duration, number of motions/day, stool consistency, weight gain and their acceptability of the formulas. Statistical analysis of the results was performed.

Results: Feeding patients formulas demonstrated insignificant ($p< 0.05$) differences among age, gender, and illness characterize of cases. The percentages of cases with watery, loose and semi solid stools were greatly reduced after five days in all the groups. Insignificant difference ($p< 0.05$) was found among weights of formulas' groups and control at enrollment, after 5 and 15 days. These groups showed significantly lower mean number of motions per day after getting proposed formulas for 5 dayscompared to control group ($p<0.001$).

Conclusions: During diarrhea episodes, feeding participants proposed formula showed better outcome than those not receiving dietetic intervention.

Key words: acute diarrhea, infant, young children, soy based formulas.

PO2659

DEVELOPMENT OF PROBIOTIC FOOD MULTIMIX (PFMM)

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Background and objectives: The food multimix (FMM) concept is one of the attempts used successfully by international programmes to meet the food insecurity challenges in poor African rural area. Despite its success the current FMM formulation concept target mainly common nutrient as carbohydrates, protein and vitamins thus lacking some bioactive compounds. This paper aims at adding live Bifidobacterium to a FMM formulation to develop a FMM enriched with bioactive compound.

Methods: The FMM were developed using fermented sorghum flour, cowpea, tiger nuts milk, red Hibiscus extracts and Aloes vera extracts. The probiotic were a strain ofBifidobacterium Longum isolated from chocolate bars. The FMM were first prepared and aliquot (102UFC/g to 1010UFC/g) of live encapsulated bifidobacterium added. The mixture allowed drying in an owen. The Arrhenius model supplemented by the linear model was used to predict the survival time of bifidobacterium in PFMM stored at ambient conditions.

Results: The proximate composition of developed PFMM shows an energy value of 427.77±23 Kcal/100g, a protein value of 23.4±6g/100g, and total fats value of 6.29g/100g. Vitamins iron and calcium were also recorded. The survival time experi-

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ments indicate an optimal rate of bifidobacterium as 106UFC/g with 30% death after 6 month storage time.

Conclusions: The new probiotic food multimix can be considered as a powerful bioactive enriched meal, with adequate required energy and key nutrients together with live microroganisms for bioactives compound.

Key words: Probiotics, Food multimixt, North Cameroon

PO2661

BENEFITS OF HYDROLYSED COLLAGEN SUPPLEMENTATION IN SKIN'S PHYSIOLOGY OF MIDDLE-AGED PORTUGUESE WOMEN

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Background and objectives: Collagen play a key role in normal dermatologic functioning. However, very few is known about the effects of hydrolysed collagen supplementation on skin's functions.We evaluated the effects resulting fromhydrolysed collagen intake in skin's water profile and biomechanicsin mature women.

Methods: Using data from measurements of transepidermal water loss, epidermal capacitanceand biomechanical behaviour, before and after 30 days of supplementation we evaluated effects on skin's physiology in 18 women, 52.3y (SD±7.3). Volunteer's hydration status was assessed by plasma osmolality. Supplementation consisted in 2,5 g hydrolysed collagen or placebo each day for 30 days. A randomized, placebo-controlled, double-blind trial was chosen.

Results: The marker of hydration status was within the range of normalcy for all women. Hydrolysed collagen supplementation significantly increased skin hydration (p=0.000) and elasticity (p=0.000). Significant variation in transepidermal water loss could not be observed.

Conclusions: In the present experimental conditions, a 2,5 g per day oral hydrolysed collagen supplementation improved skin hydration and elasticity.

Key words: Collagen hydrolysate, supplementation, skin, women

PO2662

DEVELOPMENT OF TASTY BREAD CONTAINING FUNCTIONAL ULVA PERTUSA POWDER

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Background and objectives: Ulva pertusa (Sea lettuce) has not been used as food in Japan due to its tough fibrous texture; however, in light of recent findings that the seaweed contains high levels of iron, calcium, vitamins, and polyphenols, its potential food applications are currently drawing increasing attention. We attempted to develop tasty loaf bread, which is the most regularly consumed type of bread in Japan, containing ulva pertusa powder to utilize the functional components of the plant.

Methods: Bread samples were prepared to contain powdered ulva pertusa (particle size, 250 *f* Êm) at levels of 0 (control), 1, 2, and 3%, and examined for the contents of vitamin C, chlorophyll, and polyphenols, along with DPPH radical-scavenging activity, specific loaf volume, color, texture (using a creep meter), and sensory attributes (on a five-point scoring system). Data were analyzed by Tukey-Kramer's test ($p<0.05$).

Results: The contents of vitamin C, polyphenols, and chlorophyll, and the level of DPPH radical-scavenging activity increased with the amount of added ulva pertusa powder. The breads containing 2 and 3% ulva pertusa powder showed a significantly lower specific loaf volume, a significantly higher hardness value, and a significantly lower cohesiveness value than the control. In relation to the amount of added ulva pertusa powder, there was a significant reduction in lightness and a significant increase in greenness and yellowness. The bread containing 1% ulva pertusa powder received significantly higher scores in the sensory evaluation than the other breads.

Conclusions: The contents of the functional components increased with the amount of ulva pertusa powder added, and the bread containing 1% ulva pertusa powder was ranked first in terms of preference. Regular consumption of ulva-pertusa-containing bread could be an effective way to increase the intake of its functional components.

Key words: ulva-pertusa-containing bread, functional components, color, texture, preference

PO2663

ANTIOXIDANT ACTIVITY AND PHENOLICS CONTENT OF SWEET CHERRIES (PRUNUS AVIUM L.) FROM NORTHERN SERBIA

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Background and objectives: Sweet cherry is a valuable source of some bioactive compounds important for human health preservation. Recent increasing interest in nutraceuticals and functional foods has led plant breeders to initiate selection of crops with higher antioxidant activity. Red fruits, including sweet cherries, have been reported to contain various phenolics which contribute to total antioxidant activity. Thus, the aim of this study was to determine the fruit content of different phenolic compounds and to estimate their antioxidant activity.

Methods: Red-colored fruits of 15 cultivars were collected from the productive orchard "Sloga" at Ka, in vicinity of Novi Sad. The plants were growing under continental semi-arid agroecological condition typical for the Panonnian plain lowlands representing the north of Serbia. The content of total polyphenolics (TP), total tannins (TT), total flavonoids (TF) and anthocyanins (A) has been determined in 70% ethanol fresh fruit extracts. In addition, the DPPH and FRAP antioxidant assays were evaluated, as well.

Results: TP content in the sweet cherries ranged from 7.45-147.31 mg GAE 100^{-1} g fresh weight (f.w.). Cv. Peter had the highest TP and TT content, followed by Katalin (137.55 mg 100^{-1} g) and Carmen (126.90 mg 100^{-1} g). The cultivars with high TF content observed were Peter, Rita and Margit with 41.80, 39.00 and 36.98 mg rutine g^{-1} f.w., respectively. Sweet cherries cultivars abundant in TP, TT and TF also contained more anthocyanins. The highest content was in the Katalin fresh fruits, 0.69 mg cyanidin-3-glycoside g^{-1} f.w. The DPPH-values for investigated extracts varied in a wide range between 39.76% and 78.71%.

Conclusions: DPPH activity was found to have a positive correlation with TP (0.771), TT (0.747) and A (0.548). However, the correlations of FRAP values with phenolics were relatively lower.

Key words: sweet cherries, polyphenolics, antioxidant activity

PO2664

PROTECTIVE EFFECT OF LYCOPENE AGAINST ACUTE MYOCARDIAL INFARCTION

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Background and objectives: The present study has been designed to investigate the preservation of lycopene for acute myocardial infarction in vivo.

Methods: Wistar rats were randomly assigned either to lycopene, acute myocardial infarction (AMI) model and the normal groups. Lycopene group was given lycopene dissolved in olive oil each day, while the model group and normal group were given olive oil in the same amount. After 30 days, rats of lycopene group and model group were performed left anterior descending coronary artery ligation to establish AMI model. The severity of AMI and parameters of oxidative stress were assessed by the serum, histopathological exam and myocardial homogenate.

Results: Pretreatment with lycopene significantly increase the survival rate, reduce the infarct size and amount of myocardial enzymes. The alleviation of coagulative necrosis in ventricle of lycopene group was confirmed by the histopathological exam. The comprehensive oxidative stress assessment indicated lycopene significantly decreased the amount of the products of lipid peroxidation, protein damage, and DNA damage, significantly increased the amount of antioxidative enzymes.

Conclusions: Lycopene had a myocardial preservation and the effect might attenuate the intensified oxidative stress in AMI and stimulate the generation of endogenous antioxidants.

Key words: Lycopene; Myocardial preservation; Acute myocardial infarction; Oxidative stress; Rats

PO2665

ANTIOXIDATIVE AND HEPATOPROTECTIVE EFFECTS OF GLOSSOGYNE TENUIFOLIA ON ACETAMINOPHEN-INDUCED LIVER DAMAGE IN MICE

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Background and objectives: Acetaminophen (APAP), a commonly used antipyretic and analgesic agent, can cause acute liver failure by overdose. Glossogyne tenuifolia (GT), Hsiang-Ju, used to prepare an herbal tea in Penghu, Taiwan, has been shown in recent research to exhibit antioxidative, antic-inflammatory, and anticarcinogenic properties. The present study investigates the antioxidative and hepatoprotective effects of GT against acetaminophen-induced acute liver injury in BALB/c mice.

Methods: The extracts of GT by various solvents (hot water, 50% ethanol and 95% ethanol) were used to compare the DPPH radical scavenging activity, reducing powder, total phenolic contents, and trolox equivalent antioxidant capacity (TEAC).

Results: The results showed that hot water extracts exert an excellent antioxidative capacity and were thus used in the animal experiment. The 30 male BALB/c mice were randomly divided into negative control group (APAP 400mg/kg), positive control group (N-acetylcysteine 600 mg/kg bw) and two GT groups at different dosages (100, 300 mg/kg respectively). After the administration of different oral treatments for one week, APAP was administered to the mice on the seventh day. The results showed that mice treated with GT had significantly decreased serum levels of alanine aminotrasferase (ALT), aspartate aminotrasferase (AST), and lipid TBARS (thiobarbituric acid-reactive substances), but total antioxidant capacity (TEAC) was not affected. GT-H (300 mg/kg) increased catalase activity in the liver; no prominent effects were demonstrated on superoxide dismutase, glutathione S-transferase, glutathione peroxidase.

Conclusions: In conclusion, hot water extract of GT may have potential antioxidant capacity and exert hepatoprotection in mice.

Key words: acetaminophen, Glossogyne tenuifolia, hepatoprotective, antioxidative

PO2666

IN VITRO METABOLISM OF 3,5,6,7,8,3',4'-HEPTAMETHOXYFLAVONE BY RAT LIVER MICROSOMES

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Background and objectives: 3,5,6,7,8,3',4'-Heptamethoxyflavone (HepMF), a polymethoxyflavone present abundantly in the citrus peel, have been reported to show biological properties such as the inhibition of P-glycoprotein and the suppression of growth of tumor cells. However, the mechanism which the activities are exerted by HepMF or its metabolites remains obscure. Therefore, the metabolism of HepMF was investigated using rat liver microsomes and the effects of typical cytochrome P450 (P450) inducers, phenobarbital (PB), 3-methylcholanthrene (MC) and dexamethasone (DEX), were also examined.

Methods: HepMF was incubated for 20 min at 37°C with rat liver microsomes, NADPH-generating system and HEPES buffer (pH 7.4) under aerobic conditions. Rat liver microsomes were prepared from untreated, PB-treated, MC-treated and DEX-treated rats. After incubation, an ice-cold methanol was added and the incubation mixtures were centrifuged. The supernatants were applied to HPLC.

Results: HepMF was metabolized to three major metabolites (M-2, M-3 and M-4) and four minor metabolites (M-1, M-5, M-6 and M-7) by liver microsomes of untreated rats and the amount of M-2, M-3 and M-4 was 0.42, 0.56 and 0.12 nmol/min/mg protein, respectively. PB treatment increased three major metabolites to about 2-fold and M-1 to 4.4-fold of untreated rats significantly. MC treatment increased both M-2 and M-4 to about 3-fold of untreated rats and also accelerated the formation of M-5, M-6 and M-7 to 244-, 16- and 5-fold of untreated rats, respectively. Moreover, DEX showed the similar induction pattern to PB. From the spectral data of MS and 1H-NMR, three major metabolites, M-2, M-3 and M-4, were assumed to be 4'-demethylated (OH), 7-OH and 6-OH metabolites, respectively. The chemical structures of M-1, M-5, M-6 and M-7 remain unclear because of their low yields.

Conclusion: These results suggest that CYP2B, CYP1A and CYP3A enzymes are responsible for HepMF metabolism.

Key words: polymethoxyflavone, metabolism, rat, liver

PO2667

PLANT-BASED FOODS AS A SOURCE OF LIPOTROPES FOR PREVENTING HEPATIC STEATOSIS

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Background and objectives: Lipotropes are food components that limit excessive hepatic triglyceride contents or steatosis. Steatosis is often associated with obesity and type 2 diabetes, and may lead to more serious pathologies such as steatohepatitis, hepatic fibrosis and cirrhosis, or cancer. Yet, whereas steatosis concerns several millions people worldwide, the lipotropic potential of foods has never been studied; and lipotrope-rich foods remain quite unknown. Our objective was to characterize and quantify the lipotropic potential of plant-based foods.

Methods: From lipotrope contents found in literature and nutritional tables, 132 plant-based foods and 8 lipotropes (betaine, choline, myo-inositol, methionine, niacin, pantothenic acid, folates and magnesium) could have been selected. Plant-based food lipotropic potential was expressed into a new index, the Lipotropic Capacity (LC) that integrates the sum of the 8 lipotropic densities relative to a reference food.

Results: Vegetables are the best source of lipotropes on a 100 kcal-basis and plant-based foods are a more diversified source - but complementary - of lipotropes than animal-based products. Technological processes reduce plant-based foods lipotropic potential by around 20%: while refining is the most drastic treatment, fermentations may tend to increase lipotrope densities. By comparing lipotrope consumption via both French standard diet (INCA 2 survey) and Food guide pyramid, we evaluated that our consumption in betaine, choline and myo-inositol may be increased: this can be easily reached by choosing lipotrope-dense foods like beetroot, spinash or coffee.On a one euro-basis, grains products (i.e. cereals, nuts and leguminous and oleaginous seeds) are the best compromise between a high LC and a cheap supply in lipotropes.

Conclusions: The LC allows easily ranking foods according to their lipotropic potential. But, it remains indispensable to carry out studies in humans to relate food LC with prevalence of hepatic steatosis.

Key words: Lipotropes, plant-based foods, lipotropic capacity, technological processes, consumption

PO2668

NOURISHMENT FUNCTION IMPROVEMENT OF THE WHEAT PRODUCTS BY THE ULVA PERTUSA ADDITION

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Background and objectives: In late years, eating habits were influenced by westernized countries. Lack of a mineral and dietary fiber in meal was related to diabetes mellitus. The meal intake standard of magnesium (Mg) is 370 mg/day, but there are few intakes with 250 mg. We processed Ulva pertusa (Ulva) which is unused food resources into wheat products. The chlorophyll content of Ulva is high and addition of it which is green algae in familiar food served as a source of Mg supply. Noodles and bread were prepared with addition of Ulva. Examination of chlorophyll and Mg were done to assess cooking loss and its effectiveness.

Methods: After hanging Ulva to a lyophilizer, Ulva powder was sieved using280 microns. Ulva noodles were variably added with Ulva powder with a density of 0%, 3%, 5%, 8% and 13% while Ulva bread addition of Ulva powder were 0%, 1%, 2%, and 3% respectively. Ingredient analysis for the quantity of Mg and chlorophyll were performed by Arnon Method and Ion Chromatograph Method.

Results: The chlorophyll content correspondingly increased with Ulva density addition. The quantity of Mg in 13% Ulva powder noodles increased to 1,030mg per 100 g. After boiling, Mg quantity was 530 mg. In bread, Mg quantity was 400 mg per 100 g of 3% of Ulva powder bread before bake. An amount of 151 mg was obtained after baking.Quantity of Mg in noodles and bread with increasing addition of Ulva density was similar in quantity increase of chlorophyll.

Conclusions: Increasing Ulva powder density of all wheat products put up a nourishment ingredient than additive-free noodles. It was suggested that it could become a source of Mg supply by the addition of Ulva.

Key words: Ulva pertusa, Magnesium, Chlorophyll, Wheat products

PO2669

DETERMINATION OF PHENOLIC ACIDS IN INDIGENOUS LEAFY VEGETABLES OF BOTSWANA BY HIGH PERFORMANCE LIQUID CHROMATOGRAPH

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Background and Objectives: Plant materials especially green leafy vegetables contain phytochemicals whose consumption has been associated with protecting the human body from chronic diseases.

Methods: With the aim to promote the utilisation of indigenous leafy vegetables, the present study separated, identified and quantified using HPLC-DAD the main phenolic compounds in indigenous leafy vegetables [Amaranth (Amarunthus spp.), Spider plant (Cleome gynandra), Cowpea leaves (Vignaunguiculate) and Black nightshade (Solanaceae spp)]of Botswana.

Results: 3,4-dihydroxbenzoic acid (7.56 ± 0.61mg/100g), chlorogenic acid (12.34 ± 0.95mg/100g) and ferulic acid (3.63 ± 0.09mg/g) in Amaranth spp., 3,4-dihydroxbenzoic acid (7.25 ± 0.11mg/100g), 4-hydroxbenzoic acid (3.85 ± 0.14mg/100g), p-coumaric acid (1.60 ± 0.25mg/100g) and ferulic acid (4.75 ± 0.25mg/100g) where found in Vignaunguilate, vanillic acid (1.13 ± 0.09mg/100g), chlorogenic acid (31.32 ± 4.42mg/100g) and ferulic acid (2.38 ± 0.09mg/100g) were found in Cleome gynandra, 3,4-dihydroxbenzoic acid (6.68 ± 0.05mg/100g) and ferrulic acid (7.93 ± 0.94mg/100g) were found in Solanaceae spp. Ferulic acid (2.38 ± 0.09mg/100 – 7.93 ± 0.94mg/g) appeared in all the samples analysed, however, chlorogenic acid (12.34 ± 0.95mg/100g – 31.32 ± 4.42mg/100g) was the most abundant.

Conclusion: Vegetables investigated in this study are shown to be rich sources of polyphenols which contribute to their health promoting properties. Therefore the use of these vegetables as a source of polyphenols could offer enormous opportunities for the functional food industry. In addition, it is critical to create awareness regarding diet related health benefits of these vegetables.This is the first report on identification of phenolic acids in the extracts of four indigenous leafy vegetables grown in Botswana.

Key words: Polyphenols, Amarunthus sp., Cleome gynandra, Vignaangulate, Solanaceae (nightshade), HPLC

PO2670

INFLUENCE OF PINE BARK EXTRACT POLYPHENOLS ON INTESTINAL MICROFLORA

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Background and objectives: Phenolic compounds exert antioxidant properties and beneficial effects on human health, being abundant in fruits and other vegetables, as cereals and legumes. As a concentrated of water-soluble polyphenols, Pine (Pinus pinaster Ait) bark extract (PBE) has been demonstrated to have strong antioxidant properties. In this study, the antimicrobial activity of caffeic acid, gallic acid, ferulic acid, chlorogenic acid and taxifolin; and PBE, against Escherichia coli O157:H7, Enterobacter sakazakii, Listeria monocytogenes and Staphylococcus aureus, Escherichia coli, Enterococcus faecalis, and the effect on Lactobacillus casei rhamnosus and Lactobacillus gasseri, was determined.

Methods: Taxifolin, ferulic, gallic, chlorogenic and caffeic acids, and PBE were analysed by HPLC. Each phenolic compound (1.25, 0.6, 0.3, 0.15, 0.07, 0.04 and 0.02 mg/mL) was tested against different bacterial strains to determine their effects on bacterial growth, using the microtiter plate method.

Results: Increased concentration of phenolics led to an inhibition of bacterial growth with differences depending of the compound. The growth of S. aureus and Lactobacillus gasseri was inhibited at 0.15 at 1.25 mg/mL and 0.3-0.6 mg/ml of caffeic acid, respectively. Meanwhile L. casei rhamnosus was not affected by this compound. Regarding gallic acid, the inhibitory effect was highly significant for S. aureus and E. faecalis, at concentrations of 0.02-1.25 and 0.04-1.25 mg/mL, respectively. Taxifolin showed antilisterial effect at concentrations of 1.25 mg/mL with growth inhibition values of 97%. The inhibitory effect of PBE was highly significant on the growth of E. coli O157:H7Nevertheless, the growth probiotic bacteria growth was poorly affected by most of tested phenolic compounds.

Conclusion: PBE and its constituents showed selective antimicrobial activity on intestinal bacteria. Moreover, we have demonstrated the protective effect of polyphenoles and PBE on probiotic bacteria as L. casei rhamnosus and L. gasseri.

Key words: pine bark extract, polyphenols, intestinal microflora

PO2671

SYNERGISTIC ANTIOXIDANT ACTIVITY OF PROTEIN HYDROLYSATES FROM DIFFERENT SOURCES OBTAINED BY ENZYMATIC HYDROLYSIS

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Background and objectives: Soy protein isolate (SPI), bovine whey protein (BWP) and egg white protein (EWP) hydrolysates were prepared using different microbial proteases to produce peptides with antioxidant activity (DPPH radical scavenging).

Methods: The process parameters: enzyme type, substrate and enzyme concentrations, and hydrolysis time were further investigated for each protein source. After defining the most appropriate process parameters for enzymatic hydrolysis, the interactions amongst the hydrolysates with maximal antioxidant activity obtained from the different sources, were studied using a simplex centroid mixture design.

Results: SPI hydrolysates with maximal antioxidant activity were obtained with a substrate concentration of 90 mg.mL-1 and 70.0 U of a commercial protease from Aspergillus oryzae per mL of reaction mixture ($U.mL^{-1}$), with a hydrolysis time between 120 and 180 min. For BWP hydrolysates the hydrolysis parameters were: substrate concentration of 8.0% plus 70.0 $U.mL^{-1}$ of a protease from Aspergillus oryzae produced by solid-state fermentation, and a hydrolysis time in the range from 60 to 240 min. The hydrolysates prepared from 3.0% EWP plus 20.0 $U.mL^{-1}$ of a commercial protease from Aspergillus oryzae, obtained after 120 minutes of hydrolysis time, presented high DPPH radical scavenging. In the antioxidant study of seven formulations containing SPI, BWP and EWP hydrolysates, alone or in combinations, a synergetic effect was found for the ternary mixture. In a mixture composed of SPI (1/3), BWP (1/3) and EWP (1/3), increases of 184.1, 164.7 and 217.5% in DPPH radical scavenging were observed as compared to the respective isolated hydrolysates. However the binary mixture BWP (1/2) plus EWP (1/2), showed an antagonistic effect. The interactions between the binary mixtures: SPI (1/2) plus BWP (1/2) and SPI (1/2) plus EWP (1/2) were not statistically significant ($p < 0.05$).

Conclusions: The results suggest that the enzymatic hydrolysis of proteins from different sources and their mixtures can improve the antioxidant activities.

Key words: protease, protein hydrolysates, antioxidant activity, synergistic effect

PO2672

FUNCTIONAL PROPERTIES AND INHIBITION OF THE RELATIVE LIPID ACCUMULATION OF PROTEIN HYDROLYSATES OBTAINED BY ENZYMATIC HYDROLYSIS USING STATISTICAL MIXTURE DESIGN

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Background and objectives: Statistical design mixtures of soy protein isolate (SPI), bovine whey protein (BWP) and egg white protein (EWP) were used to study the effects of the different protein sources and their mixtures on the functional properties (solubility, heat stability, emulsion activity index and foaming capacity) and inhibition of the relative lipid accumulation (RLA) in 3T3-L1 preadipocytes during differentiation.

Methods: The hydrolysates were prepared in Erlenmeyers flasks containing 50 mL of protein solution (100 mg.mL-1) and a commercial protease from Aspergillus oryzae. The solution was incubated for 2h under the optimum pH and temperature conditions for the enzyme (pH 5.0 at 50.0°C).

Results: For functional properties, the enzymatic hydrolysis increased the solubility of the proteins, excepted for EWP and the mixtures containing it. However, the hydrolysates exhibited a tendency to decrease the foaming capacity and heat stability. A synergetic effect was found for the emulsion activity index with two binary formulations and the ternary mixture, with increases of up to 12-fold. The EWP hydrolysates showed the highest RLA suppression (19.7%) followed by BWP (16.4%) and SPI (8.7%). Two binary mixtures and the ternary formulation showed similar RLA suppression compared to the isolated protein sources. The hydrolysates obtained using equal proportions of SPI and BWP, and of BWP and EWP, showed RLA suppressions of 11.5 and 12.8%, respectively, while the ternary mixture containing SPI (1/3), BWP (1/3) and EWP (1/3) showed an RLA suppression of 14.5%.

Conclusions: The results suggest that the enzymatic hydrolysis of proteins from different sources and their mixtures can improve some functional properties and increase the suppression of RLA in 3T3-L1 cell differentiation.

Key words: protein hydrolysis, mixture design, functional properties, relative lipid accumulation, 3T3-L1.

PO2673

IN VITRO METABOLISM OF DIOSMETIN AND HESPERETIN BY RAT LIVER MICROSOMES

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Background and objectives: Flavonoids in fruits and vegetables are transformed to hydroxy-metabolites via hydroxylation and demethylation in animals. To elucidate the relationship between their chemical structures and metabolic patterns, the metabolism of a flavone (diosmetin) and a flavanone (hesperetin) by rat liver microsomes was compared and the effects of inducers and inhibitors of cytochrome P450 (P450) on their metabolisms were examined.

Methods: Rat liver microsomes were prepared from untreated, phenobarbital (PB)-treated and 3-methylcholanthrene (MC)-treated rats. Each flavonoid was incubated for 20 min at 37°C with rat liver microsomes, NADPH and HEPES buffer (pH 7.4) under aerobic conditions. After addition of methanol, the incubation mixtures were centrifuged to remove the denatured protein. For analyses of the metabolites, the supernatants were applied to HPLC. α-Naphthoflavone (αNF), furafylline (FFL) and ketoconazole (KCZ) were used as P450 inhibitors for CYP1A1, CYP1A2 and CYP3A1, respectively.

Results: In untreated microsomes, diosmetin and hesperetin were mainly oxidized to give 4'-demethylated metabolites, luteolin and eriodictyol, with the rates of 0.47 and 0.16 nmol/min/mg protein, respectively. In hesperetin metabolism, three minor metabolites were also formed. PB-treatment showed a slight increase (about 1.5-fold of untreated rats) of both luteolin and eriodictyol, whereas MC-treatment increased both metabolites remarkably to 5.9-fold and 10.9-fold of untreated rats, respectively. However, the amount of eriodictyol formed were 30-64% of that of luteolin formed in all cases. 0.5 mM αNF inhibited the formation of luteolin and eriodictyol to 45% and 18% of control, respectively. 0.25 mM KCZ inhibited both metabolites to 30% of control.

Conclusion: These results suggested that CYP1A and CYP3A enzymes are the most important P450 isoforms in the metabolism of both flavonoids in rat and that diosmetin having the flavone skeleton is a better substrate for CYP1A and CYP3A enzymes than hesperetin having flavanone skeleton.

Key words: flavone, flavanone, metabolism, rat, liver

PO2674

NOVEL ANXIOLYTIC-LIKE PEPTIDE RELEASED FROM ALPHA-S-CASEIN BY GASTROINTESTINAL PROTEASES

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Background and objectives: Our previous findings demonstrated that dipeptide YL exhibited orally active anxiolytic-like activity comparable to diazepam [1]. The YL sequence is often observed in the primary structure of natural food proteins. We then investigated whether YL analogues are released from bovine alpha-s-casein by gastrointestinal proteases.

Methods: YL analogues in the pepsin-pancreatin digestion of alpha-s-casein were quantified by LC-MS. Synthetic peptides were prepared by the F-moc strategy. We investigated anxiety-like behavior using two behavioral tests, the elevated plus-maze and the open-field, in mice. Peptide or digest dissolved in saline was administered intraperitoneally and/or orally 30 min before the test. Antagonists of neurotransmitters associated with anxiolytic-like activity were co-administered intraperitoneally with peptide 30 min before the test. A percentage of the entry time in open arms or in the center circle was measured.

Results: We found that YLG, corresponding to alpha-s1-casein(91-93), was more effectively released from alpha-s-casein than YL by pepsin-pancreatin digestion, mimicking gastrointestinal enzymatic conditions. Using the synthetic model peptide, we determined that trypsin cleaved the N-terminus of YLG, and elastase and carboxypeptidase contributed to cleavage of the C-terminus of that. YLG as well as YL exhibited potent anxiolytic-like activity after oral administration. The anxiolytic-like activity of YLG was inhibited by WAY100135, SCH23390 or bicuculline, an antagonist of serotonin 5-HT1A, dopamine D1 and GABAA receptors, respectively; however, YLG has no affinity for these receptors. These results suggest that YLG exhibits anxiolytic-like activity via the releases of serotonin, dopamine, and GABA, which are a novel neuronal pathway common to YL. The pepsin-pancreatin digestion of alpha-s-casein also exhibited anxiolytic-like activity.

Conclusions: We found that YLG, a novel anxiolytic-like peptide, released from alpha-s-casein after pepsin-pancreatic digestion mimicking gastrointestinal conditions, exhibits anxiolytic-like activity in mice.[1] Kanegawa N et al. (2010) FEBS Lett 584:599-604.

Key words: emotional behavior, anxiolytic, peptide, bovine milk protein

PO2675

PRODUCTION OF OIL PALM (ELAEIS GUINEENSIS) KERNEL PROTEIN HYDROLYSATES WITH ANTIOXIDANT PROPERTIES AND APOLIPOPROTEIN B SECRETION INHIBITION

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Background and objectives: Plant proteins played essential roles in human nutrition. Palm oil was the most important oilseed crops globally. There was 12-16% of crude protein in oil palm kernel. However, little was known about the functional properties of the kernel protein. Hence, this study aimed to produce the protein hydrolysates and characterize its health promoting properties.

Methods: The protein isolate used for the generation of protein hydrolysates was obtained by alkaline extraction and acid precipitation. Then, oil palm kernel protein hydrolysates (OPKH) were produced by protease and pepsin-pancreatin hydrolysis. SDS-PAGE was used for qualitative assessment of its polypeptide profiles. Amid acid profile was analyzed by Pico Tag Amino Acid Analyzer. The effect of both protein hydrolysates (PH) on apoB secretion and lipid metabolism in vitro was undertaken using HepG2 cells in ApoB Microwell ELISA Assay Kit (AlerCHEK). In vitro antioxidant activity (AA) was determined using ferric reducing antioxidant power (FRAP) and 2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) (ABTS) assay.

Results: The estimated polypeptide molecular mass of both protein hydrolysates from reducing SDS-PAGE were 7, 8, 11 and 12 kDa while only one protein band was observed from non-reducing SDS-PAGE, 50 kDa. Both protein hydrolysates were richest in Aspartic acid and Glutamic acid (> 35% of total amino acids), followed by sulfur amino acids, lysine and valine. Both PH (1 mg/ml) reduced apoB secretion and its triglycerides and cholesterol synthesis significantly. Protease and pepsin-pancreatin hydrolysates reduced apoB secretion 45.4% and 32.6% respectively compared to control. OPKH (5 mg/ml) were highly effective in scavenging ABTS radicals and with high reducing power (FRAP) compared to many other seed PH. There was a dose-dependent relationship between both PH and AA.

Conclusions: OPKH have good health promoting properties as a source of nutraceuticals contributed by its lipid lowering and antioxidative properties.

Key words: Oil palm kernel; protein hydrolysates; apoB secretion; antioxidant activity

PO2676

DEVELOPMENT OF A REPROTER ASSAY SYSTEM TO SCREEN FOR CHEMICALS MIMICKING THE ANTI-AGING EFFECTS OF CALORIE RESTRICTION

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Background and objectives: Caloric restriction (CR) in normal mice, and suppression of the growth hormone (GH) / insulin-like growth factor-I (IGF-I) pathway in spontaneous mutant Ames dwarf (DF) mice extends their lifespan and delays the onset of age-dependent disorders. In combination, these two lifespan-extending interventions have an additive effect upon DF mice. In this study, we tried to identity the intracellular signaling pathways of CR beneficial effects and develop a system to screen anti-aging chemicals.

Methods: We previously identified dozens of genes up-regulated in the liver of DF and CR mice by using DNA microarray. Motif analysis was performed to identify consensus sequence motifs in the upstream of these putative pro-longevity genes. We tried to identify binding factors of these motifs using gel shift assay. We also constructed the reporter assay system to screen CR mimetics generating the constitutive cell lines and the transgenic mice harboring the motif sequence.

Results: We found that one of the synthesized sequences of identified motifs bound to hepatocyte nuclear factor-4 (HNF-4) alpha, an important transcription factor involved in glucose and lipid metabolism. When the reporter construct, containing an element upstream of a secreted alkaline phosphatase (SEAP) gene, was co-transfected with HNF-4 and its regulator peroxisome proliferator-activated receptor-gamma coactivator 1 (PGC-1) alpha, activity of SEAP was increased dose-dependently in comparison to untransfected controls. Moreover, transgenic mice established using this construct showed increased SEAP activity both CR and resveratrol-fed mice in comparison to ad

libitum fed mice. Furthermore, oxidative stress resistance was correlated with SEAP activity of these transgenic mice.

Conclusions: These data suggest that our bioassay would be useful to screen for CR mimetic photochemical both in vitro and in vivo.

Key words: Aging, calorie restriction, photochemical, HNF-4, PGC-1

PO2677

MONITORING OF BIOACTIVE COMPOUNDS IN READY-TO-HEAT VEGETABLES: EVALUATION OF CONTENT, STABILITY AND COMPARISON

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Background and objectives: Bioactive compounds are present in fruit and vegetables and they are recognized for their benefits for health. Because the advantages of ready-to-heat vegetables, as time saving, healthy characteristics and low-cost, this market is currently the fastest growing subsector of food industry.The purpose of this work is the study and comparison of the content of several families of bioactive compounds in ready-to-heat vegetables, as pepper, tomato, carrot, cauliflower and broccoli, before and after applying a microwave heating. In a second step, the evolution of the content of bioactive compounds during shelf life of these products has been evaluated.

Methods: The extraction procedure carried out was based on a solid liquid extraction using methanol:water (80:20,v/v). The extract was injected into the ultra-high-performance-chromatogram coupled to triple quadrupole mass analyzer.

Results: The total content of bioactive compounds in pepper was slightly increased after heat treatment. The content of bioactives was higher when the sample was heated after expiration date.A bag of a mixture of broccoli, cauliflower and carrot was evaluated, although each matrix was always analyzed separately. Caffeic acid appeared after heat treatment, and it must be considered that it was a degradation product of chlorogenic acid. The content of total bioactive compounds in carrots increased after heating. In general, it was observed that expiration date affects more than heat treatment to the total content of bioactives. Nonetheless, differences were not statistically significant in most cases, except for broccoli.

Conclusions: The content of bioactive compounds is affected more by expiration date rather than by heat treatment.It is also interesting to indicate that transfer of bioactive compounds between vegetables during cooking can be observed. AcknowledgmentsThe authors thank Andalusian Regional Government (Regional Ministry of Innovation, Science and Enterprise) and FEDER for financial support Project Ref.P11-AGR-7034.

Key words: bioactive compounds, UHPLC-MSMS, ready-to-heat vegetables.

PO2678

A COMPARISON OF BIOACTIVE COMPOUNDS IN FRESH AND FRESH CUT VEGETABLES

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Background and objectives: Consumption of fruit and vegetables could help to prevent diseases. These beneficial effects have been attributed to bioactive compounds.Nowadays,there is an increased interest of the consumers by fresh-cut products. Therefore,it is important to investigate if the minimal processing may provoke losses of important bioactive compounds. The purpose of this work was the comparison of the content of several families of bioactive compounds in fresh and fresh-cut products, as tomato, eggplant, grape, carrot and broccoli, in order to get a comprehensive view of the presence of bioactive compounds in fresh and fresh-cut products. Other variables such as type of cut and shelf life were also evaluated.

Methods: The extraction procedure was based on a simple solid-liquid extraction with methanol:water (80:20,v/v), and the extract was injected into an ultra-high-performance-chromatographic system coupled to triple quadrupole mass analyser.

Results: Phenolic acids were the most abundant class of phytochemicals in tomato, carrot and eggplant, whereas glucosinolates were majority in broccoli and flavonols in grape. When bioactive compounds contents were compared in fresh and fresh-cut products, the concentrations in fresh products were higher than in fresh-cut, except for phenolic acids in eggplant, although in most cases the difference was not statistically significant. On the other hand,it was observed that phenolic acids were the class most affected by type of cut.Furthermore, it was noted that the storage at lower temperature (4 ºC) provides higher levels of the assayed compounds.

Conclusions: Fresh and fresh-cut products have similar beneficial properties with respect to their content in bioactive compounds, except tomato, which contains a higher amount of phenolic acids in fresh products.

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Key words: fresh vegetables, fresh-cut vegetables, bioactive compounds,UHPLC-MSMS

PO2680

FUNCTIONAL/NUTRACEUTICAL EVALUATION OF CITRUS PEEL AGAINST DYSLIPIDEMIA

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Background and objectives: Functional/nutraceutical foods are the core element of diet based therapy owing to their health enhancing potential beyond the basic function of supplying nutrients. Citrus peel, a byproduct of food processing industry has group of bioactive components that play a significant role against various physiological threats. The most prevalent polymethoxylated flavones are tangeretin and nobiletin that have physiological importance with enormous food and pharmaceutical applications. The present project was designed to establish the dyslipidemic potential of citrus peel extract with special reference to their active ingredients.

Methods: The citrus peel was characterized followed by product development phase and nutraceutical evaluation for the management of dyslipidemia through experimental rats modeling. The citrus peel extracts were prepared by using methanol, ethanol and water and checked for FRAP, DPPH, flavonoids, flavonols and ABTS. Functional/nutraceutical cakes and biscuits were also prepared. Further, the citrus peel extract and powder were assessed for cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides (TG) in Sprague Dawley rats.

Results: The citrus peel methanolic extract showed higher total polyphenols, FRAP, DPPH, flavonoids, flavonols & ABTS values in comparison with other extracts. Functional/nutraceutical cakes and biscuits were prepared after adding citrus peel extract and powder. Bioevaluation comprised of three groups of rats feeding on control diet, diet containing 10% citrus peel and diet containing 5% citrus extract. Cholesterol and LDL were significantly reduced ranging from 6.01 to 7.25 and 8.78 and 11.39%, respectively with subsequent rise in HDL. Furthermore, the values for liver and kidney functions tests were within the normal range showing the safety prepared products.

Conclusions: In the nutshell, citrus peel based edibles have potential to curtail different physiological malfunctioning thus should be encouraged in diet based therapy among the vulnerable segments.

Key words: Citrus peel, functional/nutraceutical, dyslipidemia, cholesterol, HDL

PO2681

FAVORABLE EFFECT OF CONSUMPTION OF LILY BULB ON COLONIC LUMINAL ENVIRONMENT IN RATS FED A HIGH-FAT DIET

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Background and objectives: The bulbs of lily (Liliumleichtliniivar. maximowiczii) are traditionally consumed in East Asia, including Japan, as both food and oriental medicine. It contains high amounts of starch, protein, and dietary fibers including glucomannan. This study investigated the effect of dietary lily bulb on the colonic luminal environment in rats fed a high-fat (HF) diet.

Methods: In experiment 1, male SD rats were fed a HF diet (30% beef tallow)with or without 5% or 10% raw lily bulb powder for 3 weeks. In experiment 2, rats were fed a HF diet with or without 7% steamed or raw lily bulb powder for 3 weeks. Intestinal luminal variables, including IgA, mucins (indices of intestinal immune and barrier functions, respectively), organic acids and microflora were measured.

Results: In experiment 1, Food intake and growthwere reduced in the 10% raw lily bulb group. Dietary raw lily bulb significantly increased fecal IgA and mucinsand cecalLactobacillales in a dose dependent manner. In experiment 2, Food intake and growth were unaffected by the dietary treatment. Fecal IgA and cecalLactobacillales were significantly elevated in the raw lily bulb group, and similar trends were observed in the steamed lily bulb group. Consumption of both steamed and raw lily bulb markedly elevated fecal mucins, the weight of cecaldigesta and cecal organic acids, including lactate, propionate, acetate and butyrate. Compared with the control group, fecal ?-glucosidase activity was significantly higher in the raw lily bulb group, but not in the steamed lily bulb group. Dietary steamed lily bulb significantly reduced mesenteric adipose tissue weight and increased fecal triglyceride excretion.

Conclusion: The results suggest afavorable effect of lily bulbon colon health in rats fed a HF diet.

Key words: lily bulb, colonic luminal environment, rats

PO2682

THREE NOVEL PROBIOTIC STRAINS ISOLATED FROM FECES OF BREAST-FED INFANTS MODULATE THE IMMUNE SYSTEM OF HEALTHY ADULTS

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Background and objectives: Probiotics are microorganisms that provide health benefits to the host when ingested in adequate amounts. We have described the identification and characterization of 3 novel bacterial strains (Lactobacillus paracasei CNCM I-4034, Bifidobacterium breve CNCM I-4035 and Lactobacillus rhamnosus CNCM I-4036), which were isolated from the feces of exclusively breast-fed infants. Prior to its evaluation for beneficial effects in humans, safety of any probiotic strain must be demonstrated. Here we describe a trial with healthy volunteers to test the safety of the aforementioned strains.

Methods: One hundred and three healthy patients underwent a 15-day washout period after which they were randomly and blindly divided to receive a placebo or a daily capsule containing 10^{E10} CFUs one of the 3 strains for 30 days. The intervention period was followed by a second washout of another 15 days. Patients did not take any fermented product for the entire duration of the study.

Results: Three volunteers dropped out of the study. No patient had side effects of any kind. Volunteers that received the placebo showed a decrease in serum IL-12 and IL-4 concentrations, as well as decreased populations of Atopobium, Lactobacillus and Bifidobacterium in feces. IgA concentration and Clostridium coccoides population increased in the feces, whereas IL-12 decreased in serum, of patients fed B. breve CNCM I-4035Intestinal colonization occurred in 86% of the patients fed L. rhamnosus CNCM I-4036In these patients, increases in the population of Clostridium leptum in feces, and IL-10, IL-4, IL-10/IL-12 in serum, together with decreases in IL-12 and TNF-alpha/lL-10, occurred. Patients fed L. paracasei CNCM I-4034 showed augmented IL-10/IL-12 ratio.

Conclusions: Intake of the three novel probiotic strains by healthy patients is safe. Altogether, results obtained warrant the undertaking of similar studies in patients affected of pathologies such as intestinal-related diseases.

Key words: probiotics, safety.

PO2683

DETERMINATION OF THE PHENOLIC COMPOSITION OF GRAPE JUICE AND DIFFERENT TYPES OF WINES FROM MONTEVIDEO AND INTERIOR OF URUGUAY

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Background and objectives:: Several epidemiological studies have examined the relationship between the consumption of red wine and its derivatives rich in phenolic compounds and cardiovascular disease. That is why we propose the following problem: if the wine contains polyphenols, anthocyanins in them and these compounds provide health benefits, Can grape juice polyphenols present and provide similar benefits? The objectives: Determination of the phenolic composition in grape juice and different types of wines (red, white and pink) from the departments of Canelones, Montevideo and Paysandú in the June-July period of 2011.

Methods: A descriptive cross with a type of non-probability sample of convenience with a total of 67 samples from 20 local wineries. Each sample was analyzed in the total polyphenol index (IPT) and total anthocyanins (At), using the methods of ultraviolet absorbance at 280 nm and 520 nm (nanometers).

Results: The group of red wines showed the highest values in the quantification of total phenolics and total anthocyanins (76.79 and 655.33 mg / l), then follows the grape juice (32.36 and 175.88 mg / l). Thirdly rosés group (14.89 and 74.46 mg / l), and the white wine group has the lowest values (11.90 and 3.28 mg / l).

Conclusions: The grape juice could be considered a food source of antioxidants, which contributes to health, due to the polyphenolic compounds content.

Key words: antioxidant, phenolic compounds, juice.

PO2684

INCREASING THE RESISTANT STARCH CONTENT OF CHICKPEA FLOUR BY ENZYMATIC AND THERMAL TREATMENTS

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Background and objectives: Resistant starch (RS) is the starch which can not be absorbed in the small intestine of healthy humans. RS has positive effects on diabetes, cardiovascular diseases, colonic health, obesity and osteoporosis.

Considering potential sources of RS, the scientific literature has reported that the starch contained in legumes can be transformed into RS by means of enzymatic and thermal methods. The purpose of this work was to compare the efficiency of both methods intended to increase the RS content of chickpea flour.

Methods: In the case of enzymatic treatment, a suspension of chickpea flour was pre-heated at 100 ºC for 15 min. Then, the suspension was hydrolyzed with pullulanase (EC. 3.2.1.41) for 24 h. In the case of thermal treatment, 4 heating-cooling cycles were applied. Each cycle comprised heating at 100 ºC for 30 min plus cooling at 4 ºC for 24 h. The RS content of the lyophilized samples was determined using the AACC Official Method 32-40, which included a simulated digestion with α-amylase at 37 ºC for 16 h.

Results: The initial RS value of the flour (0.88%) improved significantly by the usage of both treatments. Regarding the enzymatic one, after the pre-heating step, the RS amount reached 4.47%. This value was further enhanced up to 7.47% at the end of the hydrolysis. By the usage of the thermal treatment, the RS content increased up to 8.74%, 9.85%, 10.28% and 10.67%, after 1, 2, 3 and 4 cycles, respectively.

Conclusions: Thermal as much as enzymatic treatments were effective in order to enhance the amount of RS which is present in raw chickpea flour. Due to hydrolysis with pullulanase, RS content was multiplied by a factor of 8.5, while executing 4 heating-cooling cycles provided a factor of 12.

Key words: resistant starch, simulated digestion, legume, chickpea.

PO2685

INFLUENCE OF SIMULATED DIGESTION IN THE ACE INHIBITORY ACTIVITY OF GOAT MILK PROTEIN HYDROLYSATES

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Background and objectives: Some peptides derived from food proteins have shown angiotensin converting enzyme (ACE) inhibitory activity, which can be useful in the formulation of functional foods intended for hypertensive individuals. However, these peptides must remain active after the digestion process in order to exert its inhibitory action. The objective of this work was to evaluate the effect of simulated digestion on the ACE inhibitory activity of protein hydrolysates from goat milk.

Methods: Goat milk casein hydrolysates were produced by three different enzymatic treatments, using subtilisin, trypsin and the mixture of both. The hydrolysates were summited to a simulated digestion process, which consisted in two consecutive hydrolysis with pepsin (1 hour, 37 ºC, pH 2) and pancreatin (2 hours, 37 ºC, pH 7.5). The ACE inhibitory activity of hydrolysates was evaluated before and after the simulated digestion by a spectrophotometric assay using 2-furanacryloyl-L-phenyl-alanylglycylglycine as substrate.

Results: The values of the IC50 (defined as the concentration of hydrolysate which reduces the ACE activity by 50%) of digested hydrolysates were compared with the values of the initial samples (248 microg/L). When the complete simulated digestion was performed, an increase of 3% in the IC50 only was measured in the case of the subtilisin hydrolysate. For the trypsin hydrolysate, it was reached the highest worsening in the IC50 (53%). Finally, when the mixture of both enzymes was employed, an intermediate increase (16 %) in the IC50 was observed.

Conclusions: The hydrolysis of goat milk caseins with subtilisin, trypsin or a mixture of both enzymes yielded hydrolysates which maintained their ACE inhibitory activity to some extent after being subjected to simulated digestion with pepsin and pancreatin.

Key words: Bioactive peptides, ACE-inhibitory activity, protein hydrolysates, goat milk, simulated digestion.

PO2686

AZUKI(RED) BEANS PASTE: EFFECT OF COOKING TIME ON RESISTANT STARCH CONTENTS AND PARTICLE MORPHOLOGY

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Background and objectives: Traditional Japanese sweets are very popular and are often eaten by middle-aged and elderly people. A lot of traditional Japanese sweets are made using an Azuki bean paste, so called 'An' in Japanese. Azuki beans are a good source of carbohydrate as well as protein, because they are starchy pulse. Resistant starch (RS) escapes digestion until reaching colon and acts like dietary fiber. Recently, many researchers suggest taking this type of dietary fiber for our health benefits. The purpose of this study was to investigate the effect of different cooking times on the amount of RS and the morphology of 'An' particles.

Methods: Azuki beans were boiled 50, 70, 90 minutes in water. The ratio of Azuki beans to water was one to five. After grinding, each mixture was strained through a sieve in order to remove husk and put into cheesecloth. Then, a 6kg of stone was placed on cheesecloth for 1 hour to discard excess water and to make 'An'. The amount of RS of each 'An' was measured and each 'An' particles was observed by optical microscope.

Results: The amount of RS of 'An' in 50, 70, 90 minutes cooking time were 6.4%, 5.0%, 4.4%, respectively. This result showed that increasing cooking time was decreasing the amount of RS. Optical microscope observation showed that as the cooking time become longer, the ratio of damaged or ruptured 'An' particles increased.

Conclusions: These results indicated that damaged 'An' particles had more digestible starch than intact 'An' particles. One of the possible reasons could be that intact 'An' particles resist digestive enzymes. Another reason might be that a starch in 'An' particles affects its structure during cooking.

Key words: Azuki bean paste 'An', resistant starch, 'An' particles

PO2687

EXTRACTS OF SENEN YEMENI PLANTS WITH ANTIOXIDATIVE AND ANTIBACTERIAL ACTIVITIES

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Background and objective: The increasing interest in natural dietary components has focused attention on plants used as food or spices which are a rich source of bio-nutrients or bioactive phytochemicals. The most important of these bioactive compounds of plants are alkaloids, tannins, and phenolic compounds. Herbs and spices have been employed since ancient times as flavouring and storing agents for food, attributing to their antimicrobial and antioxidant components. This study aims to find out the phenolic contents of the most important plants grown in Yemen and their antioxidative and antibacterial activities.

Methods: The total contents of phenolic (TPC), flavonoid (TFC), tannins (TTC), and anthocyanin (TAC) in the extracts of seven Yemeni plants: Punica granatum, Zizyphus vulgaris, Ruta graveolens, Lavandula officinalis, Thymus vulgaris, Conyza bonariensis, and salavia officinalis were determined by Folin-Ciocalteu method, flavonoid-aluminium complex method, Folin and Ciocalteu method, and pH-differential method. The antioxidative activities of the extracts were determined by DPPH and β-carotene bleaching. The effects of the extraction on the growth inhibition of some indicators of foodborne illness bacteria were investigated.

Results: There is a great variability in the TPC, TFA, TTC, TAC, inhibition of DPPH radical and β-Carotene bleaching of the extraction obtained from the seven plants. C. bonariensis and P. granatum presented the best antioxidative activities, had the highest TPC, TFC, TTC, and TAC and strongest inhibition of DPPH radical and β-Carotene bleaching. Extracts of C. bonariensis and P. granatum showed inhibitory effects on the gram positive and negative bacteria at all added doses.

Conclusions: Extracts of seven Yemeni plants showed antioxidative and antibacterial activities. Extracts of C. bonariensis and P. granatum possessed the best activities may attribute to their high content of polyphenols.

Key words: Total phenolic, Antioxidant , Antibacterial, Conyza bonariensis, Punica granatum

PO2688

ALGINATE ENRICHED BREAD AS AN OBESITY TREATMENT

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Background and objectives: Obesity is a fast growing medical issues worldwide is fast becoming one of the leading causes of mortality. Data from our laboratory have demonstrated that alginate possess the ability to inhibit pancreatic lipase in-vitro. The purpose of the present study was to determine if alginate enriched bread inhibits fat digestion in-vitro and in-vivo.

Methods: Control bread and alginate bread developed by Greggs Plc was used. Trioctanoate and tributyrate were digested in an open model gut system developed within our laboratory which replicates digestion in the mouth, stomach and small intestines. The substrate was added to the model gut alone or with either 5.2 g alginate bread or 5.2 g control bread (n=6). 1ml samples were taken every 15 minutes from 0-180 minutes and analysed for free glycerol. Preliminary data from a double blind study using ileostomy patients (n=13) fed either an alginate bread (105 g) or control bread (105 g) (visits were one month apart), which included 20 g of butter post fasting. Blood samples were taken at baseline and then every 30 minutes. A t-test was used to compare control bread and alginate bread with normal substrate digestion, and to compare total triglycerides in plasma between alginate and control bread.

Results: At 180 minutes there was a significant reduction in fat digestion of 47.7% (1.2) and 32.5% (2.4) for trioctanoate ($p>.05$) and tributyrate ($p>.05$) respectively. Data from ileostomy patients indicated a reduction in the total triglycerides in the plasma ranging from 9-34% compared with the control bread, with a significant difference at 210 minutes ($p>.05$).

Conclusions: This study provides evidence that normal foods supplemented with alginate could be used to treat obesity/overweight. Further analysis is required of a larger group of ileostomy patients and to assess the ileum effluent fluid to demonstrate undigested lipids.

Key words: obesity, digestion, alginate.

PO2689

EFFECTS OF RESVERATROL ON CHANGES INDUCED BY HIGH-FAT FEEDING ON CLOCK GENES IN RATS

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Background and objectives: In mammals, the main component of the circadian system is the suprachiasmatic nucleus of the hypothalamus, but circadian clocks are also present in most peripheral tissues such as adipose tissue or liver. The purpose of the study was to analyze the potential effects of resveratrol on changes induced by high-fat feeding in the expression of different clock genes and clock-controlled genes (CCG) in white adipose tissue and liver from rats.

Methods: 24 rats were divided into three groups: the control group fed a standard diet and two groups fed a high-fat diet supplemented with resveratrol (RSV) or not (HF). The polyphenol was daily added to the diet in amounts that assured a dose of 30 mg/kg body weight/d. The expression of clock genes (Bmal1, Clock, Npas2, Cry1 and Per2) and CCGs (PPARγ, Rev-Erbα, Rorα and Sirt1) was analyzed by real time RT-PCR in epididymal adipose tissue and liver.

Results: Final body weight, adipose tissue weights and liver weight were significantly higher in animals from HF groups than those from control group. Resveratrol reduced body weight and the sum of adipose tissues but these parameters did not reach the values observed in control rats. By contrast, resveratrol did not modify liver weight. When compared with the controls, the RSV group showed similar patterns of response to HF group, except for Rev-Erbα, which was down-regulated in both analyzed tissues.

Conclusions: The effects of resveratrol on changes induced on the circadian clock machinery in adipose tissue an liver by high-fat feeding, together with the weight loss induced in rats, allow this polyphenol to be proposed as a therapeutic agent in the chronobiological treatment of obesity.

Key words: High-fat feeding, Clock gene,: Resveratrol, Rats

PO2690

MALAYSIAN SELECTED LOCAL BASED DISHES: CONTENTS OF MACRONUTRIENT, ISOFLAVONE, TOTAL PHENOL AND ANTIOXIDANT ACTIVITY.

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Background and objectives: Phenolic content in soybean have been identified to prevent chronic diseases through antioxidative activity. This study was carried out to determine the macronutrient, total phenol, isoflavone contents and anti-oxidative activity in selected soy based dishes.

Methods: Eight types of local soy based dishes were bought from restaurants and food stalls located in Kuala Lumpur. Each sample from two different locations were analysed in duplicates. Proximate contents were analysed by using AOAC methods (1997) while carbohydrate content was calculated by difference. Isoflavone content was analysed using High Performance Liquid Chromatography method by Hutabarat et al. (2000). Total phenol content (TPC) was determined using Folin-Ciocalteu method while antioxidant activities were assessed using DPPH radical scavenging assay and B-carotene bleaching assay.

Results: The soy based dishes contained 8.18-161.34 mg total isoflavone/ 100g food sample, 34.91-87.64% moisture, 3.93-13.83% protein, 4.35-32.90% fat, 0.53-41.74% total carbohydrate and 1.20-1.92% ash. Average TPC in all the dishes was in the range of 19.14-62.82 mg of GAE/g wet weight. Antioxidant activities based on DPPH radical scavenging assay and B-carotene bleaching assay were significantly ($p < 0.01$) correlated with TPC. Total isoflavone content was significantly ($p < 0.01$) correlated with TPC ($r=0.711$), DPPH radical scavenging assay ($r=0.720$) and B-carotene bleaching assay ($r=0.720$). Dishes containing tempeh has significantly ($p < 0.05$) higher isoflavone content compared to other dishes containing other type of soy products.

Conclusions: Soy product like egg tofu contained highest moisture but lowest protein and isoflavone contents. Method of cooking such as frying increased the fat content in the dishes. Dishes containing fermented food such as tempeh have high amount of isoflavone and significantly higher antioxidant activity compared to other type of soy products.

Key words: Soy based dishes, Isoflavone, Total phenol content, Macronutrient, Antioxidant activity.

PO2691

COMPARATIVE ANALYSIS OF VOLATILES FROM PLANT CZ BY HDE-GC/MS

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Background and objectives: The purpose of this report was to evaluate and compare the chemical variability of the volatile compositional differences of CZEOs in Korea. Volatile composition differences of CZEOs prepared via different producing methods (wild-growing and cultivate-growing) were also determined.

Methods: The dried CZ were crushed for 10 sec by a blender (NJ-8060SM, NUC Electronics, Seoul, Korea) and extracted by hydro-distillation extraction (HDE) method for 3 hr using a Clevenger-type apparatus (Hanil Lab Tech Ltd, Incheon, Korea). and analyzed by gas chromatography-mass spectrometry (GC/MS).

Results: Total 57 and 55 volatiles constituents were confirmed in CZEOs from wild-growing and cultivate-growing. Alcohols were predominant in the volatiles of CZ flowers (%): the wild, 37.57; and the cultivated, 30.34.

Conclusions: There was some differences between CZEOs from wild-growing and cultivate-growing; the yields of CZEOs were 0.35 and 0.12%(v/w), respectively. Borneol was the most abundant volatiles in the wild-growing and *f*Ñ-curcumene was the major component in the cultivated.

Key words: volatile composition, producing methods, hydro-distillation extraction borneol, *f*Ñ-curcumene

PO2692

EFFECTS OF SERICULTURAL PRODUCTS ON BLOOD GLUCOSE AND LIPID STATUS IN STREPTOZOTOCIN-INDUCED DIABETIC MICE

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Background and objectives: The effects of four types of sericultural products on the blood glucose and lipid status as well as peroxidative state and muscle glycogen level were investigated under diabetic condition. The four products were silkworms (SW), mulberry leaves (ML), mulberry fruit (MF), and native mulberry fruit (kujippong; NMF).

Methods: Dried powders of the four products were added to diets (AIN-93G) for the corresponding four groups of streptozotocin-induced diabetic mice and fed for four weeks. Non-diabetic (Normal) and diabetic mice fed no test product (DM-Control) were another experimental groups to compare the effects of test diets.

Results: Compared to the DM-Control (mean; 289.4±23.1 mg/100mL), the NMF group (mean; 255.3±19.9 mg/100mL) increased blood glucose at reduced rate most effectively among the test groups. Serum cholesterol and triglyceride levels were lowest in the ML group (114.2±17.5 and 136.9±14.4 mg/100mL) but those of SW, MF, and NMF groups were tended to be lower than the DM-Control group (159.6±14.7 and 169.0mg±15.1 mg/100mL). Liver cholesterol and triglyceride contents were lower in the MF (12.8±1.2 and 12.9±1.9 mg/g) and the NMF groups (12.9±1.0 and 13.2±1.5 mg/g) than the DM-Control group (16.5±1.3 mg/g, and 21.1±2.3 mg/g). Liver level of thiobarbituric acid reacitve substances (TBARS) was lower in the NMF (20.9±1.9 nmol MDA/g) than the other groups while muscle glycogen level was higher only in the MF group than the DM-Control group.

Conclusions: A proper combination of mulberry fruit, kujippong, and mulberry leaves as the ingredients of functional foods helps blood glucose and lipid status maintain proper levels and improves body peroxidation under diabetic state.

Key words: mulbery, blood glucose, lipid, diabetic mice

PO2693

THAI FRUIT SOURCES FOR LUTEIN AND ZEAXANTHIN : PROTECTIVE EFFECTS AGAINST AGE-RELATED MACULAR DEGENERATION (AMD)

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Background and objectives: Lutein and zeaxanthin play an important role in protecting against age-related macular degeneration (AMD), rising an evidence in the elderly. This study was aimed at determining lutein and zeaxanthin in 170 Thai fruits.

Methods: Fruit sample was extracted with 0.1% BHT in MeOH and analyzed by HPLC.

Results: It showed that lutein was predominately found in Thai fruits about 122 samples or 71.76% of total samples, while zeaxanthin was rarely found about 65 samples or 38.24 %. When fruits were classified according to sugar content, Thai melon (Tangthai) contained the highest lutein of 66.17 ± 26.4 µg/100g in group of sugar < 10%. Among all samples, Tangthai also provided the highest lutein, following with roseapple (Phed), watermelon (Torpedoe and Kinaree), guava (Kimju),

mango (Pramkaymea) and pamelo (Kaonumpueng), respectively. In group of sugar between 10-20%, banana (Namwa) contained the highest lutein of 26.04 ± 6.76 μg/100g following with other banana varieties and sapote (Lamod). In group of sugar > 20%, all jackfruits contained lutein and Sritong variety had the highest lutein of 22.91 ± 8.25 μg/100g. Whereas ripe mangoes and sweet tamarinds did not contain lutein. For determination of zeaxanthin, mango (Munkunsri), in group of sugar < 10% had the highest of 24.93 ± 49.86 μg/100 g, following with papaya (Kekdum), mango (Keowsavoy), pamelo (Kaonumpueng), mango (Pramkaymea) and pamelo (Tongdee), respectively. In group of sugar between 10-20%, Maprang showed the highest zeaxanthin of 27.29 ±26.43 μg/100 g, followed with Mayongchid, mango (keowyai), orange, pineapple and starfruit, respectively. Source of both lutein and zeaxanthin were Tangthai, pamelo, roseapple, raw mangoes, Maprang, Mafueng, orange, sapote, purple passionfruit and pineapple.

Conclusions: Thai fruits are important source of lutein and zeaxanthin which should be regularly consumed to promote eye health, particularly for the fruits with low sugar.

Key words: Thai fruits, lutein,zeaxanthin, eyehealth.

PO2694

ADLAY CONSUMPTION AMELIORATED THE PROGRESSION OF ALCOHOLIC LIVER DISEASES

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Background and objectives: Fatty liver has become a health problem in Taiwan and dietary modification may show beneficial effects. Adlay has been reported to exhibit hypolipidemic, antiobesity and antiinflammation effects. Therefore, the aim of the study is to investigate effects of adlay on alcoholic liver disease.

Methods: We fed rats with ethanol liquid diet to induce alcoholic liver disease (group E) and added 22.1 g/L (group A) and 44.2 g/L adlay (group B) powder in diet of rats. After a 12-wk experimental period, rats were sacrificed for blood and liver sample collections.

Results: We found elevation of hepatic index AST and ALT in the ethanol group since the 4th week and adlay consumption attenuated the elevation of hepatic index. At the end of the study, the ethanol group showed hepatic steatosis and higher levels of liver malondialdehyde, tumor necrosis factor-and early fibrosis markers hydroxyproline than the control group and the two adlay groups. We also found that group A had lower cytochrome P450 2E1 protein expression than group E. In the histological analysis, the fatty change scores of both central and portal vein zone of group A were also lower than group E.

Conclusions: These results suggested that dietary adlay consumption may be beneficial in the prevention of alcohol-induced hepatic fat accumulation and inflammation.

Key words: alcohol, fatty liver, adlay, inflammation

PO2695

BENEFICIAL EFFECTS OF SOY PROTEIN AND β-CONGLYCININ ON NONALCOHOLIC LIVER DISEASES VIA AMELIORATING HEPATIC STEATOSIS AND INSULIN RESISTANCE

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Background and objectives: Nonalcoholic fatty liver disease (NAFLD) is the most common liver disorder in the Western world and is related to obesity, insulin resistance, inflammation, and oxidative stress. Nonalcoholic steatohepatitis (NASH) is the most extreme form of NAFLD, and is characterized by steatosis with necroinflammation. This study aims to explore the beneficial effects of soy protein and soy-conglycinin on hepatic steatosis and insulin resistance in NASH.

Methods: Male Wistar rats were induced to have NASH with high-fat-liquid diet for 16 weeks and divided into NASH group (N), soy protein group (S), and β-conglycinin group (B). Experimental diets were based on high-fat-liquid diet with 50% soy protein or equivalent β-conglycinin as substitution of casein for 8 weeks. Plasma and liver samples were collected for analysis of lipid profiles, cytokines and insulin sensitivity, as well as cytochrome P-450 2E1 (CYP2E1) protein expression and pathological analysis in the liver. Feces were assembled for lipid content analysis.

Results: Rats treated with high-fat diet for 16 weeks showed abnormal plasma alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activity, and they also exhibited increasing levels of TG, interleukine(IL)-1and MDA concomitant with an upregulation of CYP2E1 in the liver. After 8-wk soy protein or β-conglycinin consumption, hepatic TG, tumor necrosis factor (TNF)-and MDA concentrations were lower than those in the NASH group, whereas the systemic insulin sensitivity was also improved by β-conglycinin. We also found improvement of hepatic steatosis in pathological analysis.

Conclusions: Soy protein and soy β-conglycinin may improve the liver function in rats with NASH by lowering lipid levels in the liver and ameliorating inflammation and insulin resistance.

Key words: soy protein,conglycinin, fatty liver, nonalcoholic steatohepatitis

PO2696

GREEN TEA EXTRACT SUPPRESSES DISUSE MUSCLE ATROPHY IN MICE

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Background and objectives: A variety of stresses, including starvation, muscle disuse, systemic illness, and aging cause skeletal muscle atrophy. Loss of muscle protein primarily is a result of enhanced protein breakdown, which is initiated by the activation of the ubiquitin-proteasome pathway. Two muscle-specific E3 ubiquitin ligases, muscle RING finger 1 (MuRF1) and muscle atrophy F-Box (Atrogin-1) are recognized as markers of muscle atrophy since they are expressed at relatively low levels in resting muscle and transcriptionally increased under a variety of atrophy-inducing conditions. In this study, we examined the suppressive effects of green tea extracts on disuse muscle atrophy and its causative genes in mice.

Methods: Tail suspension was maintained for 10 days using the male C57BL6 mouse, and the oral administration of green tea (Sunrouge or Yabukita) extract continued at 48 h intervals during the tail suspension. Gastrocnemius, soleus, plantaris, and quadriceps femoris were extracted, and weight was measured. In each muscles, the expression level of MuRF1 and Atrogin-1 gene was measured.

Results: The tail suspension group had a significantly decreased ratio of gastrocnemius, soleus, plantaris, and quadriceps femoris weight as compared with the ground group. Oral administration of Sunrouge or Yabukita extract suppressed the decrease of muscle weight ratio in the tail suspension group. The tail suspension induced mRNA expression of MuRF1 and Atrogin-1The green tea extracts significantly suppressed the induction of MuRF1 and Atrogin-1 in the tail suspension group.

Conclusions: The green tea has a potential to attenuate skeletal muscle atrophy. The inhibitory effect of the green tea may

PO2698

TOCOPHEROL CONTENT AND TOTAL ANTIOXIDANT CAPACITY IN EXTRA VIRGIN ARGAN OIL

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Background and objectives: Virgin argan oil has been traditionally consumed in the Magreb countries, but recently its consumption has been extended into European, Japan and USA oil-markets. This oil is rich in oleic and linoleic acids (45 and 34%, respectively) and tocopherols. Polyphenols, sterols, carotenoids, squalene, and other minor compounds also contribute to its antioxidant capacity. However, available bibliography on composition data is scarce and contradictory due to the lack of standarization of the oil extraction method. In this study, we selected extra virgin argan oil to determine tocopherols and total antioxidant capacity (AC) in comparison with other edible vegetable oils widely consumed.

Methods: The presence of alfa, beta, gamma and delta-tocopherols were quantified by HPLC following the UNE-EN ISO 9936-2006 method. AC was determined by ABTS, DPPH and FRAP methods previous sample treatment with a mixture methanol/water.

Results: Total tocopherols in virgin argan oil ranged between 342.3–510.6 mg/kg, being gamma-tocopherol the major fraction (78.3%); alfa, beta and delta-tocopherols represents 11.2, 2.1 and 8.5%, respectively. The mean content in extra virgin olive oil (Picual variety) was 244.1 mg/kg and alfa-tocopherol was the major fraction. In virgin argan oil, the AC varied between 0.099-1.052, 0.056-0.257 and 0.179-0.237 mmol Trolox/kg for ABTS, FRAP and DPPH methods, respectively. Statistically significant higher AC values were detected in virgin olive oil but not in other oils such as soy or sunflower oils. Nosignificant correlation was observed between tocopherol content and AC.

Conclusions: The elevated presence of gamma-tocopherol (a potent antioxidant and anti-inflammatory agent) and its major total AC in relation to other oils corroborates the extra virgin argan oil nutritional value and its potential human healthy properties. Present findings may provide additional market opportunities for the food industry to develop new products.

Key words: argan oil, tocopherols, antioxidant capacity, edible oils

PO2699

BIOACCESIBILITY OF POLYPHENOLS AND ANTIOXIDANT ACTIVITY IN VIRGIN ARGAN OIL. COMPARISON WITH VIRGIN OLIVE OIL

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Background and objectives: Phenolic compounds are of essential importance in the nutritional properties of vegetable oils, mainly related with their potent antioxidant activity. Nevertheless, to achieve any in vivo effect these bioactive compounds must be bioaccesible, which depend on their release from the food matrix during the digestion process. The aim of this study was to evaluate the bioaccesibility of total phenols and antioxidant properties of extra virgin argan oils (AO) as compared with extra virgin olive oil (OO), using an in vitro gastrointestinal digestion method to approach physiological conditions. Results were compared with those obtained in oil extracts before digestion process.

Methods: Chemical extraction of antioxidants from oils was performed by addition of methanol/acetone/water. Moreover, oil samples were in vitro digested in two sequential steps to simulate gastric and duodenal conditions, followed by centrifugation. Chemical extracts and supernatants of digested samples (which represent bioaccesible fraction) were used to determine phenolic compounds (Folin-Ciocalteau method) and antioxidant activity (ABTS and FRAP assays).

Results: Phenol content and antioxidant properties were always higher in bioaccesible oil fractions than in chemical extracts. Phenol content in chemical extracts was lower in AO (ranging 193-624 mg/kg) than in OO (1018 mg/kg), but only minor differences were observed in bioaccesible fractions (AO 2440-3008 mg/kg, OO 3618 mg/kg). A similar tendency was observed for the antioxidant activity, and high correlations were shown between phenol content and ABTS and FRAP assays ($p<0.001$).

Conclusions: Differences of polyphenol content and antioxidant activity found between AO and OO in chemical extracts were attenuated in the bioaccesible fraction obtained after the in vitro digestion process, as comparatively higher release of antioxidants due to digestive enzymes activity seem to occur in AO.

Key words: virgin argan oil, polyphenols, antioxidant activity, bioaccesibility.

PO2702

THE NATURAL IMINUSUGAR D-FAGOMINE REDUCES WEIGHT GAIN AND FAECAL ENTEROBACTERIAL POPULATION OF RATS FED AN ENERGY-DENSE DIET

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Background and objectives: Increasing evidence reveals that diet induced changes in the composition of gut microbiota are related to fat accumulation, insulin resistance and obesity. Particularly, high consumption of fat and sucrose increases the proportion of intestinal Enterobacteriales. As D fagomine, an iminosugar analogue of D glucose, agglutinates Enterobacteriaceae and inhibits their adhesion to intestinal mucosa in vitro, we hypothesized that it may have a functional effect on the gut microbiota of animals fed an energy-dense diet.

Methods: Rats were fed a standard diet, a high-fat, high sucrose diet and a high-fat, high sucrose diet supplemented with D fagomine (0.065 %) for 5 weeks. Body weight and feed intake were measured at the onset and at the end of the study. Total bacteria, Enterobacteriales and Escherichia coli were quantified by quantitative real-time PCR on faecal DNA.

Results: During the nutritional intervention energy intake was independent of the diet. After 5 weeks the mean weight gain of the group fed the high fat, high sucrose diet was~13 % higher than that of the standard group whereas the gain in the group supplemented with D fagomine was ~7 % higher ($P<0.05$). All the animals presented similar amounts of total bacteria in faeces. The relative abundance of Enterobacteriales and E. coli excreted was significantly higher ($P<0.05$) in the high-fat, high-sucrose group. The animals supplemented with D fagomine and the standard group presented similar amounts of faecal Enterobacteriales and E. coli.

Conclusions: The iminosugar D fagomine reduces the weight gain and the raise in the proportion of faecal enterobacteria associated with an energy-dense diet. The two effects may be related.

Key words: D-fagomine, iminosugars, obesity, microbiota, Escherichia coli

PO2703

INHIBITORY EFFECTS OF PHENOLIC EXTRACTS DERIVED FROM JAPANESE APRICOT FRUIT (PRUNUS MUME) ON RAT SMALL INTESTINAL DISACCHARIDASE ACTIVITIES

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Background and objectives: Japanese apricot fruit (Prunus mume Sieb. et Zucc) has been traditionally used as a folk remedy in Japan.We have already established a preparation method for extracting phenolics from 'umezu', exuding juice of salted Japanese apricot fruits.Umezu phenolics (UP) contain about 12% (w/w) polyphenol as gallic acid equivalents and mainly consist of hydroxycinnamic acids (caffeic acid, ferulic acid, p-coumaric acid) and their derivatives.Chlorogenic acid is one of the most abundant phenolics in UP.The aim of this study was to investigate whether UP inhibits small intestinal disaccharidase activities and suppresses the postprandial elevation of blood glucose levels in rats.

Methods: The disaccharidase (maltase, sucrase, isomaltase, glucoamylase, lactase, trehalase) activities were assayed by the Dahlqvist method using rat intestinal mucosa homogenates.A single oral administration of 2 g/kg BW sugars (glucose, maltose, sucrose, starch) was carried out with or without UP and blood glucose levels were measured up to 120 min.

Results: UP inhibited all disaccharidase activities examined in this study although the effects varied among disaccharidases.Inhibitory effect of chlorogenic acid or non-esterified hydroxycinnamic acids at the concentration equivalent to those in UP was relatively low.This may indicate the presence of other unknown derivatives responsible for the inhibition. The blood glucose levels were significantly altered when sucrose was administered to rats.The suppressive effects after other sugar load tests were marginal.

Conclusions: These results suggest that UP could be useful as a food ingredient to reduce risks for diabetes and obesity.

Key words: Japanese apricot, phenolics, disaccharidase, blood glucose.

PO2704

LACTOBACILLUS PARACASEI CBA L74 AND FERMENTED OAT INHIBIT ENTRANCE OF UNDIGESTED GLIADIN PEPTIDES IN CACO-2 CELLS

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Background and objectives: Recent reports describe a role of probiotics as therapeutic approach for Celiac Disease (CD). Undigested A-gliadin peptides P31-43 and P57-68 are central to CD pathogenesis, inducing an innate and an adaptative immune response respectively. They enter enterocytes and localize to vesicular compartment to induce their toxic/immunogenics effects. Our aim is to test the effect of Heinz property strain Lactobacillus Paracasei (LP) CBA L74 (International Depository Accession Number LMG P-24778, its supernatant and LP CBA L74 fermented oat on P31-43 and P57-68 entrance in Caco-2 cells to verify itsprotective effect.

Methods: We treated Caco-2 cells with LP CBA L74, its colonies supernatant or with fermented oat for 30 minutes, and then fluorochrome labeled P31-43 or P57-68 were added to cells cultures. We studied entrance of labeled peptides by fluorescence assay.

Results: LP CBA L74 inhibit both P31-43 (FI: 75%) and P57-68 (FI: 50%) entrance respect to control. LP CBA L74 supernatant is also able to induce decrease of both gliadin peptides entrance in Caco-2 cells (FI: 70% and 50% respectively), indicating that this biological effect is due to some product included in LP CBA L74 supernatant. LP CBA L74 fermented oat is also able to reduce P31-43 entrance in Caco-2 cells respect to not fermented oat (FI: 50%).

Conclusions: LP CBA L74, its supernatant and fermented oat, reduce P31-43 and P57-68 entrance in Caco-2 cells. This is the first study that attempts to explain the molecular mechanism of probioticseffects in the prevention of undigested gliadin peptides toxic effects.

Key words: probiotic, celiac disease, oat, LP CBA L74

PO2705

IRON AND CALCIUM BIOACCESSIBILITY FROM CEREAL DERIVATIVES

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Background and objectives: Cereal flours and derivatives are ideal foodstuffs for mineral fortification with iron (Fe) and calcium (Ca). Iron deficiency is the most prevalent single nutritional deficiency in the world and is related to delayed cognitive development and intellectual impairment in children. Calcium intake during childhood is associated with increased peak bone mass during adolescence, bone fragility and hip fracture prevention and a reduction in the prevalence of osteoporosis.The aim of this study was to determine the bioaccessibility (amount of mineral available for absorption and utilization) of Fe and Ca in six fortified biscuits and bakery products.

Methods: A simulated gastrointestinal digestion with two stages (gastric with pepsin pH= 2 and intestinal with pancreatin and bile salts pH= 6.5) was applied to obtain the soluble mineral (bioaccessible fraction) by centrifugation. Total and bioaccessible iron and calcium were determined by atomic absorption spectrometry after dry mineralization (450ºC).

Results: Bioaccessible iron: 0.5-2 mg Fe/100g sample. The highest Fe content was found in the product with one of the lowest Ca/Fe ratios and one of the highest total Fe contents. Negative influence: Ca content (Ca/Fe ratio) and fiber. Positive influence: Fe content. Iron bioaccessibility was > 20% (23-32%). Bioaccessible calcium: 49-79 mg Ca/100g sample. The highest Ca content appeared in the product with less fiber content and more total Ca. There was a trend of less soluble Ca when fiber increases and in the presence of polyphenols used in the ingredients found in the formulation. Calcium bioaccessibility was > 40% (40-70%).

Conclusions: Bioaccessibility results indicate that cereal derivatives fortified with Fe and Ca are suitable complementary sources for meeting the nutritional requirements for these minerals.

Key words: iron, calcium, bioaccessibility, cereal derivatives

PO2706

ANTIOXIDANT AND SCAVENGING CAPACITY OF SERBIAN OAK TREE

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Background and objectives: Quercus trees, commonly known as oaks, belong to the family Fagaceae. They comprise 450 species worldwid. European oak corresponds well with these requirements, and is mainly represented by Quercus robur L. (pedunculate) and Quercus petraea L. (sessile oak). Bearing in mind that antioxidant potential of two major Serbian oaks-Quercus robur L. and Quercus petraea L. has not been studied well enough, especially their leaves and twigs, the aim of this work was to investigate the in vitro antioxidant activities.

Methods: Antioxidant characteristics of leaves, twigs and acorns from Serbian oak species from Vojvodina province (northern Serbia) were investigated. 80% EtOH (in water) extracts were used for antiradical power (ARP) determinations against DPPHo, oNO, O2o- and oOH radicals, ferric reducing antioxidant power (FRAP), total phenol (TPC) and tannin (TAC) contents. Permanganate reducing antioxidant capacity (PRAC) was determined using water extracts. Beside mentioned parameters, soluble proteins, lipid peroxidation (LP), pigment, proline, flavonoid and proantocyanidine contents were also determined. The data of different procedures were compared and analysed by multivariate techniques (correlation matrix calculation and principal component analysis (PCA)).

Results: Significant positive correlations were obtained between ARP parameters and contents of phenolic antioxidants. Close interdependence was also observed between PRAC and O2o- ARP, which were totally opposite to LP on the loading plot. PCA found that investigated organs of two different oak tree species possess similar antioxidant characteristics.

Conclusions: The superior antioxidant characteristics showed oak leaves over twigs and acorns and seems to be promising source of antioxidants with possible use in industry and pharmacy.

Key words: antioxidant; scavenging capacity; oak tree; FRAP, DPPH

PO2707

PRODUCTION OF LIPIDS WITH IMPROVED NUTRITIONAL AND BIOLOGICAL PROPERTIES USING ENZYMATIC INTERESTERIFICATION OF VEGETABLES OILS FROM AMAZONIAN AREA

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Background and objectives: Composition and nature of oils and fats used in the preparation of food products is acquiring greater importance. It is now known that the incidence of cardiovascular disease, diabetes and other metabolic syndromes are directly related to the type and amount of lipid consumed. Currently, the search for lipids non-hydrogenated, low cholesterol and rich in polyunsaturated fatty acids is a need for the food market. Therefore, oil industries have focused mainly on upgrading products to better fit the current needs of consumers, who are looking for healthier foods, manufactured with higher quality. Enzymatic interesterification, involving the rearrangement of fatty acids among glycerol backbones, proving to be a good alternative. The changes in the original triacylglycerol composition modified the physical and nutritional properties of reestructured triacylglycerol, thus increasing the potential applications of these lipids. The objective of this study was to produce interesterified blends rich in unsaturated fatty acids using different enzymatic systems.

Methods: For the production of these mixtures were used buriti and muru-muru oils, natural riches of the Amazon region, with huge unexplored and nutritional potential.

Results: The results obtained of regiospecific distribution of fatty acids on triacylglycerol (13C NMR) indicate the production of oils rich in unsaturated fatty acids at positions sn-1,3 for both enzyme systems tested. The concentration of unsaturated fatty acids at positions sn-1, 3 of triacylglycerol increased from 33.5% in the original mixture to 54.1% in the mixture produced using lipase from Rhizopus sp, and 54.5% in the mixture produced with a commercially available immobilized lipase.

Conclusions: The production of lipids with high content of unsaturated fatty acids in the position sn-1,3 of triglyceride and free of trans fatty acids is of great interest for the development of lipids with high nutritional and biological potential.

Key words: lipase, amazon oils, interesterification.

PO2708

METABOLIC TRANSIT OF N-CARBOXYMETHYL-LYSINE AFTER CONSUMPTION OF MODEL MAILLARD REACTION PRODUCTS

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Background and objectives: The purpose of this study was to investigate the intake and excretion of an advanced glycation compound produced in the Maillard reaction, carboxymethyllysine (CML), after feeding rats a diet containing Maillard reaction products (MRPs) from the glucose-lysine model system. CML in serum and different tissues was measured to detect target organs.

Methods: Equimolar mixture of glucose-lysine-HCl (GL) was heated (150°C, 90 min) to obtain GL90 sample. It was added to the AIN-93G diet (Control diet) to reach a final concentration of 3% (GL90 diet). Twenty-four weanling rats were distributed into two groups and assigned to dietary treatments for three months, monitoring food consumption and body weights. In the last week, faeces and urine were collected daily and stored as a 1-week pool. After sacrifice, blood was drawn to obtain serum, and some organs removed. CML analysis was performed by HPLC/MS-MS in diets, faeces, urines, serums and tissues.

Results: CML intake increased after GL90 diet consumption (30 vs. 175µg/day for Control and GL90 group), accordingly these animals excreted much more CML in faeces and in urine. As percentage of the intake, faecal CML was 2.5-fold higher in animals fed GL90 diet. However, the rate of urinary CML was lower in them. No changes were found in protein-bound-CML levels in serum whereas CML in bone, tendon and heart increased due to MRPs consumption

Conclusions: Faecal CML excretion is highly influenced by dietary CML levels. The rate of CML excreted in urine was probably limited or saturated depending on the type of compounds ingested. Consumption of assayed MRPs led to a higher CML deposit in heart and tendon, while in bone the increased amounts of CML ought to have an in situ origin as a consequence of a dicarbonyl compounds environment.

Key words: Maillard reaction products; carboxymethyllysine; bone; heart; tendon.

PO2709

EFFECT OF GARLIC ESSENTIAL OIL ON PROTEIN OXIDATION IN CHILL STORED PORK PATTIES

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Background and objectives: Taking into accounts that meat products, such as burger patties, are very susceptible to oxidation as mincing, cooking, and addition of salt promotes the formation of Reactive oxygen species (ROS), the addition of natural antioxidants as essential oil on these meat products could be an interesting strategy to improve their quality. The aim of this study was to determine the effect of garlic (G) essential oil (EO) on protein oxidation in pork burgers manufactured without synthetic additives and stored under retail display conditions.

Methods: For that purpose 3 batches of pork burgers (minced to 5 mm and 2 % salt) were prepared: the control group C; G1 (Level 1: 0.05% EO); and G2 (Level 2: 0.4% EO). The patties were packed with modified atmosphere (70%O2: 20%CO2: 10% N2) (MAP), stored for up to 9 days at 4ºC. The oxidative stability was evaluated by the formation of myosin cross-links as analysed by SDS-PAGE, and protein thiol loss as analyzed spectrophotometrically after derivatisation with DTNB.

Results: Results showed that protein thiols were lost to yield myosin cross-links in the pork patties during storage.Garlic was found to promote protein oxidation, as seen by an extreme loss in thiol groups and highly elevated myosin cross-link formation, indicating that G interacts with the thiol groups of the myofibrillar proteins, and thus increases the cross-link formation in pork patties stored in oxygen containing packages.

Conclusions: This study shows that essential oils of garlic should be tested for prooxidant activity before to be used.

Key words: Pork patties; thiol oxidation; protein cross-linking, garlic

PO2710

ANTIOXIDANT AND PROOXIDANT ACTIVITIES OF PHENOLIC COMPOUNDS OF THE EXTRACTS OF ECHINACEA PURPUREA (L.) AND CASTANEA SATIVA MILL

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Background and objectives: In recent years, there is a growing interest on natural and safer antioxidants. So far, little is known about the potential of E. purpurea and C. sativa extracts.

Methods: In order to evaluate its antioxidant activity of extracts investigation had to include the total phenolics content and the scavenging capacity on DPPHradicals. The ability of extracts to scavenge superoxide and hydroxyl radicals were tested using electron paramagnetic resonance (EPR) techniques. Also, the extracts were screened for cytotoxicity using neutral red chemotherapeutic sensitivity assays on human colon cancer cell lines SW480. The cells were exposed to various concentrations of extracts and different treatment times.

Results: The content of total phenolic compounds of extracts of E. purpurea and C. sativa leaves were 10.57 % GAE and 6.74 % GAE, respectively. The scavenging activity of the radicals was found to exhibit 50% of the inhibition value (IC50 value) at the concentration of 15.67 μg/ml for the investigated of E. purpurea and 1.87 μg/ml for C. sativa leaves. The ability of C. sativa to scavenge hydroxyl and superoxide radicals was at the concentration of 42.3 μg/ml and 8.5 μg/ml. Examination of redox potential E. purpurea on cancer cells SW480 was shown prooxidant effect at lower concentrations of extract and shorter incubation period. Treatment of cancer cells with chestnut leaf extract immediately cause a cytotoxic effect with the initial concentration and cytotoxic effect increases as a function of the concentration of the extract. The highest concentration was also the most toxic which is particularly evident in the treatment of 24 hours.

Conclusions: The obrained results shown that investigated extracts have good antioxidant potential. The antioxidant properties of phenolic compounds C. sativa leaves extracts was better compared to E. purpurea.

Key words: Antioxidants, phenolic compounds, Echinacea purpurea, Castanea sativa.

PO2711

DOCOSAHEXAENOIC ACID DOWN-REGULATES EGF-INDUCED MATRIX METALLOPROTEINASE-1/-9 AND UPA EXPRESSION VIA DISRUPTION OF INTERACTION BETWEEN EGFR AND ERBB2 AND INACTIVATION OF EGFR/ERBB-2 SIGNALING IN SK-BR3 BREAST CANCER CELLS

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Background and objectives: Matrix metalloproteinase-1 (MMP-1), MMP-9 and urokinase plasminogen activator (uPA) play crucial roles in tumor metastasis. Previous studies showed polyunsaturated fatty acids exhibit an anti-cancer effect in various human carcinoma cells; however, the effect of docosahexaenoic acid (DHA; 22:6, n-3) on metastasis of breast cancer cells is not fully clarified. ErbB2 is overexpressed in 20-30% of human breast cancers and correlates with poor prognosis.

Methods: We used ErbB2-overexpressing SK-BR3 breast cancer cells as cell model, and used Western blotting, real-time PCR, siRNA, and zymography assay to explore the anti-metastasis activity of DHA.

Results: EGF (40 ng/ml) induced MMP-1, MMP-9, and uPA mRNA and protein expression, as well as enzyme activity in both dose- and time-dependent manners, and 100 £gM DHA significantly inhibited EGF-induced MMP-1, MMP-9, and uPA protein expression, enzyme activity, and cell migration. Treatment with SP600125 and PD98059 decreased EGF-induced MMP-1, MMP-9, and uPA protein expression. In addition, EGF-induced MMP-1 and uPA expression was also decreased by SB203580 and LY294002DHA was shown to inhibit EGF-induced activation of ERK1/2 and JNK. The phosphorylation of EGFR and ErbB2 was induced within 15 min after EGF treatment and the total amount of protein was found to increase after 12 h of EGF exposure. EGF-induced phosphorylation and increased total protein of EGFR and ErbB2 were decreased by DHA. Co-immunoprecipitation analysis showed the interaction between EGFR and ErbB2 was disrupted by DHA. EGFR siRNA mimics the inhibition of EGF-induced MMP-1, MMP-9, and uPA expression as well as enzyme activity by DHA.

Conclusions: Taken together, these results suggest attenuation of EGFR and ErbB2 expression and disruption of protein interaction between EGFR and ErbB2 and their downstream signaling pathways are involved in DHA's down-regulation of EGF-induced MMP-1/-9 and uPA expression in SK-BR3 breast cancer cells.

Key words: Docosahexaenoic acid; MMP; uPA; EGFR; ErbB2; SK-BR3

PO2712

ANTI-OBESITY EFFECTS OF DIETARY D-PSICOSE IN GROWING RAT FED A HIGH-SUCROSE DIET

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Background and objectives: D-Psicose (D-ribo-2-hexulose), C-3 epimer of D-fructose, is a rare sugar presents in small quantities in nature product. We previously reported that D-psicose provided no energy and had anti-obesity effects in rats, but their detailed mechanisms remain to be elucidated. We here investigated the effects of anti-obesity effects of dietary D-psicose in growing rat pair-fed a high-sucrose diet (HSD).

Methods: Thirty-one male Wistar rats aged 4weeks were divided into two dietary groups: HSD contained 5% cellulose (C, n=21), and HSD contained 5% D-psicose (P, n=10). The rats in the C dietary group were further divided into two groups: rats fed the C diet ad libitum (C-AD group, n=11), and rats pair-fed the C diet with rats in the P group (C-PF, n=10). Each diet was fed for 8 week. At the weeks between 5th and 7th, energy expenditure (EE) was measured. At the end of the test period, all rats were killed by decapitation after 4-hours fasting. The serum and tissues were collected for biochemical analysis.

Results: The food intake was significantly lower in the P and C-PF groups than in the C-AD group. The body weight gain and food efficiency did not differ between the P and C-PF groups. The EE in darkness, lipoprotein lipase activity of the soleus muscle, and hepatic glycogen content were significantly higher, and in contrast, the serum levels of glucose, leptin, and adiponectin, glucose 6 phosphate dehydrogenase activity, body fat accumulation were significantly lower in the P group than in the C-PF group.

Conclusions: The anti-obesity effects of D-psicose could be induced by not only the suppression of food intake, but the increases of EE in rats.

Key words: D-psicose, pair-feeding, obesity, energy expenditure, rat

PO2713

ASPERGILLUS AWAMORI-FERMENTED BURDOCK ELEVATES BIFIDOBACTERIUM AND REDUCES ADIPOSE TISSUE WEIGHT IN RATS FED A HIGH-FAT DIET

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Background and objectives: Aspergillus has been used widely for the production of sake, miso, soy source, etc. in Japan. However, there is very limited study on the utilization of Aspergillus for the production of functional foods. Burdock, Artium lappa, is a popular vegetable in Japan, and has been used therapeutically in Asia, Europe, and North America for hundreds of years. Burdock contains high amounts of dietary fibers such as inulin and oligosaccharides as well as polyphenols such as chlorogenic and caffeic acid. Recently, to improve the functional properties of burdock, we have developed a method for producing Aspergillus awamori-fermented burdock. This study was conducted to investigate the effects of dietary supplementation with the fermented burdock powder on colonic luminal environment and body fat in rats fed a high-fat diet.

Methods: Male SD rats (5 weeks old) were fed on a high-fat diet (30% beef tallow) containing 5% burdock powder or 5% Aspergillus awamori-fermented burdock powder for 3 weeks.

Results: Food intake and growth were unaffected by dietary manipulation. Consumption of the burdock and fermented burdock diets significantly elevated fecal IgA and mucins (indices of intestinal immune and barrier functions) and reduced fecal lithocholic acid (a risk factor for colon cancer) ($p< 0.05$). Interestingly, the fermented burdock diet markedly elevated cecal Bifidobacterium and organic acids including lactate, acetate, propionate and butyrate, and reduced fecal deoxycholic acid (a risk factor for colon cancer) and perirenal adipose tissue weight ($p< 0.05$), but the burdock diet did not.

Conclusions: The results suggest that the consumption of fermented burdock improves the colonic luminal environment and suppresses obesity in rats fed a high-fat diet.

Key words: burdock, Aspergillus awamori, Bifidobacterium, obesity, secondary bile acids

PO2714

EFFECTS OF SOY YOGURT ON INTESTINAL AND PLASMA POLYAMINE LEVELS IN YOUNG AND ADULT RATS

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Background and objectives: Polyamines, putrescine, spermidine and spermine, are important constituents of all mammalian cells and are essentially involved in a variety of regulatory step during normal and malignant cell proliferation. The level of polyamine in the body tends to decrease with age. Recently, a causative role for polyamines in longevity has been noted. Soy foods are rich in polyamines. Soy yogurt was produced from soy by using Lactobacillus and was richer in polyamine content than unfermented soy. We investigated the effect of soy yogurt on polyamine levels in intestines and blood of young and adult rats.

Methods: The polyamines in food, intestine and blood were measured as fluorescent derivatives by HPLC analysis.

Results: Spermidine was most abundant polyamine in soy yogurt. The ingestion of soy yogurt induced the increase of mucosal polyamine level in small intestines of young and adult rats. Although the polyamine level in cecum content was significantly increased in both young and adult rats ingested soy yogurt, the polyamine level in large intestinal mucosa was not increased. Soy yogurt intake was effective for polyamine increase of small intestinal mucosa in spite of age. The large intestinal mucosa seems to regulate the polyamine level to prevent own cells from hyperproliferation. The polyamine level in plasma of young rats was not changed by soy yogurt intake, whereas the level in adult rats ingested soy yogurt was significantly increased.Especially, plasma spermidine in adult rats ingested soy yogurt was significantly increased compared with that of control rats, whereas plasma putrescine did scarcely increase in adult rats. It was found that soy yogurt is useful for the recovery of polyamine, especially spermidine, in adult rats.

Conclusions: Soy yogurt is a functional food supplying polyamines to aged animal.

Key words: polyamine, soy yogurt, rat, intestine, blood

PO2715

FRUCTOOLIGOSACCHARIDES ENHANCES THE EFFECT OF A FLAVONOID, α-GLUCOSYL-ISOQUERCITRIN, ON GLUCAGON-LIKE PEPTIDE-1 (GLP-1) SECRETION IN RAT INTESTINE AND ENTEROENDOCRINE CELLS

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Background and objectives: Hyperglycemia with insufficient insulin action is a major symptom of diabetes mellitus (DM). Glucagon-like peptide-1 (GLP-1) an incretin hormone released from enteroendocrine cells (L-cells), has received much attention for improving the glucose tolerance but the GLP-1 secretion differs by characteristics of ingested foods. Fructooligosaccharide (FOS) and α-glucosyl-isoquercitrin (Q3GM) in diet are known to improve glucose metabolism. To our knowledge, however, no study is available about the effects of GLP-1 secretion in response to the FOS and Q3GM together. Therefore, we conducted in vivo and in situ rat experiments to investigate the differences in the secretion of GLP-1 in response to oral ingestion or ileal injection of test solutions (i.e., Q3GM, FOS, and Q3GM+FOS).

Methods: Blood samples were collected from jugular vein in vivo, and from portal vein in situ experiments before (0 min) and after (15, 30, 60, 90, and 120 min) oral or ileal administration of test solutions to evaluate plasma level of GLP-1.Direct effects of Q3G with- or without FOS on GLP-1-producing L-cells were also examined through an in vitro study using a murine enteroendocrine cell line, GLUTag.

Results: Q3GM transiently stimulated the secretion of GLP-1 in both in vivo and in situ experiments. Contrariwise, administering Q3GM+FOS significantly enhanced and prolonged the plasma GLP-1 concentrations in both experiments. The plasma GLP-1 concentration however, was higher after the ileal injection (in situ) compared to the oral injection. Likewise, the in vitro experiment using GLUTag showed the direct simulative action of Q3GM on GLP-1 secretion, whilst FOS enhanced the effect of Q3GM.

Conclusions: Our findings suggest that Q3GM+FOS has the potential for prevention or treatment of DM by enhancement and prolongation of GLP-1 secretion.

Key words: Diabetes mellitus, Fructooligosaccharides, Glucagon-like peptide-1, Glycosyl isoquercitrin

PO2716

FRUCTO-OLIGOSACCHARIDE SUPPLEMENTATION REDUCED FECAL TOXICITY, BILE ACID AND BACTERIAL RISK FACTORS OF COLORECTAL CANCER IN CONSTIPATED OLDER VOLUNTEERS

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Background and objectives: The study assessed effects of fructo-oligosaccharide (FOS) supplementation on fecal precancerous risks and preventive factor of colorectal cancer and whether effects of FOS were sustained after its withdrawal in constipated older volunteers.

Methods: Six men and three women (73.4 ± 3.9 y old) participated in a double-blind, placebo-controlled, diet-controlled study that consisted of a 4-wk placebo (3 mL of fructose syrup) period, a 4-wk FOS (10 g/d) and a 4-wk post-FOS period. Stools were collected in the last wk of each period to determine the risk markers of colorectal cancer, such as fecal bacteria enzyme activities, bile acids and toxicity of fecal water on Caco-2 cells, a human colonocyte model, as well as the beneficial factor, short-chain fatty acid.

Results: Fecal activities of £]-glucosidase, £]-glucuronidase and mucinase, total fecal bile acid, and the proportion of secondary to total bile acid (%) significantly decreased with FOS compared with placebo. In contrast, fecal acetate and butyrate levels increased with FOS. In agreement with the reduced mutagenic markers, the fecal water-induced cytotoxicity and DNA damage towards Caco-2 cells were the lowest in the FOS period. Furthermore, the fecal β-glucuronidase, mucinase, total and secondary bile acid, and fecal water toxicity remained significantly lower in the post-FOS period than that in the placebo period, respectively.

Conclusions: Supplementation of FOS for 4 week significantly reduced fecal precancerous risks related to bacterial metabolism in constipated older volunteers and these effects partially remained at the end of post-FOS period.

Key words: Fructo-oligosaccharide; β-glucuronidase; mucinase;bile acid; toxicity

PO2717

SENSORY CHARACTERISTICS AND ACCEPTABILITY OF SAUSAGES WITH 10 % FAT AND ADDED RYE OR WHEAT BRAN

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Background and objectives: Improving the nutritional profile of sausages by addition of dietary fibres might influence appetite, sensory characteristics and liking differently depending on the fibre source.The objective of this study was to investigate the sensory characteristics of sausages with 10 % w/w fat and added rye or wheat bran reaching a final dietary fibre content of 2.4 and 3.2 g/100 g respectively. Furthermore consumer liking of the two sausages was assessed among two Danish target groups.

Methods: A trained sensory panel (n=9) evaluated the sausages with rye (RBS) and wheat bran (WBS) using sensory descriptive attributes in terms of odor, appearance, texture and flavor.Commercial 20 % w/w fat sausage (20%S) and 10 % w/w fat sausage (10%S) sausages were also included. Furthermore a consumer test, including a novel method "Holistic by DMRI", was conducted among children (6-9 years old, n=49) and their parents (n=24) to investigate liking of RBS and WBS.

Results: With respect to appearance RBS and WBS differed significantly from the remaining test sausages. They were browner ($p>0.001$), had the greatest extent of dots ($p>0.001$) and the coarsest inner structure ($p>0.001$). WBS differed from all other samples being less juicy ($p>0.001$) and having a higher intensity of cereal flavour ($p>0.001$) whereas RBS was similar to the commercial 10%S according to juiciness ($p>0.001$), fatty mouth feel ($p>0.0001$) and firmness ($p>0.001$). The consumer tests showed that liking was significantly lower for WBS than for RBS whereas the latter was not different from the commercial 10%S. Finally RBS was correlated with more positive words compared to WBS although both were correlated with "healthy".

Conclusions: Addition of dietary fibre from rye bran to sausages represents a promising approach to improve the healthiness of conventional sausages while maintaining consumer liking.

Key words: Bran, dietary fibre, sausage, sensory characteristics, consumer liking

PO2718

POTENTIAL APPLICATION OF SOME COMMON INDIAN SPICES AS FUNCTIONAL FOOD ON FISH UNDER REFRIGERATED STORAGE

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Background and objectives: Spices, popularly used as flavouring agents, are excellent source of phenolic compounds which exhibits good antioxidant activity with health-promoting properties. They may also be used in functionalization and natural preservation of foods.

Methods: Hence potential antioxidant activities of six commonly used spices - fennel, black-pepper, ginger, cinnamon, celery, panchforon (mixture of fennel, celery, cumin, black-cumin, fenugreek), and BHT, a synthetic antioxidant were evaluated and potentialto reduce lipid peroxidation was determined post application on homogenized tilapia fish muscle. Antioxidant activity and oxidative stability of fish oil, extracted at interval of one week over a span of six weeks was estimated from amount of total phenol content, inhibition to peroxidation, metal chelating activity, and free fatty acid, peroxide, p-anisidine, thiobarbituric acid (TBA) values.

Results: Contrary to other spices cinnamon and panchforon remarkably could successfully decrease the amount of malonaldehyde accumulation and free fatty acid formation in oil. Peroxidation was effectively controlled by panchforon, fennel and pepper for longer duration. Maximum phenolic concentration was recorded in cinnamon extract and inhibition to peroxidation was high in pepper and celery extract.Phenolic concentration in fish oil was found to be highest in panchforon and pepper. Most effective metal chelating activity of fish oil was found in panchforon, followed by fennel in 4th week.

Conclusions: Cinnamon and panchforon showed maximum efficiency in controlling oxidation whereas panchforonand fennel enriched fish oil exhibited higher antioxidant activity Antioxidant activity of fish increases on preservation with spices which suggest potential health benefitsin human body by inhibiting the lipid peroxidation and arresting the harmful free radicals in addition to imparting flavor to the food.

Key words: antioxidant, lipid peroxidation, phenolic compounds, metal chelating activity, malonaldehyde

PO2719

CHANGES IN BAX, BCL-XL, CASPASE-3 AND 8 CONTRIBUTE TO PHYTIC ACID (IP6) INDUCED APOPTOTIC IN HT-29 CELLS

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Background and objectives: Loss of apoptotic response is a major hallmark of various human malignancies. The mechanism of action of many anti-cancer drugs is based on their ability to induce apoptosis.Previous studies have shown that phytic acid (IP6) can inhibit the growth of various tumor cells in many mechanisms.The cellular and molecular mechanism underlying IP6 induced apoptosis however, have not been well defined. Hence, this study aimed at investigating the expression of the apoptotic-related targets; pro- and anti-apoptotic; Bax and Bcl-xl, respectively and also caspase-3 and 8 caused by IP6.

Methods: HT-29 cells were treated with different concentration of IP6 that was extracted from rice bran for 72 hrs, then total RNA of cells were isolated, and qRT-PCR was performed followed by western blotting.

Results: IP6 showed an extensive significant reduction of anti-apoptotic, Bcl-xl and a coherent increment of pro-apoptotic, Bax at mRNA and protein level.These results showed that IP6 caused a marked increase in apoptosis, which was accompanied by significant increased at mRNA and protein levels of caspase 3 and caspase 8 ($p<0.05$).

Conclusions: These molecular alterations provide an insight into IP-6 caused apoptotic death of human colon cancer, HT-29 cells.

Key words: Phytic acid (IP6), Bcl-xl, Bax, caspase.

PO2720

SUPPRESSIVE EFFECT OF CRYSTALLIZED CELLULOSE ADDED TO THE LIQUID FORMULA ON POSTPRANDIAL GLUCOSE ELEVATION IN HEALTHY SUBJECTS

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Background and objectives: The elderly patients often experience osmotic diarrhea due to the enteral nutrition and also have hyperglycemia. It is important for these patients to develop the liquid formula (LF) which causes the suppressive effect on postprandial glucose elevation and on diarrhea. We have already clarified that dietary fiber materials, especially crystallized cellulose (CC), suppressed osmotic diarrhea induced by sufficient ingestion of nondigestible oligosaccharides. In this study, we investigated that LF containing CC suppress the elevation of postprandial glucose and insulin levels using healthy subjects.

Methods: Study protocol was carried out using a within-subject, repeated measures design and was approved by the Ethical Committee of University of Nagasaki Siebold. A total of 21 healthy subjects (21.7 y; BMI, 21.3 kg/m2) were participated in this study. The criteria were no history of diabetes; the fasting glucose is less than 110 mg/dL; BMI is between 18.5 and 26.0. The LF containing 0.5 g of CC was used as a control (CONT), and compared to the LF containing 1.7 g (CC-1.7) and 1.8 g (CC-1.8) of CC. After the overnight fasting, the subject was examined by the medical doctor, then blood was collected to measure basal level. After the subject ingested the test substance, blood was collected at 30-min intervals for 2 h. The plasma glucose and insulin were measured with Trinder's method and with ELISA, respectively.

Results: When the subject ingested separately CC-1.7 and CC-1.8, the elevations of postprandial glucose and insulin levels were significantly low in comparison with the ingestion of CONT ($p<0.05$). In addition, no subjects induced osmotic diarrhea.

Conclusions: The LF containing plentiful CC was suppressed the postprandial elevation of glucose and insulin levels. These results can contribute to develop LF with suppressive effect on both osmotic diarrhea and hyperglycemia.

Key words: crystallized cellulose; dietary fiber; suppressive effect on glucose elevation

PO2721

DIETARY POLYPHENOLS PROTECT THE BARRIER FUNCTION OF CACO-2 CELLS EXPOSED TO INDOMETHACIN THROUGH THE MODULATION OF OCCLUDIN AND ZO-1 EXPRESSION

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Background and objectives: Dietary polyphenols represent a group of secondary metabolites abundant in fruits and vegetables, which display antioxidant, anti-inflammatory and anti-proliferative properties. We have recently shown in in vitro and in vivo models of gastrointestinal damage induced by the non-steroidal anti-inflammatory drugs, indomethacin, that dietary polyphenols protect against the indomethacin-induced mucosal damage through their ability to regulate mitochondrial function and intracellular calcium mobilization. The aim of this study was to determine whether dietary polyphenols may exert a protective effect against the disruption of the intestinal barrier function induced by indomethacin in Caco-2 cell monolayers.

Methods: The integrity of Caco-2 cell monolayers was determined by measuring their transepithelial electrical resistance (TEER) and permeability to FITC-dextran. The expression of the tight junction proteins occludin and ZO-1 was evaluated by immunofluorescence and RT-qPCR assays. These experiments were carried out in the presence or absence of indomethacin and the polyphenols quercetin, rutin, resveratrol and epigallocatechingallate.

Results: Indomethacin decreased TEER and correlatively increased FITC-dextran permeability in Caco-2 monolayers; these alterations were abolished by all the tested polyphenols but rutin, being quercetin the most efficient. The protective effect of quercetin was associated to its capacity to inhibit the redistribution of ZO-1 protein induced both by indomethacin and by rotenone, an inhibitor of the mitochondrial complex-I, and to prevent the decrease of ZO-1 and occludin expression.

Conclusions: The dietary polyphenols differentially protect Caco-2 barrier function, independently of their antioxidant properties; these findings, in addition to the fact that some of the alterations induced by indomethacin were reproduced by rotenone, suggest that indomethacin exerts its deleterious effect on the intestinal barrier function not only by inducing oxidative stress but also by altering the mitochondrial function.

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Key words: polyphenols; quercetin; indomethacin; tight junction.

PO2722

INCREASED ANTIOXIDANT POTENTIAL OF RYE FLOUR BYENZYMATIC HYDROLYSIS

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Background and objectives: The consumption of processed grains and vegetables not only improve nutrient utilization, but also act as potential nutraceutical and therapeutic foods for human health. Cereal based foods generally comprise a significant part of daily diets throughout the world. Rye products are particularly known for its high level of dietary fiber and bioactive compounds such as phenolic compounds, phytosterols, minerals, vitamins and tocotrienols. The treatment with tannase enzyme in rye is an alternative to the release of bioactive compounds, such as phenolics, which have antioxidant activity towards oxidative stress in the body. Tannase is an enzyme that hydrolyzes the tannins of grains, increasing the antioxidant activity and the release of gallic acid. In this context, the present study aimed to evaluate the relationship between phenolic compounds released by the action of tannase and antioxidant activity in rye.

Methods: The crude extract of tannase was produced using the Paecillomyces variotti in solid-state fermentation. The rye grain was milled in laboratory mill and the enzymatic reaction was performed in a shaked water bath at 40°C and 200 rpm for 2 hours. After that, the flour was frozen, freeze dryed and stored at -18°C. The phenolic compounds were determined as gallic acid equivalents (GAE) using the Folin Ciocalteu method. The antioxidant activity was evaluated by scavenging of DPPH radical, the results were expressed as uM of trolox equivalents.

Results: Rye treated with tannase showed an increase in antioxidant activity by 89% and total phenols by 20% compared to the control (without enzyme).

Conclusions: Rye is used as an ingredient in breads, fermented and distilled beverages. The results indicated that the enzymatic treatment is an alternative for improving nutritional value of this grain as an ingredient.

Key words: Antioxidant activity, Phenolic Acids, DPPH, tannase, rye.

PO2723

HOW TO ASSESS GASTROINTESTINAL HEALTH BENEFITS OF PREBIOTICS: FOCUSING ON 'MICROBIAL FERMENTATION AND METABOLISM'

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Background and objectives: Colonic microbial fermentation is a key function of the microbiota that might contribute to gastrointestinal health as well as overall health. Metabolites are the end-products of metabolic activity and might be most closely related to induction of health effects, therefore some of them are generally accepted as beneficial to the host, whereas others are considered as potentially toxic. The aim of this activity was to evaluate the available evidence for the toxicologic or nutritional properties/relevance of the metabolites of gut microbes on host tissues.

Methods: A literature search was performed to address available evidence for the physiological and nutritional effects of metabolites such as short chain fatty acids. In addition, the evidence of adverse effects of particularly compounds produced during the protein fermentationwere assessed.Holistic approaches including biological assays analysing of genotoxicity as well as metabolomics analysis were reviewed.

Results: No formal systematic reviews evaluating the physiological or toxicological properties of bacterial fermentation metabolites were found. Comprehensive reviews and experimental studies indicated that protein fermentation metaboli-

tes, typically considered as harmful metabolites, do not induce toxic effects at the concentration ranges retrieved in the colon. Studies indicate that dietary interventions with prebiotics reduce the incidence of cancer. At present, there is no evidence that these effects are due to reduction in genotoxic compounds, thus limiting the usefulness of genotoxicity assays.Metabolomic analysis has great promise in providing meaningful data related to gut health but there are insufficient data to provide convincing links with different gut conditions or dietary changes.

Conclusions: There are not yet sufficient studies or data to support the established use of any biomarkers of gut health. However the range of concentrations of several metabolites can be established in faeces at in different conditions.

Key words: Gut microbiota, gut functions, digestive health, markers

PO2724

EFFECT OF SARDINE PROTEINS AND CASEIN COMBINED WITH MARGARINE OR MILK LIPIDS ON OXIDATIVE STRESS MARKERS IN HYPERCHOLESTEROLEMIC RATS

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Background and objectives: The relationship between dietary fats consumption and the risk of cardiovascular disease (CVD) has been a topic of strong debate over the years because the numerous investigations relating the relationship between margarine and dairy fats intake, and several risk factors associated with CVD have been incoherent. The present investigation was undertaken to study the potential effects of milk lipids compared to margarine combined with sardine proteins or casein on some markers of oxidative stress in rats fed a cholesterol - enriched diet.

Methods: Male Wistar rats (n=32) were fed a 20% sardine proteins or casein combined with 5% milk lipids (SP-milk, CAS-milk) or 5% margarine (SP-margarine, CAS-margarine) and 1% cholesterol for 28 days. Serum total cholesterol (TC), triacyglycerols (TG) and uric acid concentrations were determined. Lipid peroxidation and antioxidant enzyme activities were evaluated.

Results: In CAS-margarine versus CAS-milk, TC level was 2.6-fold lower but TG content was 2.7- higher. Uricemia was decreased in CAS-margarine compared to CAS-milk (2.3-fold) and SP-milk (5-fold). In spite of unchanged antioxidant enzymatic defense (only in aorta), serum TBARS were higher (1.3-fold) in CAS-margarine versus SP-margarine but lower in CAS-milk versus SP-milk (1.7-fold) and CAS-margarine (2.7-fold). In contrast, serum hydroperoxydes contents were not influenced by the oil and protein origin. In heart, brain and aorta TBARS values were decreased in CAS-margarine versus CAS-milk and SP-margarine versus SP-milk ($P<0.001$). Indeed, tissues hydroperoxydes values were decreased in SP-margarine than CAS-margarine and SP-milk.

Conclusions: Margarine combined with casein or sardine protein induced a hypocholesterolemic effect and seems to protect some tissues against the cytotoxic action and oxidative stress of cholesterol supplementation in particular, when it is combined with the sardine protein.

Key words: Margarine, milk lipids, sardine protein, oxidative stress, hypercholesterolemia

PO2725

ANTHOCYANIN-RICH GRAPE-BILBERRY JUICE INFLUENCES FAT METABOLISM AND IMPROVES RISK FACTORS FOR CARDIOVASCULAR DISEASES IN FISCHER RATS

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Background and objectives: Cardiovascular diseases (CVD) are a public health problem in Western countries. Diets rich in fruit and vegetables are inversely associated with the risk of CVD. Anthocyanins, a subgroup of flavonoids, are among the bioactive compounds in plant foods, for which a preventive potential for CVD is discussed. Therefore we investigated the impact of an anthocyanin-rich juice on CVD risk factors, while feeding a Western style diet.

Methods: Fischer rats were fed a diet mimicking Western fat intake (34 %kcal fat, rich in saturated fatty acids (SFA)) for ten weeks. Anthocyanin-rich grape-bilberry juice (ARJ) or anthocyanin-depleted grape-bilberry juice (control) were provided ad libitum (n=24/group). After the intervention period parameters of fat metabolism, adipokines, as well as fatty acid composition of plasma were determined.

Results: Intervention with ARJ decreased serum concentrations of cholesterol, leptin, and resistin ($p<0.05$). Triglycerides tended to be decreased, too ($p=0.079$), whereas no effects were observed for non-esterified fatty acids, glucose, insulin, and adiponectin. Furthermore, ARJ decreased the amount of SFA in plasma and increased the amount of polyunsaturated fatty acids (PUFA; $p<0.05$). The ratio of n6:n3 PUFA was not affected.

Conclusions: The results of this study indicate that diets rich in anthocyanins might possess preventive potential for

CVD, even with concurrently high intake of SFA. Especially the increase in plasma PUFA should be investigated further, as health promoting effects for PUFA have been described. So far nothing is known about the mechanisms by which anthocyanins influence fatty acid composition of plasma.This study has been financially supported by the German Federal Ministry of Research and Education (0315379G).

Key words: Anthocyanins, fatty acids, adipokines, lipid metabolism

PO2726

PHENOLIC COMPOUNDS AND ANTIOXIDANT CAPACITY OF FRESH AND DEHYDRATED CHILEAN FRUITS AND VEGETABLES

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Background and objectives: Cardiovascular diseases, cancer, diabetes, among other non transmissible chronic diseases, are the main causes of death worldwide. Numerous epidemiological studies have demonstrated that diets containing high amounts of fruits and vegetables (F&V) reduce risk factors of these diseases, in association with their phenolic compounds content, which possess antioxidant properties. The aim of the study was to characterize the potential healthy value of F&V, fresh and dehydrated, by analyzing their total phenolics content and antioxidant capacity.

Methods: Blackberries, blueberries, eggplants, spinaches, Granny Smith apples, Red Delicious apples, red peppers, green peppers, tomatoes, and carrots, fresh and dehydrated, were analyzed in order to evaluate the effect of drying on their healthy potential. We assayed total phenolic compounds (Folin Ciocalteu), anthocyanins (differential pH), catechin, caffeic acid, and gallic acid (HPLC), vitamin C (HPLC) and antioxidant capacity (DPPH and ORAC).

Results: The highest amount of phenolics was found in blackberries (22.1 mg EAG/g fresh and 126.3 mg EAG/g dry), followed by blueberries. Phenolics correlated positively with antioxidant capacity ($p<0.01$). The most abundant phenolic compound in F&V was catechin. The highest vitamin C content was observed in fresh peppers and dry Granny Smith apple. Vitamin C did not contribute to antioxidant capacity in the analyzed products.

Conclusions: It is concluded that the amount of phenolic compounds and antioxidant capacity are higher in dehydrated F&V, which constitute an interesting source of potential healthy value ingredients for foods.Funded by FONDEF D09I1222 and CIDAF.

Key words: phenolic compounds, antioxidant capacity, fruits, vegetables, healthy value.

PO2727

ISOFLAVONES CONTENT OF QUINOA GRAINS FROM LOCAL ECOTYPES GROWN IN DIFFERENT CONDITIONS

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Background and objectives: Quinoa (Chenopodium quinoa Willd.) is a typical crop of the Andean zone. The nutritional value of this chenopod is well recognized, however little has been described on its content of bioactive compounds. The aim of this study was to determine the concentration of two "phytoestrogens": genistein and daidzein, in local ecotypes of quinoa from three different geographic zones in Chile (north Altiplane at 19°S, central zone at 34°S and southern region at 39°S) and to evaluate the effects of environmental growing conditions on isoflavones content.

Methods: Daidzein and genistein were determined by HPLC in seeds of three genetic regions of quinoa: from the three Zones in Chile. Grains were collected and daughter seeds were grown and harvested under controlled conditions at 30°S) in an experimental field and the same isoflavones were measured.

Results: Isoflavones contents varied between the quinoa types studied ($p<0.05$), daidzein was significantly higher than genistein content ($p<0.05$). Daidzein ranged from 0,54±0,03 to 1,80±0,05 mg/100 g in the original regional seeds and from 0,73±0,01 to 1,08±0,06 in daughter seeds, while genistein ranged from0,36±0,02 and 0,48±0,02 mg/100 g in the original grains, and from 0,34±0,00 to 0,46±0,05 in daughter seeds. Interestingly, two farmers' varieties or local ecotypes of daughter seeds exhibited absence of one isoflavone. Northern seeds (a high temperature, low rainfall and deficient soil condition) contain more isoflavones, which decrease when the ecotype is grown in a different environment.

Conclusion: Besides its well recognized nutritional value, quinoa also possesses an excellent potential as a source of health-promoting bioactive compounds such as isoflavones. However, Isoflavones content of quinoa seeds is highly dependent on environmental growing conditions.Funded by FONDECYT 1100638 and CIDAF CID 04/06.

Key words: isoflavones, daidzein, genistein, bioactives, quinoa, ecotypes.

PO2728

APPLYING A BOX-BEHNKEN DESIGN FOR OPTIMIZED EXTRACTION OF AGAVE FRUCTANS (AGAVE TEQUILANA WEBER VAR. AZUL) WITH PREBIOTIC POTENTIAL

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Background and objectives: Nowadays there is a great quest for food ingredients that besides of their nutritional function provide benefits to consumer health. The carbohydrates present in Agave tequilana are fructans which have prebiotic potential because they include fructose chains joined by(2-1) linkages, such as those present in inulin. The objectives of the study were establishing the optimum extraction conditions of these compounds by maceration and determine their polymerization degree.

Methods: Factors as temperature, time and solvent:solid ratio for the extraction of fructans were studied in a maceration process of Agave powder using a Box-Behnkendesign. The Agave powder was obtained by grinding, drying and sieving of the stem of a plant of 7 years. The evaluated response variable was the extraction yield. The fructans extracted were precipitated with ethanol and dried by freeze-drying; the reducing sugars and degree of polymerization (apparent glucose-fructose ratio) were determined.

Results: It was found statistically significant effects ($p < 0.05$) for the three factors studied, like interactions between temperature and solvent:solid ratio, also between solvent:solid ratio and time. A significant quadratic term was determined for the time factor which indicated the presence of a maximum in the range of study. The factor solvent:solid ratio had a positive influence on the performance of response variable. A negative effect was observed in the factor temperature possibly due to a partial hydrolysis of polysaccharides. The 93.72±2.88% of dry material obtained was carbohydrates with 1.85±0.08% of reducing sugars. The polymers had an apparent polymerization degree of 29.

Conclusions: The selection of study variables were decisive in extraction yield obtained. The conditions of maximum extraction of fructans were determined with an extraction yield predicted of 37.84%. Fructans with suitable polymerization degree were successfully obtained and being used as prebiotics in dairy.

Key words: Agave, extraction, fructans, prebiotics.

PO2729

EFFECTS OF LACTIC ACID-FERMENTED SOYMILK ON LIPID METABOLISM-RELATED GENE EXPRESSION IN RAT LIVER

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Background and objectives: Cardiovascular disease is a severe problem in developed and developing countries. One of the risk factors of atherosclerosis is dyslipidemia. Soy foods have been known to exhibit lipid metabolism-modulating effects. The major bioactive ingredients of soy foods are soy proteins and isoflavones. The ingestion of soymilk has reduced plasma and hepatic lipid levels. As the taste of soymilk is not always favorable for everybody, we prepared fermented soymilk using lactic acid bacteria derived from vegetable food to ingest it more easily. Thus we examined the effects of fermented soymilk on the lipid metabolism in rat liver.

Methods: Male Sprague-Dawley rats aged 7 weeks were fed experimental diets for 1 week or 5 weeks after acclimatization on AIN-93G diet for 1 week. The rats were divided to a control diet (AIN-93) group, soymilk diet (SM) group or fermented soymilk diet (FSM) group. Plasma parameters were measured after fasting for 8 h. The influences of diet on hepatic gene expression in non-fasted rats were investigated.

Results: The hepatic triglyceride and cholesterol contents and plasma cholesterol levels in the SM and FSM groups were significantly lower than those in the control group. The fatty acid synthesis-related genes were down-regulated in the SM and FSM groups after 1 week. The gene of CYP7a1 related to cholesterol catabolism was more markedly up-regulated in the SM and FSM group after 5 weeks. This up-regulation was higher in the FSM group than in the SM group.

Conclusions: The bioactive components produced or increased by lactic acid fermentation seem to induce the up-regulation of hepatic CYP7al to reduce the plasma cholesterol level in rats.

Key words: soymilk, lactic fermentation, lipid metabolism, CYP7al, isoflavone.

PO2730

QUERCETIN INCREASES BILE ACID EXCRETION IN RATS

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Background and objectives: previously, we found that dietary supplementation of quercetin increased serum LDL-c concentration significantly in rats. In this study, the effects of quercetin on bile acid excretion was further investigated in order to probe into the action quercetin played on cholesterol metabolism in detail.

Methods: Male Wistar rats were fed AIN-93 diets containing 0%, 0.1%, 0.2%, 0.4%, 0.8% quercetin for 5 weeks, respectively. At the end of experiment, serum lipid profiles were analysed and bile excretion was recorded under sodium pentobarbital anesthetization. Fecal samples also were collected for analysis of bile acids. Hepatic 7α-hydroxylase activity and mRNA expression were determined.

Results: It was confirmed that serum LDL-c level was increased after querceitn treatment in a dose dependent manner. The bile excretion was not changed, whereas the contents of bile acids in bile and fecal samples were significantly increased in response to quercetin supplementation. The hepatic 7α-hydroxylase activity was significantly increased in the 0.4% quercetin group compared to the control. However, the mRNA expression of 7α-hydroxylase gene was not increased after querctin exposure.

Conclusion: Quercetin may change cholesterol metabolism via the increase of bile excretion and this action is associated with increased activity of hepatic 7α-hydroxylase.

Key words: quercetin, cholesterol metabolism, bile excretion, 7α-hydroxylase

PO2731

EFFECTS OF MANGROVE-BARK EXTRACTS ON THE ANTI-TUMOR ACTIVITY IN TUMOR-BEARING C57BL/6 MICE

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Background and objectives: The present study was carried out to examine the effects of mangrove-bark extracts on the anti-tumor activity in tumor-bearing mice.

Methods: Some extracts were prepared with methanol, acetone or ethyl acetate from the bark of mangrove (Bruguiera gymnorrhiza or rhizophora stylose), and methanol from that of Heritiera littoralis, Exoecaria agallocha and Soneratia alba in the study. C57BL/6 mice were implanted with B16 melanoma cell line and administered intraperitoneally for each sample for 60 days. The survival rate and the tumor growth during experimental periods were observed. Serum IFN-gamma and IL-12 concentrations of mice were also measured using the commercially available ELISA kit. In addition, to estimate the functional component, we estimated the active ingredient of each extracts with TLC and HPLC.

Results: No significant differences were observed in the survival rate of mice and tumor growth among various groups, but the survival rate and the suppression of tumor growth of mice administered ethyl acetate extracts of Bruguiera gymnorrhiza or rhizophora stylose were superior to those of mice administered other extracts. Serum IL-12 concentration of mice administrated methanol extracts from the bark of Bruguiera gymnorrhiza also showed the response of the dose-dependent manner. These extracts contained both some kind of catechin and their polymers.

Conclusions: The results indicate that the administration of ethyl acetate extracts from the bark of mangrove exerts anti-tumor activity in C57BL/6 mice. These effects maybe, in part, depend on the polyphenols containing characteristically in the mangrove bark.

Key words: Mangrove bark extracts, tumor-bearing mice, survival rate, tumor growth.

PO2732

CONTENTS OF QUERCETIN, KAEMFEROL, MYRICETIN, APIGENIN AND LUTEOLIN OF VEGETABLES AND FRUITS IN CHINA AND ESTIMATED DIETARY INTAKE BY CHINESE

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Background and objectives: It was reported that intake of flavonoids was inversely related to the morbidity and mortality of degenerative diseases, such as cardiovascular diseases and certain type of cancers. In this study, the cotents of quercetin, kaemferol, myricetin, apigen and luteolin in vegetables and fruits sampled in China were analysed and the dietary intake by Chinese was estimated.

Methods: The vegetables and fruits were sampled from Beijing, Tianjin, Shanghai and Hangzhou. A HPLC procedure was developed to analyse the contents of quercetin, kaemferol, myricetin, apigen and luteolin after acid hydrolysis. Based on the data of Chinese Nutrition and Health Survey 2002, dietary intake by Chinese was calculated.

Results: Total of 46 vegetables and 38 fruits samples were collected. Quercetin was detectable in most vegetables and fruits and most abundant in onion bulb, lotus root, broccoli and scallion in vegetables and pomegranate, hawthorn, data, fox grape in fruits. Kaemferol, myricetin, apigen and luteolin distributed in limited vegetables and fruits. It was calculated that total dietary intake of quercetin, kaemferol, myricetin, apigen and luteolin from vegetables and fruits was not less than 16.7mg, in which 83.2% was from vegetables and 16.8% from fruits.

Conclusions: Quercetin distributes most abundantly and more fruits should be recommended to be consumed by Chinese in orde to increase the intake of dietary flavonoids.

Key words: flavonoids, vegetables, fruits, dietary intake, Chinese

PO2733

THE SEPARATION AND PURIFICATION OF ANTIHYPERTENSIVE PEPTIDES FROM JAPANESE CLASSIFIED BARLEY FLOUR

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Background and objectives: Barley is useful as a foodstuff, because it contains high levels of protein, dietary fibers and minerals.We have been attempting to identify the biological active peptides from Japanese barley flour obtained from the outer layer of the grain.Angiotensin 1 converting enzyme (ACE) is important for blood pressure regulation.ACE inhibitory peptides have been derived from many food sources including fish, casein and soybean.In this study, we investigated the ACE inhibitory activity of peptides from Japanese classified barley flour.

Methods: Japanese classified barley flour was extracted in water and the extract was dialyzed with a Cell Sep T1 (nominal MW=3,500). The external solution of dialysis was evaporated and taken to dryness.Then the sample was dissolved in water and subjected to size exclusion chromatography on a Bio Gel P-4 column. The fractions were collected and subjected to HPLC using a CAPCELL PAK C18 column.The molecular weight of these fractions was confirmed by HPLC analysis with Tosoh TSK 3000SW column. The ACE inhibitory activity was measured by the method of Lam et al.

Results: Five fractions (P4-1a, P4-1b, P4-2-2a, P4-2-2b, and P4-3a) were identified by the preceding sequential steps. The molecular weight of P4-1a, P4-2-2a and P4-3a were 407.8, 299.9 and 147.9, respectively. The IC50 values of these peptides were 0.28mM, 4.61mM and 4.39mM, respectively.

Conclusions: From the results of analysis of molecular weight, it was considered thatthese fractions are short peptides with two to four amino acids.Fraction P4-1a has the strongest ACE inhibitory activity among 3 peptides purified from barley, however, the IC50 value of the peptide is much higher than that of commercialized antihypertensive peptides such as Ile-Phe-Phe.

Key words: antihypertensive peptides, ACE inhibitory activity, barley

PO2734

THE EFFECT OF DIFFERENT HARVEST PERIODS ON THE CONTENT OF RUTOSIDE IN HERB OF THE SELECTED CULTIVARS OF BUCKWHEAT

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Background and objectives: Tartary buckwheat and buckwheat herb are used in medicine. The raw material contains flavonoids (mainly rutoside), phenolic acids, minerals and fagopyrin. The extracts of herbs are used as a drug regulating the permeability of the capillaries, in the treatment of psoriasis and vitiligo.The aim of this study was to compare the content of rutoside in the leaves and stems of four cultivars of buckwheat: Green Corolla, Kora, Panda, Red Corolla, harvested in two periods: I - phase of intensive growth, II - at the beginning of blooming.

Methods: the experimental material for the analysis came from the two-factor field experiment which was carried out in the locality of Wierzbica (50o29'N. 19o45'E) in 2012Rutoside was determined on a Dionex liquid chromatograph, with a PDA 100 UV-VIS detector, P 680 pump, TCC 100 thermostat, ASI 100 autosampler, and CHROOMELEON 6.60 control program. The results were calculated using a two-way statistical variance analysis.

Results: The compared buckwheat cultivars significantly differed in rutoside content both in leaves and stems. The rutoside content in the leaves ranged from 2.51 to 4.20%, and in stems from 0.031 to 0.065%. The leaves of Red Corolla cultivar had the highest rutoside content (4.20%), and the Polish cultivar Panda had the lowest (2.51%), as well as Kora (2.54%). Green Corolla cultivar contained rutoside (3.13) at the level of Tatary(3.24). The content of rutoside in buckwheat stems was low and the most of the ingredient was found in Kora cultivar

(0.065%). The first period (period 1 - 3.477%, period 2 - 2.72%) was favourable for harvesting rutoside from the leaves out of the two compared periods. However, the experiment harvest dates had no significant impact on the content of rutosidein the stems (period 1 and 2 - 0.046%).

Key words: buckwheat, leaves, stems, rutoside

PO2735

EFFECTS OF LONG-TERM FEEDING WITH NON-DIGESTIBLE OLIGOSACCHARIDE AND DIETARY FIBER ON AGE-RELATED LEARNING AND MEMORY OF SENESCENCE ACCELERATED MICE

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Background and objectives: Senescence accelerated mouse-prone 8(SAMP8) is a model of learning and memory disorder.Gut microbiota play more important role in maintaining human health than those previously known. Prebiotics is defined as food-grade components that deliver measurable benefit to the host through themicrobiotamodulation.However, the effect of prebiotics on learning and memory disorder is not clear. The purpose of this study was to examine the effects of non-digestible oligosaccharide and dietary fiber feeding on learning and memory ability of SAMP8.

Methods:SAMP8 (4wk, n=54) were randomly divided into three groups. AIN93M dietcomposition wasreplaced with 5% sucrose(CONT), 5% fructooligosaccharide(FOS)or 5% glucomannan(GM). In addition, senescence accelerated resistant strain mice(SAMR,n=15) were used as an external control, and fed control diet. Identification of gut microbiota was measured by Mitsuoka's method.The learning and memory ability were evaluated bypassive avoidance test (PAT). Total grading score was evaluated by Hosokawa's method. Oxidative stress and amyloid-betaconcentrationin brain were measured by ELISA method. Serotonin and catecholaminein brain were analyzed by HPLC.

Results: Total bacterial count was higher in FOS than in SAMR1 and CONT groups, and beneficial microbiota increased.PAT was better in FOS than in CONT. Total grading score was lower in FOS and GM than in CONT, although it increased depending on aging in any groups. Amyloid-betaconcentration and oxidative stress were lower in FOS and GM compared with CONT. Serotonin and catecholamine concentrationswere not significantly different amonggroups.

Conclusions: Long-term intake of FOS and GMimproved intestinal microbiotaand also suppressed learning and memory disorder, and delayed the aging of SAMP8. These results may becausedby the suppression of oxidative stress and deposition of amyloid-beta.

Key words:fructooligosaccharide, glucomannan, senescence accelerated mouse

PO2736

SUPPRESSION ON POSTPRANDIAL BLOOD GLUCOSE AND INSULIN BY INHIBITION OF LOQUAT LEAF EXTRACT FOR DISACCHAARIDASE AND GLUCOSE TRANSPORT IN RATS

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Background and objectives: Loquat leaf is traditionally used for treating lung and stomach diseases, and diabetes mellitus, and is found to be effective for inflammatory diseases. It contains many biologically active compounds such as polyphenols and triterpenoids. Some of these biological compounds appear to have a hypoglycemic property, as well as Morus alba leaf. The objectives of the present study were to clarify the suppressive effect of Loquat leaf extract (LLE) on the elevation of blood glucose and insulin levels.

Methods: Fresh Loquat leaves were thoroughly extracted with 6-fold of 50 % MeOH after drying. The inhibitory effect of LLE on rat intestinal disaccharidases was investigated by the modified Dahlqvist method using glucose oxidase. Transporter-mediated glucose uptake was perfrormed using everted gut sac of rat jejunum. To estimate the suppressive effect on the elevation of postprandial blood glucose and insulin levels, the sucrose (150 mg) or glucose (150 mg) solution (2.5 mL) with or without LLE was administered orally to fasting rats (250 g). Blood was collected from the tail vein before administration and at 30-min intervals for 3 h after administration. Plasma glucose and insulin were measured by Trinder's method and by ELISA kit, respectively.

Results: LLE inhibited strongly the activity of sucrase, maltase, trehalase and lactase, and the inhibitory mode was noncompetitive. LLE and phlorizin as SGLT1 inhibitor decreased significantly the uptake of glucose using everted gut sac. Furthermore, when the sucrose or glucose solution containing LLE was orally administered in rats, the elevation of blood glucose and insulin levels were significantly suppressed ($p<0.05$).

Conclusions: The present study demonstrates that the suppressive effect of LLE on the elevation of blood glucose and insulin levels is caused by the inhibition of both disacchaaridase activity and glucose transport in rats.

Key words: Loquat leaf extract; blood glucose; disaccharidadase; glucose transport

PO2737

ORAL 2´-FUCOSYLLACTOSE INCREASES ACETYLCHOLINESTERASE LEVELS IN A MODEL OF EARLY DEVELOPMENT IN ZEBRAFISH

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Background and objectives: Research on Human Milk Oligosaccharides (HMO) has intensified in the last decade due to the accelerated improvement in analytical methodology and the availability of large quantities of pure carbohydrate structures. Since 2´-fucosyllactose (2´FL) is one of the most abundant HMO, several groups have focused on this particular trisaccharide Here, we report the effect of 2FL on Acetylcholinesterase (AchE) activity,which is a commonly used biomarker for patterning of synaptic activity, neuronal growth, and circuitry. We used the Zebrafish model as a tool to assess changes in activity of AchE,

Methods: Zebrafish embryos were grown in water for 96 hours after fertilization. Larvae were transferred into 24-well culture dishes and incubated for 24 hours at 26°C in a water solution of 2'FL (74.73 mg/l). Water was used as negative control and a solution of docosahexaenoic acid (100 mg/l) was the positive control. After incubation, larvae were homogenized and centrifuged and AChE levels and protein were determined in the supernatants. The experiment was conducted twice, each one with two separate assays done in triplicates. Specific AChE activity data were referred to control and analyzed by ANOVA Dunnett post hoc tests were used for comparisons.

Results: 2´FL induced a significant increase on AChE activity when compared to the negative control and was similar to that of the positive control. Data from the two experiments was similar, suggesting that the observed changes were not artifacts.

Conclusions: This constitutes the first account to provide evidence on the effects of 2'FL on neuronal development and suggests that 2'FL may play a role in the development of neuronal tissues of breast fed infants.

PO2738

PRELIMINARY CHARACTERIZATION OF PHENOLIC AND OTHER POLAR COMPOUNDS IN WATERMELON (CUCURBITACEAE) BY USING LIQUID CHROMATOGRAPHY COUPLED TO TANDEM MASS SPECTROMETRY

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Background and objectives: Watermelon (Citrullus lanatus) is a member of the economically important family Cucurbitaceae. It is a widely cultivated and consumed crop in the world, occupying the first largest production of all cucurbits. Recently, fruits and vegetables have been recognized as important sources for a wide array of phytochemicals that may benefit health.Nevertheless, data about these compounds are lacking so far. The aim of this work was to develop a powerful HPLC-ESI-QTOF-MS method to carry out an expansive characterization of phenolic and polar compounds present in an aqueous-methanolic extract of watermelon.

Methods:0.5 gram of lyophilized sample was extracted by a methanol/water solution. Then the mixture was vortexed, sonicated for 30 min, and finally centrifuged for 15 min at 4000 rpm. The supernatant was collected in a round bottom flask and thoroughly evaporated. The final extract was resolved in 0.5 ml of methanol/water which was filtered and finally injected in the instrument. The analysis were performed by using an HPLC coupled to QTOF-MS equipped with an ESI interface operating in negative ionization mode using a C18 column and acidified water and acetonitrile as mobile phases at 0.8 mL/min.

Results: The coupling of HPLC to ESI-QTOF-MS has demonstrated to be a useful tool for the tentative characterization of 35 phenolic compounds and other polar compounds; most of them have not been described so far in watermelon.

Conclusions: To our knowledge, this study reports the first characterization work of phenolic compounds and other polar compounds in Citrullus lanatus. The obtained data may facilitate the quantitative analysis; also they may be used to improve the food composition tables.

Key words: Watermelon; Cucurbitaceae; Phenolic compounds; HPLC-ESI-QTOF-MS

PO2739

USING OF ULTRA-PERFORMANCE LIQUID CHROMATOGRAPHY COUPLED WITH QUADRUPOLE-TIME-OF-FLIGHT TO CHARACTERIZE UNUSUAL BIOACTIVE PHENOLIC COMPOUNDS FROM GLOBE ARTICHOKE (ASTERACEAE)

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Background and objectives: Fruit and vegetable intake is inversely correlated with risks for several chronic diseases in humans. Phytochemicals and in particular, phenolic compounds present in plant foods may be partly responsible for these health benefits through a variety of mechanisms. However, detailed information on these bioactive compounds is still needed. In this context, the present study was aimed to develop a reliable method to perform a comprehensive characterization of phenolic and other polar compounds present in the artichoke extract.

Methods:16 ml of aqueous-methanol solvent was added to homogenize about 0.5 gram of the freeze-dried artichoke sample. Thereafter, the mixture was vortexed, sonicated for 30 min, and finally centrifuged for 15 min at 3750 x g. The supernatant was completely evaporated and the final extract was resolved in 0.5 ml of aqueous-methanol, filtered and finally injected in the instrument. The analysis were performed by using an RP-UPLC coupled to QTOF/MS operating in negative ionization mode using a C18 column and acetonitrile and acidified water as mobile phases at 0.8 mL/min flow rate for a total time of 40 min.

Results: The proposed method has facilitated the tentative characterization of 61 phenolic and other polar compounds of which 33 unusual compounds have been never reported before. Other 28 known compounds of previously described phenolics have also been detected in this work.

Conclusions: As far as we know, a total of 33 new phenolic compounds with their isomers have been tentatively characterized in artichoke for the first time. The obtained data may be used in further quantitative analysis; they may also be used to update the food composition tables.

Key words: Artichoke; Asteraceae; Phenolic compounds; RP-UPLC; QTOF

PO2740

ORAL 2´-FUCOSYLLACTOSE PREVENTS LONG TERM EFFECTS OF EARLY PSYCHOLOGICAL STRESS ON GLIAL CELL CYTOKINE AND STRESS HORMONE RESPONSE

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Background and objectives: 2´-fucosyllactose (2'FL) is the most abundant human milk oligosaccharides (HMO). Several beneficial effects have been ascribed to HMOs, covering aspects as diverse as immunomodulation and regulation of intestinal development. A mouse model of early stress by maternal separation (MS) has been reported to induce permanent changes in the central nervous system resulting in a hyperactive hypothalamic pituitary adrenal (HPA) axis. The aim of this work was to determine the ability of orally administered 2´FL to ameliorate the effects of early stress as measured by biochemical markers.

Methods: C57/BL6 mouse pups were daily removed from the dam for 4 hours (days 2 to 14 after birth). Sham animals were kept with their mothers. After weaning, early stressed mice were separated into two groups, one fed on AIN-93G control diet and the other with AIN-93G supplemented with 2´FL (350mg/kg BW per day). After three months of feeding, the basal level of serum corticosterone was measured. Mice were submitted to an acute restrain stress during 20 min and serum corticosterone was measured. Animals were then sacrificed and glial cells were isolated from the brain and cultured in the presence of LPS (1µg/ml). Cytokine levels in supernatants were measured.

Results: The control group had higher serum corticosterone and lower IL-6 and IL-10 secretion from glial cells than the sham group. Dietary 2´FL supplementation restored the level of these parameters to those of sham animals.

Conclusions: Feeding 2´FL prevented alterations induced by stress during early life. This suggests that HMOs may also play a role in the development/function of the central nervous system by modulating the HPA axis.

PO2741

THE EFFECT OF HARVEST TIME ON THE BASIC CHEMICAL COMPOSITION OF DRIED LEAVES OF SOME BUCKWHEAT CULTIVARS

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Background and objectives: Buckwheat is known as a plant showing functional properties. It reduces the cancer risk and it has anti-allergic and anti-inflammatory properties.The aim of the study was to determine the basic chemical composition of some varieties of dried buckwheat leaves.

Methods: Four varieties of dried buckwheat leaves (Green Corolla, Red Corolla, Kora, Panda) were harvested in June and July. Leaves were shredded and dried. The total amount of nitrogen, fat, ash, dietary fibre and carbohydrates were determined using AOAC methods in dry mass.

Results: In every case, the harvest time had a significant effect on the content of the tested components. It has been shown that the dried buckwheat leaves are an important source of protein (25g/100g). The lowest concentration of those components was in Panda variety harvested in July and the highest was noted in Kora variety collected in June. The dried buckwheat leaves are rich in minerals (ash) (13g/100g). The lowest amount was found in Panda variety from July, the highest in the Kora from June. The buckwheat leaves have low concentration of fat (1g/100g). The average total carbohydrate content was ca. 50g/100g.

Conclusions: The harvest time had a significant effect on the content of the tested components. The researched varieties of dried buckwheat leaves are a valuable source of basic nutrient components and should be considered as the raw material for food production.

Key words: chemical composition, buckwheat, protein

PO2742

INCREASE IN HIPPOCAMPAL LONG-TERM POTENTIATION RESPONSE BY 2´-FUCOSYLLACTOSE AFTER SHORT OR LONG TERM FEEDING IN RODENTS

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Background and objectives: The ability of synapses to change their strength is considered one of the major mechanisms that underlie learning and memory. A Long Term Potentiation (LTP) model might replicate cellular changes in synapses that occur during cognitive function. It has been shown that incorporation of fucose into glycoproteins and fucokinase activity increase after induction of LTP or learning tasks. Since 2'fucosyllactose (2'FL), is the most prevalent human milk oligosaccharides we set to determine its effects on LTP using two different models.

Methods: Experiment 1 (rats): Basal LTP was established in four adult Sprague Dawley rats,which were then fed an AIN-93M diet supplemented with 2FL (350 mg/kg BW/day) for two weeks. LTP was then measured and compared with basal LTPExperiment 2 (mice):Weanling C57BL/6 mice were divided into 2 groups. Control (n = 10) and FL (n = 10). Animals were fed either AIN-93G control diet or diet supplemented with 2FL (350mg/kg BW per day) from weaning for 12 weeks. LTP was measured at the age of three months.LTP: The animals were surgically implanted with electrodes in the hippocampus (CA3-CA1 area). After application of a high frequency protocol (HFS), field excitatory post-synaptic potentials (fEPSPs) were recorded for each animal. Additional recordings were carried out for 15 min during the 3 following days

Results: In both experiments LTP were evoked following HFS of the hippocampal synapse. Furthermore, LTP evoked after 2 weeks (rats) or 12 weeks (mice) of feeding with 2'FL diets presented significantly larger fEPSPs than basal data (rats) or than control values.

Conclusions: 2-Fucosyllactose increases LTP response regardless of the duration of feeding; this suggests that this human milk trisaccharide plays the role of a molecular mediator in processes of learning/memory.

PO2743

ORALLY GIVEN 2´-FUCOSYLLACTOSEBUT NOT FUCOSE INDUCES AN INCREASE OF THE HIPPOCAMPAL LONG-TERM POTENTIATION RESPONSE IN CONSCIOUS RATS

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Background and objectives: Long-term potentiation (LTP) is a long-lasting enhancement in signal transmission between two neurons. LPT underlies synaptic plasticity, and is widely considered one of the major cellular mechanisms involved in learning and memory. It has been postulated that fucosylated proteins are implicated in this process. Direct intrahippocampal injection of L-fucose or the human milk oligosaccharide 2´fucosyllactose (2´FL) enhances LTP. In previous studies, we have confirmed that feeding with 2´FL enhances LTP in mice after a long period of feeding and in rats after only two weeks. The objective of this work was to determine whether the positive effect of oral 2FL on LTP is due to its L-fucose content or to the entire 2´FL molecule.

Methods: Adult Sprague Dawley rats (n=10 per group) were fed during 40 days with three diets: a AIN-93M control diet, the same diet supplemented with 2´FL (350mg/Kg BW), or with L-fucose (equimolar to 2´FL).Electrodes were surgically implanted in the CA3-CA1 area. LTP was evoked, using a high frequency protocol HFS and the field excitatory postsynaptic potentials were recorded for 30 min. Additional recordings were carried out for 15 min during the 3 following days.

Results: The 2´FL group presented a significantly larger LTP as compared with the other two groups. Feeding with L-fucose did not modify LTP respect to control group.

Conclusions: The effect of oral 2´FL on the potentiation of hippocampal synapses appears to be independent of the metabolic contribution of its fucose content. This results suggests that either intact 2'FL or one of its structural motifs may play a role in LTP-mediated cognitive processes

PO2744

PHOSPHORUS BALANCE AFTER MODEL MAILLARD REACTION PRODUCTS CONSUMPTION IN YOUNG AND ADULT RATS

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Background and objectives: Studies concerning effects of Maillard reaction products (MRPs) on mineral availability have been mainly focused on divalent cations. However, information on MRPs and phosphorus is scarce since it acts as an anion in the biological fluids. Our purpose was to investigate the effects of the consumption of MRPs from glucose-lysine model system heated 150°C-90 min on phosphorus bioavailability and its main metabolic destination, the bone.

Methods: Equimolar mixture of glucose-lysine-HCl (GL) was heated (150°C-90 min) to obtain GL90 sample. It was added to the AIN-93G diet (Control diet) in a concentration of 3% (GL90 diet). Forty-eight rats were distributed into two groups (n=24) and assigned to one of the dietary treatments. Food intake was monitored during the whole experimental period. To investigate the phosphorus balance in different stages of growth, each dietary treatment was divided into two groups (n=12). One of them was sacrificed after three weeks, whereas the other continued the experiment until twelve weeks. In each slaughter 6 animals were destined to the calculation of phosphorus balance, while the remaining 6 animals were used for femur extraction. Phosphorus in diets, whole animals and femurs was colorimetrically determined (vanadomolybdate procedure).

Results: Phosphorus intake was unaffected by the consumption of MRPs after three or twelve weeks. After three weeks, phosphorus body content was increased by consumption of GL90 diet, as well as its global retention and bioavailability. However, considering the twelve-week period these parameters were unchanged. Phosphorus content and concentration in femur did not modify by MRPs consumption in any case.

Conclusions: Consumption of glucose-lysine MRPs by young rats increased phosphorus retention and bioavailability. An adaptation mechanism seems to occur with age, as once rats reach maturity phosphorus bioavailability was unaffected by the intake of these compounds.

Key words: Maillard reaction products; phosphorus; retention; bioavailability.

PO2745

BACTERIAL CELL WALL COMPONENETS AND PROBIOTIC STRAINS INDUCE ALTERATIONS IN DNA METHYLATION OF TNF AND TLR4 IN HUMAN INTESTINAL EPITHELIAL CELLS

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Background and objectives: Commensal bacterial strains and bacterial cell wall components are proposed to induce differential cell responses regulated by intracellular signalling pathways. Epigenetic modulation of gene expression was recently discussed to be influenced by LPS and probiotic bacteria. The main aim of this study was to investigate promoter methylation in response to probiotic strains in contrast to LPS.

Methods: Upon stimulation of Caco-2-cells with LPS, Lactobacillus rhamnosus GG (LGG) and Lactobacillus delbrueckii (LD) quantitative DNA methylation of four CpG loci in the TNF-α promoter region and four CpGs of the TLR4 exon were analysed by the pyrosequencing.

Results: Methylation in four analysed TNF-α CpG loci ranged between 70-90% in unstimulated cells. Significant changes in TNF-α methylation over all four CpGs were caused by LGG after 12h of stimuation (+1.07±0.24%, p=0.048), LD after 24h (+1.54±0.3%, p=0.035) and LPS after 72h (-0.58±0.05%, p=0.007). TLR4 methylation was not consistent among cell culture experiments and ranged between 10 and 45% in unstimulated cells. CpG 4 was significantly increased by 12h LPS treatment (+2.00±0.42%, p=0.041), CpG 3 was decreased after 72h LGG treatment (-1.77±0.29%, p=0.027) and CpG 2 was also decreased after 12h LPS treatment (-1.62±0.26%, p=0.024).

Conclusions: The results indicate, that epigenetic regulation of TNF-α and TLR4 contributes to the specificity of inflammatory reactions induced by bacteria and bacterial cell wall components

PO2746

EFFECTS OF ADVANCED GLYCATION COMPOUNDS FROM BREAD CRUST ON IRON METABOLISM AND TISSUE DISTRIBUTION

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Background and objectives: Advanced glycation end-products (AGEs) can interfere mineral utilisation, as they can act as anionic polymers which complex minerals. We investigated effects of AGEs from bread crust (BC) on iron bioavailability and tissue distribution in rats, analysing whether effects are related to the molecular weight of AGEs.

Methods: BC was digested with pronase-E, obtaining soluble and insoluble fractions. Ultrafiltration was applied to separate compounds higher and lower than 5kDa (HMW and LMW) from the soluble fraction. BC was added to the AIN-93G-diet (Control diet) to reach a concentration of 10% (BC diet). LMW and HMW fractions were individually added to the AIN-93G-diet in the proportion they were present in BC (LMW and HMW diets). Four groups of rats (n=12) were assigned to one of dietary treatments for three months, monitoring food consumption and body weights. Afterwards, animals were sacrificed and iron balance calculated in six individuals of each group (initial-final iron), whereas in the remaining animals different organs were removed. Dietary, faecal, urinary and tissue iron was determined by AAE.

Results: Iron intake did not differ in any dietary treatment, however iron body content and its retention tended to increase by consumption of BC and derivatives, leading to a higher iron bioavailability, only significant in HMW group. Iron body concentration resulted increased after consumption of AGEs-enriched-diets, especially in LMW and HMW groups. BC intake led to higher iron content and concentration in liver and small intestine, while consumption of LMW and HMW fractions conducted to increased iron concentration in spleen and femur. Haemoglobin levels were unaffected.

Conclusions: Consumption of AGEs from BC or its derivatives led to increases on iron bioavailability between 13-33%. A hyperconcentration of iron occurred in the organism, conducting to higher stored iron in organs as liver or spleen.

Key words: AGEs; iron; bioavailability; distribution.

PO2747

POTENTIAL DIETARY HEALTH BENEFITS OF THE UNEXPLOITED SEEDS OF SOME SPECIES FROM THE FLORA OF TUNISIA

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Background and objectives: There has been recent growth in research aimed at investigating new sources of plant oils, particularly from unexploited seeds. Samples from Acacia cyanophylla, Juniperus phoenicea, Punica granatum and Capparis spinosa were analyzed in order to evaluate the potential nutritional value of their unexploited seeds.

Methods: Samples were collected from different Tunisian geographic locations. Seed oils were extracted and total lipids including polyunsaturated fatty acids, carotenoids, tocopherols and sterols were evaluated. Storage proteins and total phenols were also investigated.

Results: All the studied seeds seem to be quite rich in lipids: from 11% (A. cyanophylla) to 33% (C. spinosa) and proteins from 8.4% (J. phoenicea) to 27% (C. spinosa). Lipids are mainly unsaturated (ca.86%). ω6 PUFAs can reach 63% for A. cyanophylla and ω3 PUFAs average 34% for J. phoenicea. Total phenols are highly present for all studied species (reached to 1764 mg Gallic Acid Eq/100 g DW for J. phoenicea) and mean free radical scavenging activities can reach 1337 TEAC per 100 g D W for J. phoenicea. Tocopherols attained 3 g/ kg of total lipids (P. granatum). Carotenoids (mainly xanthophylls) are also quantified and ranged up to 113 mg. kg-1 of total lipids (A. cyanophylla). Sterols are also highly present, particularly for A. cyanophylla (8.9 g/ kg of total lipids).

Conclusions: All of these findings highlight that these non conventional oils and theses unexploited seeds might have a potential nutritional value and encourage researchers to more explore and find developments for these plants for healthy purposes.

Key words: Unexploited seeds, Oils, healthy purposes.

PO2748

GLYCEMIC INDEX OF FONIO (DIGITARIA EXILIS) COUSCOUS WITH OKRA (ABELMONSCHUS ESCULENTUS) AND WHITE BREAD CONSUMED WITH CASHEW NUTS (ANACARDIUM OCCIDENTALE)

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Background and objectives: Glycemic index (GI) and glycemic load (GL) of foods are interesting tools in the prevention of diabetes. The objective of the study was to measure GI and GL values of Fonio couscous with okra (F-Okra) and white bread (WB) consumed with local cashew nuts (W-Nuts).

Methods: Fifteen (15) healthy men volunteers participated to the experimental study and were randomized into F-Okra group (n=7, mean age=28 y, mean BMI=18.9 kg/m^2), and W-Nuts group (n=8, mean age=24 y, mean BMI=20.6 kg/m^2). After a 10-12h overnight fast, the subjects received 97 g of WB (equivalent to 50 g of available carbohydrate) as the reference food during 3 consecutive days, and the day after they received either 74.63 g of Fonio mixed with 11 g okra powder, or 97 g of WB consumed with 60 g of cashew nuts. Finger capillary blood samples were collected before the meals (fasting) and at 15, 30, 45, 60, 90 and 120 min. The GI and GL were calculated according to WHO/FAO standards and published tables, respectively.

Results: F-Okra had a GI of 64.9±27.2 and W-Nuts a GI of 60.8±18.6 when WB was used as the reference. After adjusting for glucose, low GIs (<55) were found for F-Okra (49.9±20.9), and W-Nuts (46.7±14.3). The GL corresponding to 150 g of cooked Fonio couscous (WB reference) was 20.3 g. The GL corresponding to 80 g of WB (WB reference) was 24.3 g. Both GL were high and intermediate when adjusted for glucose:15.6 g and 19.2 g respectively.

Conclusions: GIs of these African foods are intermediate and low when adjusted for glucose. Depending on the amount of food consumed, the corresponding GL was high or intermediate. Therefore it's important to consider food GI and GL in nutritional counseling for diabetic patients.

Key words: GI, GL, F-Okra, W-nuts, Senegal

PO2749

SIALIC ACIDS IN HUMAN MILK: IN VITRO ACCESSIBILITY STUDY

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Background and objectives: Sialic acids (N-acetylneuraminic acid-Neu5Ac and N-glycolylneuraminic-Neu5Gc) are bioactive compounds present in human milk that play a role essential in the brain development during the first stages of life. The aim of this study is to assess the precision/variability of simulated gastrointestinal digestion in sialic acids present in human milk and to estimate their bioaccessibility (maximum soluble amount available for absorption).

Methods: The gastrointestinal digestion, with three sequential steps (salivary with neuraminidases, gastric and intestinal-soluble fraction), was applied to a human milk pool (4-7 months of lactation). Aliquots of all the stages of digestion and blanks were hydrolized with H^2SO^4 0.05M, centrifuged (1000xg/4ºC/10min), purified by ion exchange (2ml of Dowex 1x8), ultrafiltered (Microcon Ultracel YM-10, 13000xg/4ºC/10min) and derivatized (DMB 50ºC/2.5h). The Neu5Ac and Neu5Gc contents were determined by HPLC-fluorescence.

Results: Large intraday (n=3, four digestions) and interday (n= 12, three different days) variability for Neu5Ac were observed in salivary (5.2-25.3% and 26.2%), gastric (3.7-15.5% and 11.1%) and intestinal (2.8-10.1% and 21.5%) fractions.No statistically significant differences ($p < 0.05$) among Neu5Ac contents from all fractions were observed. The percentages of decrease of Neu5Ac in each fraction respect to the average content in human milk without digest (299.9±7.8 mg/L) ranged between 30.47% and 35.74%. Bioaccesibility percentage was 68.1±15%.Neu5Gc was detected only in intestinal fraction with high intraday (14%) and interday (28%) values and contents ranged between detection and quantification limits (0.7 and 2 mg/L, respectively).

Conclusions: It is necessary to standardize simulated digestion models. The salivar digestion with neuraminidases reduced significantly the Neu5Ac content, though the bioaccesibility remained high.

Key words: sialic acid, human milk, in vitro bioaccesibility

PO2750

BULGARIAN MEDICINAL PLANTS WITH A POTENTIAL TO IMPROVE LIPID PROFILE IN HEALTHY VOLUNTEERS

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Background and objectives: Obesity and diabetes are among the most common and socially significant diseases associated with hyperlipidemia. Plant derived therapeutics have less side effects and often possess higher efficiency, than those derived synthetically. Sambucus ebulus(SE) and Agrimonia eupatoria(AE) are medicinal plants widely used in Bulgarian traditional medicine. They are rich in polyphenols with proven high anti-oxidative and anti-inflammatory activity and possibly play a role for the prevention of obesity-related diseases. With respect to identifying new drug sources, we aimed to compare the effect of SE (fruits) and AE (aerial parts) tea consumption on body mass index (BMI), serum of triacylglycerides (TG), total cholesterol (TC), high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-cholesterol (LDL-C) and glucose in healthy volunteers.

Methods: The study involved two groups of healthy volunteers n=22 and n=19 who consumed SE or AE tea 200 ml/day for 30 days. Blood samples were collected at the start and at the end of the study. Plasma lipids and glucose levels were measured using standardized spectrophotometric methods.

Results: Although that AE tea consumption induced an increase in TG and TC ($p<0.01$), also HDL-C was elevated significantly ($p<0.05$) contributing thus to elevated HDL/LDL ratio. A slightly different mode of action of SE tea was observed – its consumption induced statistically significant decrease in TG ($p<0.01$), TC ($p<0.001$), and in LDL-C ($p<0.001$), and also a slight increase in HDL-C. Both teas induced elevation of HDL/LDL ratio, the change being significant only in the SE ($p<0.01$) group. In both groups of volunteers blood glucose levels stayed within the reference values. BMI did not change either.

Conclusions: Apparently both plants have a potential to improve lipid profile, although that SE tea seems to be a better therapeutic source to treat hyperlipidemia and related disorders.

Key words: Sambucus ebulus, Agrimonia eupatoria

PO2751

EFFECT OF SOY ISOFLAVONE, INULIN CALCIUM AND VIT D3 IN THE TREATMENT OF POST-MENOPAUSAL HOT FLUSHES: A CONTROLLEDOBSERVATIONAL STUDY

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Background and objectives: Inulin may increase theplasma concentrations of the soybean isoflavones (Am J Clin Nutr. 2007 86:775-80), improving soy isoflavone effect on climateric symptoms.

Methods: To test this hypothesis, we conducted an observational prospective study.Peri-post-menopausal women observed in seven Italianoutpatients gynaecological servicesfrom January 2102, aged 45-60 years, reporting 3 or more hot flushes (HF)die, not requiring hormonal therapy (HT) and/or therapy for osteopenia/osteoporosis, were eligible for the study.They gave informed consent to the study. A daily treatment with 55 mcg calcium + 7.5mcg Vit D3+ 3 gr inulina and 40 mg of soy isoflavones per os was proposed to all women. Thosewho accepted the treatment were included in the treatment group, who did not in the control one. Follow up visits were after 3 and 6 months. In this analysis we present the results available until January 2013, with reference to 3 months follow up visit.

Results: Univariate analysis of variance was used to evaluate the change from baseline of number of HF die. 144 women entered the study, 82(mean age 53.8, SD 3.8) were in the treatment group and 64 (mean age 53.9, SD 4.4) in the control one. At study entry the mean number/die of HF was 6.1 (SD 4.6) in the treatment group and 5.6 (SD 6.5) in the control one. At the 3-month follow up visit, the mean change of the number of HF was -2.9 (SD 4.0) in the treatment group and+0.2 (SD 4.1) in the control one ($P<0.05$).

Conclusions: This preliminary analysis shows that 3 months after study entry a daily treatment with 55 mcg calcium + 7.5mcg Vit D3+ 3 gr inulina and 40 mg of soy isoflavones per os lowers the number of hot flushes/die reported by the women. No change was observed in the control group

PO2752

PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF RAW AND PROCESSED ROOTS AND TUBER CROPS

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Background and objectives: Root and tuber crops which play an important role as a global source of energy, next to cereals are generally peeled and subjected to a hydrothermal treatment before consumption.The objectives of the study were to determine the phenolic contents and their antioxidant activities of several raw tuber crops and their processed counterparts.

Methods: Several roots and tubers, namely cassava (Manihot esculenta), potato (Solanum tuberosum), sweetpotato (Ipomea batatas) and elephant foot yam (Amorphophallus paeoniifolius), country potato (Solenostemon rotundifolius), lesser yam (Dioscorea esculenta), arrowroot (Maranta arundinacea) and purple yam (Dioscorea alata) were studied.Phenolic extracts obtained from tubers and their peeled and cooked counterparts were studied for their total phenolic (TPC) and flavonoid (TFC) content, radical scavenging capacity and reducing power.

Results: The TPC of raw and cooked tubers ranged from 4 to 79 and 1.5 to 48 µmoles gallic acid equiv /g of dry matter for flesh, respectively.For all varieties employed in this study the peelshowed the highest TPC and TFC.All roots and tubers exhibited notable 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, trolox equivalent antioxidant capacity (TEAC), and reducing power (RP).Peeling and hydrothermal processing affected the TPC, TFC andradical scavenging and antioxidant activities of tubers depending on the variety.In general, peel had higher TPC thus exhibited superior antioxidant activities compared to flesh.Cooking with peel showed a high retention of phenolic compounds in the flesh.

Conclusions: Thus, the present study demonstrated that peeling and hydrothermal treatments affect the phenolic content and antioxidant activities of root and tuber crops.Processing conditions should be optimized to retain natural antioxidants.Peeled tubers as well as peel fraction may serve as natural source of nutraceutical and functional food ingredients in health promotion and disease risk reduction.

Key words: DPPH, Flavonoids, Reducing power, TEAC

PO2754

MUCILAGE OF OPUNTIA STREPTACANTHA: DIETARY FIBER WITHPOTENTIAL PREBIOTIC

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Background and objectives: The mucilage of Opuntia streptacantha (OS) is formed mainly by complex carbohydrates which are resistant to digestion and absorption processes of the small intestine. The partial hydrolysis of their sugars produce oligosaccharides, which can be considered as prebiotic active compounds. Therefore the aim of this study was to determine the content of dietary fiber (DF) of mucilage OS and prove the potential prebiotic of oligosaccharide fraction (OF).

Methods: The mucilage was extracted from fresh cladodes of OS and it was determined its DF content. By partial enzymatic hydrolysis, gel permeation chromatography and ethanol precipitation was obtained the OF, and it was determined its molecular weight. Prebiotic potential was evaluated using the OF by an in vitro assay using Lactobacillus acidophillus.

Results: Total DF content determined in the mucilage was 57.62%, of which 37.16% were soluble DF; these values are within those reported for other plants such as soy and pulp of cactus pear fruit. In the in vitro assay it was observed that cell growth presented by Lactobacillus acidophillus showed no significant difference, compared with the growth shown for a commercial prebiotic (Inulin). Changes in pH were according to the reported for others oligosaccharides.

Conclusions: The mucilage of OS showed a significant content of DF, so that your consumption can generate gastric and/or systemic benefits. In vitro behavior of the OF was similar to that of inulin, so can be considered as a potential prebiotic.

Key words: Mucilage, Opuntia, Dietary fiber, Prebiotic, Oligosaccharides.

PO2755

EFFECTS OF SPICE INGREDIENTS ON APOLIPOPROTEIN B48 BY CACO-2 INTESTINAL CELL LINE

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Background and objectives: Postprandial hypelipidemia is considered to be one of strong risk factors for atherosclerosis. Several spice ingredients and food components are of interest, supposed to suppress lipid absorption and hyperlipidemia. Analysis of the secretion and metabolism of chylomicron is important to study postprandial hyperlipidemia.Apolipoprotein B48, a partial peptide of B100 originated from the same gene, is the constitutional protein moiety of chylomicron.We established monoclonal anti-B48 antibody using C-terminal synthetic peptide as antigen and developed ELISA system for B48.Human colon cancer cell line Caco-2 keeps physiological characteristics as normal intestinal cells.

Methods: In this study we cultured Caco-2 cells in permeable membrane insert, where cells are polarized and secrete nutrients absorbed at apical side from upper chamber to lower chamber from basal side.

Results: Caco-2 cells cultured in the medium with lipid micelles secreted considerable amount of apoB48.Addition of 350microM of piperine, 300microM of gingerol and 200microM of curcumin, a spice ingredient of turmeric, decreased apoB48 secretion by 55%, 57% and 85% respectively.Suppression of the secretion of apoB48 from Caco-2 cell is also observed by addition of 200microM of soy isoflavone and wine polyphenol.On the other hand, capsaicin the component of red pepper increased the apoB48 secretion to 135% of control.

Conclusions: Several candidate steps may be responsible for regulation of the secretion of apoB48, such as lipid digestion, absorption, apoB48 messenger editing and triglyceride incorporation into lipoprotein.Some of relevant proteins are under investigation.Spices increase appetite and may lead people to over-eating, but those tested above possibly suppress over-taking of energy by inhibiting absorption and secretion of lipids into blood.When eating fat-rich dishes, taking them with these spices may be beneficial to prevent hyperlipidemia through suppression of the secretion of apoB48 and chylomicron.

Key words: apolipoprotein, chylomicron, cell, spice, hyperlipidemia

PO2756

NATURALLY OCCURRING SPHINGOID BASES REGULATE EXPRESSION OF GENES ENCODING MEDIATORS OF FILAGGRIN DEGRADATION TO NATURAL MOISTURIZING FACTORS IN HUMAN KERATINOCYTES

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Background and objectives: Glucosylceramide (GlcCer) is major sphingolipid of natural products, including those used as daily food sources, such as rice and maize. It has been reported that dietary GlcCer improves skin barrier condition. However, the mechanism involved remains unknown. We previously found that dietary GlcCer enhanced cornified envelope formation and tight junction function, which are essential for the skin barrier function, via induction of transglutaminase-1 and claudin-1 in skin epidermis. On the other hand, filaggrin, which is a key protein for skin barrier function, plays a role in the precursor of hygroscopic amino acids and their derivatives, known as natural moisturizing factors (NMF), in the skin epidermal stratum corneum. The pathway of filaggrin degradation to NMF is also crucial for skin barrier function.

Methods: In this study, we examined whether sphingoid bases generated by metabolism of dietary GlcCer, i.e., sphingosine (SS), sphinganine (SN), phytosphingosine (PS), 4,8-sphingadienine (SD) and 4-hydroxysphingenine (4HS), influence the expression of genes encoding factors that mediate filaggrin degradation to NMF, including the filaggrin, caspase-14, calpain-I and bleomycin hydrolase genes, in cultured human keratinocytes by RT-PCR.

Results: As the result, all five sphingoid bases increased the expression of filaggrin mRNA. Among them, only PS increased the expression of caspase-14 mRNA, while SS decreased it. Further, PS and 4HS increased the expression of calpain-I mRNA, and 4HS increased the expression of bleomycin hydrolase mRNA.

Conclusions: Our results indicate that skin barrier improvement by oral GlcCer treatment is at least partly due to modulation of the expression of genes encoding mediators of filaggrin degradation to NMF in human keratinocytes, by sphingoid bases metabolically derived from GlcCer.

Key words: Glucosylceramide; Sphingoid base; Filaggrin; Natural moisturizing factors; Keratinocyte

PO2757

CATECHIN INCREASES THE SEROTONIN RELEASE IN THE RAT HIPPOCAMPUS

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Background and objectives: Catechin has been reported to be responsible for a lot of physiological functions including central nervous system. However, the effects of catechin on the brain function, especially the central serotonergic systems, remain to be clarified. Therefore, the aim of the study was to examine whether or not the catechin increases serotonin (5-hydroxytryptamine;5-HT) release from the brain region.

Methods: We used the male Wistar rat and measured the extracellular 5-HT in the hippocampus using in vivo microdialysis techniques. We used five catechin compounds (10μM); (+) catechin (CAT), (-) epigallocatechin gallate (EGCG), (-) epigallocatechin (EGC), (-) epicatechin gallate (ECG), and (-) epicatechin (EC). We mainly used CAT because EC was changed to CAT by heating. The effect of CAT was also examined under the conditions of high or low K+ and of the presence of tetrodotoxin (TTX, 1μM), clorgyline (MAO inhibitor, 1mM) and/or fluvoxamine (serotonin selective reuptake inhibitor; SSRI, 1mM).

Results: All catechin compounds used markedly increased the 5-HT release from hippocampus. EC was most effective in increasing 5-HT release, followed by CAT, EGC, ECG, and EGCG in that order. CAT (1μM~1mM) increased the 5-HT release concentration-dependently, and the ED50 was about 0.1mM. The 5-HT release by CAT remained unchanged even in the conditions of low K+, high K+, or TTX. On the other hand, clorgyline or fluvoxamine also significantly increased the 5-HT release. However, the additional increase of the 5-HT release by clorgyline or fluvoxamine was not observed even in co-existence of CAT.

Conclusions: These findings suggest that catechin may act as an antidepressant, which elevates the 5-HT levels in the brain, thereby permitting the improvement of depression.

Key words: catechin, in vivo microdialysis, 5-HT, hippocampus, antidepressant

PO2758

DIOSCOREA JAPONICA EXTRACT SUPPRESSES THE EXPRESSION OF THE RELATED ENZYMES SYNTHESIZING LIPID MEDIATOR PROSTAGLANDIN E2

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Background and objectives: Dioscorea japonica is one of wild yams and is a relative of the Dioscoreaceae family native to Japan. For many years, it is believed that Dioscorea japonica is good for a nutritional fortification, and has some effects of gastric mucosal protection, digestive enhancement and so on. In some areas, the wild yam has been used as folk medicine against asthma, rheumatoid arthritis, bronchitis, and other disease. However, the detailed physiological effects of the yam have not been clear. In the present study, we focus on the functional effects of Dioscorea japonica on the related enzymes synthesizing prostaglandin (PG) E2PGE2 is one of the lipid mediators, and is involved in many pathological conditions such as inflammation and tumorigenesis. PGE2 is synthesized from arachidonic acid by cyclooxygenase (COX) and PGE synthase (PGES), and the isozymes, COX-2 and mPGES-1 are induced in those diseases.

Methods: The 50% extract of Dioscorea japonica powder (DJP) was added to human lung carcinoma A549 cells, human colon carcinoma Caco-2 cells, and lipopolysaccharide(LPS)-induced mouse macrophage RAW264 cells. The expression of COX-2 and mPGES-1 was analyzed by real-time PCR, and COX-2 activity and PGE2 production were measured. COX-2 promoter activity was analyzed using secreted luciferase reporter gene assay.

Results: In A549 cells and Caco-2 cells, DJP extract dose-dependently suppressed COX-2 and mPGES-1, and inhibited COX-2 activity and PGE2 production. Additionally, in the inflammation model, LPS-RAW264 cells, it was also confirmed that DJP extract decreased the mRNA levels, and suppressed COX-2 promoter activity.

Conclusions: The present study indicated that DJP extract suppressed the expression of COX-2 and mPGES-1 in the carcinoma models and the inflammation model. Hence Dioscorea japonica may contribute to the prevention such as tumorigenesis and inflammation.

Key words: wild yam, cyclooxygenase-2, prostaglandin E2 synthase-1, carcinoma, inflammation.

PO2759

AMELIORATING EFFECTS OF GREEN TEA ON THE DIABETES-INDUCED OXIDATIVE STRESS

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Background and objectives: Green tea catechins confer potent biological properties including antioxidation and free-radical scavenging. Oxidative stress resulting in reactive oxygen species generation and inflammation play a pivotal role in lifestyle-related disease. Therefore, we examined whether the intake of a catechin-rich beverage, green tea, ameliorates the increased oxidative stress induced by diabetes (DM).

Methods: Eight weeks old-Wistar rats were divided into two groups; DM group and non-DM group. Rat was rendered diabetic by streptozotocin. Both group rats were further divided into three groups, respectively; freely water-intake group, forced intake of catechin-rich beverage (9mg/kg) group (CAT1) and freely intake of catechin-rich beverage group (CAT2). Catechin-rich beverage was intragastrically administered in CAT1 rats one time a day. During these periods, the body weight, water and food intake volumes were observed. After two weeks, the levels of fasting blood glucose, insulin, nitric oxide, oxidative stress, and anti-oxidant capacity were measured in the serum of these rats.

Results: In general, the increase in body weight of both DM and non-DM groups was suppressed by catechin-rich beverage, but the intake of food and water in only DM group was enhanced. Catechin increased the level of insulin in only DM group significantly. The level of oxidative stress was significantly reduced in only DM-CAT2The anti-oxidant capacity was raised by catechin intake in only DM group.

Conclusions: These findings suggest that the intake of catechin-rich beverage, green tea, may ameliorate diabetic state, because the green tea reduced the level of oxidative stress but increased the anti-oxidant capacity in DM rats. Among the large number of green tea substances, the catechin is thought to be a potent candidate showing the protective health effects of drinking green tea.

Key words: green tea, oxidative stress, diabetes

PO2760

INHIBITORY EFFECTS OF ETHYLACETATE-FRACTIONFROM SASA BOREALIS ON ADIPOCYTE DIFFERENTIATION

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Background and objectives: Sasa borealis is major source of boomboo leaves for use in traditional medicine in Korea. Obesity is a serious health problem in industrialized countries because it is implicated in various diseases, including type2 diabetes, hypertension, cancer, and coronary heart disease. Recent reports have proposed mechanisms to reduce obesity, decreased preadipocyte differentiation and proliferation. The preadipocytes play a key role by differentiation into mature adipocytes and increasing fat mass. Many of the advances in our understanding of adipogenesis are based on studies in murine 3T3-L1 cells. In this study, we investigated anti-adipogenic effects of crude extract and soluble-fractions of Sasa borealis

Methods: Sasaboreaslis were extracted with 70% ethanol and fractionated with n-Haxan, chloroform, ethylacetate, n-butanol, water (SBE). Adipocyte differentiation of 3T3T-L1 cells was induced by MDI processes and measured by Oil Red O staining assay. The expression of PPARα and C/EBPαin 3T3-L1 adipocytes was examined using reverse-transcription PCR

Results: Ethanol-soluble extract (SBE) and ethylacetate-soluble fraction (SBEA) of Sasa borealis inhibits intracellular accumulation of lipid droplet in a dose-dependent manner in 3T3-L1 cells. Down-regulation of PPARα and C/EBPα, transcription factor during adipogenesis, was confirmed by reverse transcription polymerase chain reaction (RT-PCR). Ethylacetate-soluble fraction from Sasa borealis attenuated expression of PPARα and C/EBPα, which act as key trascription factor in adipogenesis.

Conclusion: Sasa borealis inhibited adipogenic differentiation by regulating adipogenic transcription factors in of 3T3-L1 cells. Therefore Sasa borealis extracts may be a good candidate for management of obesity.

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Key words: Sasa borealis, Ethylacetate-fraction, Adipocyte differentiaion, 3T3-L1, transcription factors

PO2761

ACUTE EFFECTS OF CHLOROGENIC ACID ON NITRIC OXIDE STATUS, ENDOTHELIAL FUNCTION AND BLOOD PRESSURE IN HEALTHY VOLUNTEERS: A RANDOMISED TRIAL

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Background and objectives: There is mounting evidence that specific dietary polyphenols can enhance vascular health by augmenting nitric oxide. Our aim was to investigate the acute effects of chlorogenic acid, an important dietary phenolic acid present in coffee, on nitric oxide status, endothelial function and blood pressure.

Methods: Healthy men and women (n=23) were recruited to a randomised, double-blind, placebo-controlled, cross-over trial. The acute effects of chlorogenic acid (400 mg, equivalent to 2 cups of coffee) were compared to a control. Measurements included biomarkers of plasma nitric oxide status, assessed by measuring S-nitrosothiols + other nitroso species (RXNO) and nitrite; endothelial function, assessed by measuring flow mediated dilatation (FMD) and blood pressure.

Results: Chlorogenic acid resulted in significantly higher plasma concentrations of chlorogenic acid ($P<0.001$). Relative to control, mean post-treatment systolic blood pressure (-2.41 mm Hg, 95% CI: -0.03, -4.78; $P=0.05$) and diastolic blood pressure (-1.53 mm Hg, 95% CI: -0.05, -3.01; $P=0.04$) were significantly lower with chlorogenic acid. Markers of nitric oxide status ($P>0.10$) and the measure of endothelial function ($P=0.60$) were not significantly influenced.

Conclusions: Chlorogenic acid can lower blood pressure acutely; an effect which if sustained would benefit cardiovascular health.

Key words: Chlorogenic acid, coffee, vascular health, nitric oxide, blood pressure

PO2762

PROTECTIVE EFFECTS OF KOREAN RED GINSENG AGAINST ALCOHOL-INDUCED FATTY LIVER IN RATS

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Background and objectives: Alcohol consumption induces excess adipose lipolysis, thereby increasing fatty acid influx to the liver developing alcoholic fatty liver. This study was carried out to evaluate the protective effects of Korean red ginseng (KRG) against alcohol-induced fatty liver in rats.

Methods: Fifty-nine male Sprague Dawley (SD) rats were randomly divided into six groups and pair-fed Lieber-DeCarli liquid diet with or without 5% (w/v) ethanol for 6 weeks: normal control (CON), ethanol alone (ET), ET + silymarin 100mg/kg (positive control, ETS), or ET + KRG 125, 250 or 500 mg/kg (RGL, RGM or RGH, respectively). Silymarin and KRG were administered by gavage.

Results: Six-week ethanol administration demonstrated a significant increase of free fatty acids (FFA) and a decrease of adiponectin in the blood as compared with CON. We observed that KRG administration slightly retarded decrease in adiponectin and increase in FFA. Changes of gene expression levels in the liver: SREBP-1 expression increased in ET was significantly decreased by KRG administration, whereas CPT and PPAR-γ expressions were increased. FAS expression was also decreased in all doses of KRG compared with ET. Furthermore, all doses of KRG caused increases in levels of AMPK phosphorylation in the liver, while ACC phosphorylation was significantly decreased compared with those of ET. Histological examinations by Oil red O revealed decrease of the large lipid droplets in KRG treated groups.

Conclusion: These results suggest that KRG has a protective effect against alcohol-induced fatty liver, possibly through the regulation of the AMPK-mediated lipid metabolism. Further studies related to the effects of KRG on the balance of lipid metabolism in the liver and adipose tissue are under investigation.

Key words: Korean red ginseng, ethanol, lipid metabolism.
Acknowledgements: We thank the Korea Ginseng Corporation (Daejun, Korea) for funding that supported this research.

PO2763

QUANTITATION OF GLUCOSINOLATES IN BRASSICACEAE VEGETABLES SOLD IN LATE AUTUMN AND WINTER IN JAPAN

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Background and objectives: Brassicaceae vegetables contain glucosinolates, and have been known to contribute to health promotion of human beings. Epidemiological studies suggested that dietary Brassicaceae vegetables lower the risk for a number of cancers. The objective of this study was to identify the composition and content of glucosinolates, and to identify the distribution of α-methylsulfinyl, phenetyl, and indolyl-3-methyl glucosinolates, which were the precursors of isothiocyanates which induce phase I enzymes and/or inhibit phase I enzymes, in the 15 species of Brassicaceae vegetables (cabbage, Chinese cabbage, turnip and leafs, komatsuna, qinggeng-cai, potherb mustard, broccoli, cauliflower, field mustard, ta-sai, broccoli sprout, Japanese radish, rocket salad, and watercress) sold in late autumn and winter in Japan.

Methods: We determined quantity according to the ISO9167-1. Glucosinolate profiles were investigated by LC/MS.

Results: 25 species of glucosinolates were identified (aliphatic series; 18, aromatic series; 3, indolyl series; 4). 4-methylsulfinylbutyl glucosinolate was included in broccoli sprouts (111.15±15.46 μmol/g DW), broccoli (10.45±5.05), cabbage (5.05±5.82), and rocket salad (4.15±1.83). 5-methylsulfinylpentyl glucosinolate was included in turnip leaves (2.96±1.39) and field mustard (2.10±1.73). In watercress, 6-methylsulfinylhexyl (2.96±0.98), 7-methylsulfinylheptyl (25.08±5.20), and 8-methylsulfinyloctyl glucosinolate (4.24±3.07) were included at a higher content than in any other vegetables. Phenethyl glucosinolate was included in many kinds of Blassicaceae vegetables. These were watercress (30.03±8.88), turnip (5.64±1.86) and leaves (2.42±0.17), field mustard (1.73±0.51), broccoli sprouts (1.47±0.05), and komatsuna (1.30±1.12). Indolyl-3-methyl glucosinolate was included in many vegetables excluding Japanese radish and rocket salad.

Conclusion: The results from this study suggested that we could expect to intake more glucosinolates that exert influence of anticarcinoma activity when we ate some Blassicaceae vegetables.

Key words: Brassicaceae vegetables, glucosinolates, LC/MS

PO2764

EFFECT OF THIOSULFINATES DERIVED FROM TEARLESS ONION MODEL ON LIPID METABOLISM IN MICE

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Background and objectives: When onion tissue is disrupted, E-S-1-propenyl-L-cysteine sulfoxide (PRENCSO) is transformed predominantly into propanethial S-oxide, a lachrymatory factor, via 1-propenesulfenic acid by the actions of alliinase and lachrymatory factor synthase (LFS). Recent reports showed that suppression of the LFS activity caused a dramatic increase in thiosulfinates named cepathiolanes. Cepathiolanes have been shown to have inhibitory activities in vitro against cyclooxygenase-1 and ƒ¿-glucosidase, and are expected to be helpful in the fight against metabolic syndrome. However, effects of cepathiolanes on lipid metabolism have not been reported yet. In this study, we examined the effects of cepathiolanes on the lipid metabolism in mice.

Methods: C57BL/6N mice were randomly divided into two groups, high fat diet (HF) group and HF + cepathiolanes (HFC) group. The mice were allowed ad libitum access to water and diets, and were administered cepathiplanes or mock by oral gavage every morning. Food and water intake and body weight were measured weekly. After six weeks of feeding, triglyceride and cholesterol in the serum and the liver were analyzed. In addition, expression levels of key genes involved in the lipid metabolism in liver were examined by quantitative real-time PCR.

Results: Food and water intake were not difference among groups. In the HFC group, body weight gain tended to be suppressed. Besides, the liver triglyceride and cholesterol were significantly reduced ($P<0.05$). The gene expression levels of liver X receptor alpha (LXRƒ¿), sterol regulatory element-binding protein 1c (SREBP-1c), fatty acid synthetase (FAS), glycerol-3-phosphate acyltransferase (GPAT) and diglyceride acyltransferase 2 (DGAT2) were significantly decreased ($P<0.05$ or 0.01).

Conclusions: Cepathiolanes would be beneficial for preventing fatty liver by down-regulating a set of lipid synthesis leading to accumulation of triglycerides. Protein expression analysis and metabolome analysis using western blot and CE-TOF-MS are currently underway.

Key words: Lipid metabolism, sulfur compound, onion, CE-TOF-MS

PO2765

INTRAGASTRIC ADMINISTRATION OF ALLYL ISOTHIOCYANATE INCREASES CARBOHYDRATE OXIDATION VIA TRPV1 BUT NOT TRPA1 IN MICE

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Background and objectives: The transient receptor potential (TRP) channel family is composed of a wide variety of cation-permeable channels activated polymodally by various stimuli and is implicated in a variety of cellular functions. TRPV1 and TRPA1 are cation channels belonging to the TRP channel family that are activated by high and low nociceptive temperatures, respectively. These channels are also activated by spicy or pungent compounds in foods. Recent investigations have revealed that activation of TRP channels is involved not only in nociception and thermosensation but also in thermoregulation and energy metabolism. Therefore, we investigated the effect of intragastric administration of TRP channel agonists on changes in energy substrate utilization of mice.

Methods: We used allyl isothiocyanate (a pungent compound in mustard or wasabi, a typical TRPA1 agonist) as a TRP channel agonist. In respiratory gas analysis, the mice (C57BL/6) were kept individually in a chamber for 3 h to attain a constant respiratory exchange ratio. Allyl isothiocyanate was intragastrically administered and the expired air was analyzed. The oxidation of total fatty acids and carbohydrates was computed on the basis of oxygen consumption and carbon dioxide production. To examine whether TRP channels mediate this increase in carbohydrate oxidation, we also used TRPA1 and TRPV1 knockout (KO) mice.

Results: Intragastric administration of allyl isothiocyanate markedly increased carbohydrate oxidation but did not affect oxygen consumption. Intragastric administration of allyl isothiocyanate increased carbohydrate oxidation in TRPA1 KO mice but not in TRPV1 KO mice.

Conclusions: Intragastric administration of AITC increased carbohydrate oxidation in mice and the effects were mediated by TRPV1 but not TRPA1.

Key words: TRPV1, TRPA1, allyl isothiocyanate, energy metabolism, carbohydrate oxidation

PO2766

PREVENTION MECHANISMS OF GLUCOSE INTOLERANCE AND OBESITY BY CACAO LIQUOR PROCYANIDIN EXTRACT

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Background and objectives: Cacao beans (Theobroma cacao) are a major ingredient of cocoa and chocolate and contain polyphenols abundantly. It has been reported that cacao has beneficial effects on health, such as reduced risk of cardiovascular diseases, improvement of lipoprotein profiles, and prevention of diabetes and obesity. However, the molecular mechanisms by which cacao liquor extract prevent hyperglycemia and obesity are not yet fully understood. In this study, we investigated whether cacao liquor procyanidin (CLPr) extract ameliorated hyperglycemia and obesity.

Methods: CLPr used in this study consisted of 4.3% catechin, 6.1% epicatechin, 39.4% procyanidins and others. CLPr was orally given to ICR or C57BL/6 mice, and anti-hyperglycemic effects were investigated.

Results: Single oral administration of CLPr inhibited acute hyperglycemia after the administration of glucose, maltose, or soluble starch in ICR mice. This anti-hyperglycemic effect of CLPr was depending on the promotion of translocation of glucose transporter 4 (GLUT4) in the skeletal muscle, but not on the inhibition of α-glucosidase activity in the small intestine. We, further, investigated the preventive effect of CLPr on obesity and hyperglycemia in C57BL/6 mice fed a high-fat diet for 13 weeks. CLPr suppressed high-fat diet-induced hyperglycemia, glucose intolerance and fat accumulation in white adipose tissue. CLPr also promoted GLUT4 translocation and phosphorylation of AMP-activated protein kinase (AMPK) in skeletal muscle and brown adipose tissue. AMPK phosphorylation was also observed in the liver and white adipose tissue. CLPr up-regulated the gene and protein expression levels of uncoupling protein (UCP)-1 in brown adipose tissue and UCP-3 in skeletal muscle.

Conclusions: CLPr is a beneficial food material for the prevention of hyperglycemia and obesity through AMPK phosphorylation, GLUT4 translocation and up-regulation of UCP expression in skeletal muscle and adipose tissue as the underlying molecular mechanisms.

Key words: AMPK, Cacao liquor procyanidin, GLUT4, UCP

PO2767

4-HYDROXYDERRICIN AND XANTHOANGELOL FROM ASHITABA (ANGELICA KEISKEI) SUPPRESS DIFFERENTIATION OF PREADIPOCYTES TO ADIPOCYTES VIA AMPK AND MAPK PATHWAYS

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Background and objectives: Adipocytes differentiation is deeply involved in the onset of obesity. 4-Hydroxyderricin (4HD) and xanthoangelol (XAG) are chalcones that derived from Ashitaba (Angelica keiskei). In this study, we investigated the effects of these chalcones on adipocytes differentiation.

Methods: 3T3-L1 preadipocytes were treated with 4HD and XAG for the first 3 days, lipid accumulation in the cells was estimated by Oil red straining, and cell viability was determined by both WST-1 assay and crystal violet staining assay. Furthermore, we investigated the effects of these chalcones on the expression of adipocyte-specific transcription factors and phosphorylation levels of AMP-activated protein kinase (AMPK) and mitogen-activated protein kinase (MAPK) using RT-PCR and Western blotting analysis.

Results: We found that these two chalcones suppressed intracellular lipid accumulation at 5 μM without cytotoxicity. They inhibited adipocytes differentiation accompanying by the down-expression of adipocyte-specific transcription factors, C/EBPα, C/EBPα and PPARα. To obtain insights into the underlying mechanism, the activation of AMPK and MAPK pathways were investigated. 4HD and XAG promoted phosphorylation of AMPK and acetyl CoA carboxylase during differentiation of 3T3-L1 adipocytes accompanied by a decrease in glycerol-3-phosphate acyl transferase-1 and an increase in carnitine palmitoyltransferase-1 mRNA expression. Moreover, these chalcones also promoted phosphorylation of ERK1/2 and JNK, but did not alter phosphorylation of p38. We, further, found that the inhibitors for AMPK and ERK1/2 abolished the chalcones-caused down-expression of C/EBPα, C/EBPα and PPARα. Treatment with JNK inhibitor abolished the down-expression of C/EBPα and PPARα, but not C/EBPα.

Conclusions: we found that the inhibitory effect of 4HD and XAG on adipocytes differentiation was involved in the activation of AMPK and MAPK pathways, resulting in the down-expression of adipocyte-specific transcription factors. These results indicated that 4HD and XAG could act as the anti-adipogenic compounds to prevent obesity.

Key words: chalcone; C/EBPs; PPARα; AMPK; MAPK

PO2768

INFLUENCE OF ADMINISTRATION OF WHEY PROTEIN CONCENTRATE IN DIABETIC RATS

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Background and objectives: Lipopolysaccharide (LPS) derives mostly from gram negative bacteria and can increase insulin resistance by bacterial translocation. It increases the blood sugar level. It is reported that the diabetic humans has higher LPS concentration level as compared with the healthy humans, because of aggravation of intestinal bacterial flora.The whey protein concentrate (WPC), a byproduct of cheese and casein during the dairying process, is known to contain LPS antibodies.

Methods: In order to determine the effect of WPC which decreased LPS levels, we tried to use type 2 diabetic model rats (Zucker Diabetic Fatty rat, ZDF). After checking diabetic symptoms of ZDF rats, we added 5% WPC in feed. We collected their blood from jugular vein and feces every week.

Results: The LPS concentration in blood and feces decreased after four weeks at the start of WPC administration as compared with before WPC administration. Furthermore, when the bacteria in feces were counted by FISH, E.coli which is gram negative bacteria decreased, and Bifidobacterium and Lactobacillus increased. Bifidobacterium and Lactobacillus are gram positive bacteria and can improve mucosal barrier function.

Conclusions: Although change of the blood sugar level by WPC administration was not obtained, the improvement of the intestinal bacterial flora was checked. It was concluded that WPC was able to have a possibility of affecting improvement of insulin resistance.To date, further experiment of WPC is conducted using the diabetic model mouse.

Key words:lipopolysaccharide, whey protein concentrate, type 2 diabetes, translocation

PO2769

THE ANTI-ATHEROGENIC ACTIVITIES OF PERILLA FRUTESCENS

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Background and objectives: Perilla (Perilla frutescens (L.) Britt.) is a widely cultivated leafy vegetable that is commonly consumed as well as used in traditional medicine in Japan, China and other Asian countries. Atherosclerosis is a complex inflammatory arterial disease. Oxidized low-density lipoprotein (oxLDL) has been shown to induce multiple functional alterations and has been implicated in the pathogenesis of atherosclerosis. The aim of this study was to investigate the inhibitory effect of perilla on LDL oxidation and endothelial dysfunction induced by oxLDL.

Methods: We compared the antioxidant activity of red perilla and green perilla.

Results: Perilla had abundant polyphenol compounds. Perilla dramatically inhibited LDL oxidation by azoradials and human umbilical vein cells (HUVECs)-mediated LDL oxidation. We next examined the antioxidant effects against LDL in human subjects after the consumption of perilla extracts. After the oral intake of red perilla, the LDL oxidation lag time was significantly increased. Also, lipid peroxide formation and the electrophoretic mobility of LDL markedly decreased. Moreover, we examined whether perilla prevented oxLDL-induced vascular endothelial dysfunction. HUVECs were pretreated with perilla extracts and then stimulated with oxLDL. While oxLDL stimulation remarkably increased LOX-1 expression, red perilla treatment significantly suppressed LOX-1 expression. Perilla counteracted oxLDL-induced intracellular ROS generation as well as the downregulation of antioxidant enzymes (SOD and catalase) expression. Perilla also decreased inflammatory cytokines expression and increased eNOS expression. Next, we carried out a static monocyte adhesion assay and measured the expression of adhesion molecules (ICAM-1 and VCAM-1). Red perilla significantly blocked oxLDL-induced THP-1 cells adhesion to HUVECs and suppressed the expression of adhesion molecules.

Conclusions: These results showed that perilla inhibited LDL oxidation in vitro and in vivo and oxLDL-induced inflammatory responses in HUVECs. This suggests that perilla may contribute to prevent atherosclerosis through inhibiting LDL oxidation and oxLDL-induced endothelial dysfunction.

Key words: polyphenol, atherosclerosis, oxLDL

PO2770

THE EFFECTS OF GREEN TEA CATECHIN ON LDL OXIDATION AND ENDOTHELIAL FUNCTION IN HEALTHY SUBJECTS

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Background and objectives: Epidemiological studies suggest that green tea consumption is associated with a reduced risk of cardiovascular disease. We have demonstrated the inhibitory effects of tea catechin on low-density lipoprotein (LDL) oxidation in vitro. The objective of this study was to determine whether tea catechin could improve LDL oxidizability and endothelial function in healthy human subjects.

Methods: Either high (1000 mg) or middle (500 mg) dose catechin (EGCG 48.3 %, ECG 20.4 %, GCG 4.2 %, CG 1.1 %) were examined in a randomized, placebo-controlled, double-blind crossover trial among ten healthy men (aged 35.6 ± 6.5 years, BMI 22.8 ± 2.8). Blood samples were taken from each subject immediately before and 0.5,1,2 and 4 h after intake.

Results: A marked increase of the concentration of plasma catechin and metabolites (EGCG, ECG, EGCG3_hMe) was found. EGCG and ECG concentrations were highest at 1 h while EGCG3_hMe concentration peaked at 2 h after tea catechin intake. The total antioxidant capacity of plasma was significantly increased at 1 h after high dose tea catechin intake. High dose catechin significantly prolonged the LDL oxidation lag time, as assessed by lag time assay, relative to placebo. The endothelial function was assessed by brachial artery flow-mediated dilatation (FMD).

Conclusions: These finding suggest that tea catechin could be rapidly absorbed and improve LDL oxidizability in healthy subjects.

Key words: polyphenol,LDL oxidation, endothelial function, FMD

PO2771

EFFECT OF NANNOCHLOROPSIS OCULATA LIPID EXTRACT SUPPLEMENTATION ON LIPID METABOLISM IN EXPERIMENTAL MICE

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Background and objectives: Nannochloropsis oculata is a marine microalgae that is usually used in aquaculture as live food for larval of shrimp and mollusks. The influence of supplementing the diet with N. oculata lipid extract on lipids and selected gene expression in mice were studied.

Methods: Lipid of N. oculata was extracted by using dichloromethane:methanol (2:1, v/v). Mice were divided into 3 groups and fed one of the following diets: a control diet; 10% N. oculata lipid extract and 10% N. oculata lipid extract + 1% cholesterol over a 8 week period. Plasma lipids, liver lipids and regulation of selected genes (HMG-CoA reductase, LDL receptor, fatty acid synthase, SREBF1, SREBF2, PPARα, PPARγ and PPARδ) were determined.

Results: In the group of mice that was fed with N. oculata extract alone, plasma triglycerides increased (6.89%) while plasma total cholesterol, HDL-cholesterol, LDL-cholesterol and LDL/HDL ratio decreased by 16.5, 28.93, 71.84 and 78.1%, respectively. The addition of cholesterol to the diet supplemented with N. oculata extract however reduces all the plasma lipids after 8 weeks. No significant changes were observed in liver lipids of all groups. The mRNA levels of all genes were upregulated when treated with N. oculata extract except for SREBF2.

Conclusions: The major effect of N. oculata lipid extract is in lowering LDL levels as observed from the plasma lipids as well as the regulation of genes related to LDL metabolism.

Key words: Nannochloropsis oculata, lipid extract, lipid metabolism, mice

PO2772

EFFECTS OF LYCHEE FRUITS POLYPHENOL ON ENDOTHELIAL FUNCTION AFTER GLUCOSE TOLERANCE IN HEALTHY SUBJECTS

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Background and objectives: Endothelial dysfunction is now well known to be an initial step for atherosclerosis. We have previously demonstrated that oligomerized lychee fruits polyphenol (OLFP) inhibits LDL oxidation and improves endothelial function in vitro. The objective was to determine whether acute glucose loading attenuates endothelial function and whether OLFP could prevent these postprandial changes in healthy subjects.

Methods: We evaluated the acute effects of oral glucose tolerance (75 g) alone and with OLFP (1 g) in a crossover study of 10 male volunteers (Age: 39.6 ± 2.3 years, BMI: 23.1 ± 0.8 kg/m2). Blood samples were taken immediately before and at 0.5, 1, 2 and 4 h after tolerance. We assessed endothelium-dependent vasodilation by brachial artery flow-mediated dilatation (FMD).

Results: Plasma glucose and insulin levels were rapidly elevated and peaked at 0.5 h after tolerance. Total leukocytes and neutrophils counts and serum sVCAM-1 levels were significantly increased at 0.5 h in both trials. FMD was impaired at 1 h after glucose loading, while co-administration of OLFP improved the FMD attenuation.

Conclusions: Our results demonstrate that postprandial hyperglycemia acutely impaired endothelial function in healthy subjects, which can be prevented by OLFP.

Key words: polyphenol, postprandial hyperglycemia, endothelial dysfunction, FMD

PO2773

EFFECTS OF ORAL INTAKE OF LACTOBACILLUS CORYNIFORMIS CECT5711 ON IMMUNE PARAMETERS IN ADULTS SUFFERING OLIVE POLLEN ALLERGY. A PILOT STUDY

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Background and objectives: Prevalence of allergic disease has increased dramatically in Western countries. Intestinal dysbiosis has been shown to precede the onset of clinical allergy, possibly through altered immune regulation. A number of clinical studies have investigated the potential of probiotic bacteria to ameliorate the pathological features of allergic disease. The aim of this study was to investigate the immunomodulatory properties of L.coryniformis CECT5711 in adults suffering from olive pollen allergy.

Methods: A double-blind, randomized, placebo-controlled study was performed. A group of 20 volunteers with confirmed olive pollen allergy were included in the study and distributed into two groups: control group (CG) who received an oral daily dose of methylcellulose for 8 weeks or probiotic group (PG) who received L.coryniformis at a dosage of $3x10^9$ CFU/day for 8 weeks. The study was performed from March to June 2012. Blood samples were collected at 0, 4 and 8 weeks for determination of olive pollen-specific IgE, total IgE and total IgA levels. At the same time, cytokine secreted by Treg cells (IL-10, and TGF-β) were also measured.

Results: A significant increase in olive pollen-specific IgE ($p=0.013$) and total IgE ($p= 0.025$) in plasma was observed in CG at the end of the study. In contrast, no changes in IgE levels were detected in PG. Changes in other immune parameters were not detected with the exception of an increase in TGF-â levels in active group. That was not observed in CG.

Conclusions: Oral administration of the strain L.coryniformis CECT5711 attenuated allergen-specific IgE response in adults with olive pollen allergy. It observes an increase of up to four times in the level of TGF-beta in relation to basal level in patients receiving probiotics. It is possible that a change, dependent Treg cells happens in patients receiving L.coryniformis CECT5711.

Key words: Lactobacillus, pollen allergy, immune response.

PO2774

LACTOBACILLUS PARACASEI CNCM I-4034, A NOVEL STRAIN ISOLATED FROM BREAST-FED NEWBORNS, MODULATES PATHOGEN-INDUCED INFLAMMATION IN A NOVEL TRANSWELL CO-CULTURE MODEL

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Background and objectives: The network of dendritic cells (DCs) and intestinal epithelial cells (IECs) plays a crucial role in the regulation of gut homeostasis. Our aim is to determine whether a novel strain, Lactobacillus paracasei CNCM I-4034, could activate human intestinal DCs through a physical barrier of IECs, and how they response against Salmonella.

Methods: A novel in vitro transwell co-culture model was used. Caco-2 cells were cultured on the upper side of membrane. Bacteria were added from the apical side and co-cultured with DCs for 4h. After 20 h, culture supernatants were collected. Different cytokines and chemokines were measured with a MILLIplex kit using the Luminex 200 system. Differences between treatments were assesed by U Mann Whitney test.

Results: DCs challenged with L.paracasei increase the release of IL-1β (14,1%), IL-6 (83%), IL-8 (7,8%) and RANTES (4%) compared to controls (0%). In the presence of Salmonella, IECs and DCs release low levels of all pro-inflammatory cytokines, such as IL-1β (0,8%), IL-8 (1%) and TNF-α (1%). Salmonella was not able to induce DCs chemokines, as RANTES. DCs and IECs stimulated with the probiotic and Salmonella up-regulate pro-inflammatory cytokines production. This pattern is characterized by a high level of IL-6 (90%) and varying levels of IL-1β (2,4%), IL-8 (5,9%) and TNF-α (5,4%) secretion. IFN-γ and IL-12p70 could not be detected. Chemokines production is also increased, such as MCP-1 and MIP-1.

Conclusions: IECs and DCs were poorly responsive to Salmonella. Hence, IECs act as a barrier against pathogens, avoiding DCs activation and therefore DCs cytokine production. Just caco-2 cells were sensing pathogenic bacteria and releasing cytokines. The greatest amount of IL-6 suggests that this IL may have a key role in immune gut response. As IFN-γ and IL-12 could not be detected, this probiotic may promote regulatory responses.

Key words: Toll-like receptors, probiotics, cytokines

PO2775

NEW LIPOSOMAL FORMULATIONS OF EVOO PHENOLIC EXTRACT:BIOAVALABILITY AND POTENTIAL CYTOTOXIC EFFECTS ON HUMAN BREAST CANCER CELLS

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Background and objectives: Evidence from several studies has revealed that the protective effects of Extra-Virgin Olive Oil (EVOO) against chronic diseases such as atherosclerosis, cancer, obesity, diabetes, and coronary diseases are related to the phenolic compounds. These compounds exert strong antiproliferative effects in human cancer cell models. However, significant plasma concentrations of these compounds are hardly achieved due to poor absorption, rapid clearance and inactivation by metabolic enzymes. The development of suitable drug delivery systems such asliposomes, may be an appropriate strategy for the effective administration of these compounds. Indeed, liposome increase the half life of many drugs and reduce their clearance., The goal of this work was to develop liposomal formulations containing EVOO phenolic extract in order to improve their bioavalability and their cytotoxic effects on human breast cancer cellular models (JIMT1 and MCF7).

Methods: The degree of incorporation of EVOO polyphenols in liposomes was evaluated by high-performance liquid chromatography coupled to electrospray ionization time-of-flight mass spectrometry (HPLC-ESI-TOF-MS). Tetrazolium salt (MTT)-based cell viability assays was employed to assess the cytotoxic effects of EVOO polyphenols and liposomal formulations.

Results: EVOO polyphenols were efficiently encapsulated into phospholipid vesicles. In particular, acetoxypinoresinol and pinoresinol (lignans); luteolin and apigenin (flavones) and methyl oleuropeinaglycone, oleuropeinaglycone isomers I and II and 10-hidroxy oleuropeinaglycone (carboxymethylsecoiridoids) showed strong affinity for egg yolk phosphatidylcholine (EYPC) vesicles. Liposomal formulations showed a significant decrease of IC50 values in all treatments and consequently, an improvement of therapeutic index.

Conclusions: EVOO polyphenols were efficiently incorporated into EYPC liposomes. Remarkably, breast cancer cell sensitivity was higher against liposomal formulations containing EVOO phenolic extract compared to crude EVOO phe-

nolic extract. Flavones, some oleuropein derivatives and, in a lesser degree, lignans were the candidate compounds for such activity.

Key words: EVOO polyphenols, liposomes, breast cancer, HPLC-ESI-TOF/MS.

PO2776

METABOLIC PROFILING OF THREE VARIETIES OF LETTUCE BY REVERSED-PHASE ULTRA-PERFORMANCE LIQUID CHROMATOGRAPHY COUPLED TO ELECTROSPRAY IONIZATION-QUADRUPOLE-TIME-OF-FLIGHT MASS SPECTROMETRY

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Background and objectives: Lettuce (Lactuca sativa) is widely consumed in all over the world, fresh cut or minimally processed, and so being an important dietary source of natural bioactive compounds. However, a great number of these metabolites still remain unknown. In this study, reversed-phase ultra-performance liquid chromatography coupled to electrospray ionization-quadrupole–time-of-flight mass spectrometry (RP-UPLC-ESI-QTOF-MS) was applied for the comprehensive profiling of polar and semi-polar metabolites from lettuce varieties cv. baby, romaine, and iceberg.

Methods: Lettuce leaves were lyophilized and extracted by a methanol/water solution (80:20, v/v) previous to their analysis. The MS and MS/MS data obtained were processed through DataAnalysis 4.0 (Bruker Daltonics). Metabolites were characterized by matching their accurate masses and suggested molecular formula with those previously reported in Asteraceae family and their structures were corroborated by the MS/MS data.

Results: The analytical method showed a great resolution to separate isomers and a sensitive detection that allows characterizing 171 compounds, belonging to various structural classes: amino acids (essential and non-essential) and peptides (42), organic acids (11), nucleosides (3), tryptophan derived-alkaloids (2), phenolic compounds (92), sesquiterpene lactones (17), one iridioid and 10 novel structures formed by conjugation of known amino acids and sesquiterpene lactones. To our knowledge, the major part of these compounds has not been reported in lettuce.

Conclusions: Genotype, at least in part, affected the metabolic composition of lettuce. The studied varieties were qualitatively rich in phenolic compounds, especially baby variety, and remarking that lettuce is a good source of natural antioxidants. In addition, known bioactive alkaloids and sesquiterpene lactones were also characterized. The applied methodology is a good option to develop an exhaustive metabolic profiling of plants that helps to understand their potential biological activities and folk uses.

Key words: Lettuce (Lactuca sativa); bioactive phytochemicals; metabolic profiling; phenolic compounds; RP-UPLC-ESI-QTOF-MS

PO2777

IDENTIFICATION OF POLYPHENOLS AND THEIR METABOLITES IN HUMAN URINARY EXCRETION AFTER CONSUMPTION OF CRANBERRY SYRUP

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Background and objectives: The beneficial effects of American cranberry (Vaccinium macrocarpon) might at least in part be attributed to the phenolic composition, thus, the evaluation of the physiological behavior of this fraction is crucial. A rapid and sensitive method by reversed-phase ultra-performance liquid chromatography coupled to quadrupole-time-of-flight mass spectrometry (RP-UPLC-QTOF-MS) has been employed to identify phenolic metabolites in human urine after a single dose of cranberry syrup.

Methods: Samples from four subjects were collected before (0 h) and at 2, 4 and 6 h after the consumption of cranberry syrup. Urinary metabolites were extracted by solid-phase extraction (SPE) with LC-18, Isolute ENV+, and Evolute ABN, and analyzed by RP-UPLC-ESI-QTOF-MS in negative and positive ion modes. Their characterization was based on retention time, accurate mass data, isotope function and fragmentation pattern using DataAnalysis 4.0 (Bruker Daltonik). Once then, these metabolites were simultaneous screened by TargetAnalysis (Bruker Daltonik).

Results: Isolute ENV+ SPE was selected for the better extraction of urinary metabolites. Afterwards, they were successfully profiled using RP-UPLC-QTOF-MS. So, it was characterized free phenolic acid derivatives (coumaroyl-hexose, dihydroxybenzoic acid, caffeoyl-glucose and dihydroferulic acid 4-O-beta-D-glucuronide), flavonols (methoxyquercetin

3-O-galactoside, myricetin and quercetin) and a coumarin (scopoletin), together with 23 phase I and phase II metabolites, and including various isomers, hippuric and salyciluric acid. Among them, methylated and glucuronide conjugates of quercetin and myricetin were found largely. In general, urinary metabolites reached maximum amounts 4 h after the administration of cranberry syrup.

Conclusions: At least one fraction of the ingested cranberry polyphenols were absorbed intact and could acted in vivo in this form prior to excretion, whereas another fraction was absorbed, metabolized, and excreted in urine. Further studies of the biological properties of these metabolites would be helpful to understand the action mechanism of cranberry syrup.

Key words: Cranberry; polyphenols; urinary metabolites; RP-UPLC-QTOF-MS

PO2778

HEPATOPROTECTIVE EFFECTS OF EXTRACTS FROM PEPPERMINT, LEMON BALM AND ROSEMARY IN LAMIACEAE PLANTS

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Background and Objectives: Spices and herbs often exert various physiological functions such as anti-aging and anticancer activities. In our previous study, we examined the antioxidant capacity of 80 kinds of spices including Lamiaceae, Apiaceae, and Myrtaceae plants by the ORAC method, and found that some of the Lamiaceae plants have high antioxidant capacity. The present study aimed to examine that hepatoprotective effect of extracts from peppermint (PE), lemon balm (LB) and rosemary (RM) in Lamiaceae on liver injury induced by foreign compounds such as carbon tetrachloride (CCl4).

Methods: Male Sprague-Dawley rats were orally administered with each sample dissolved in water for five consecutive days. One hour after the final administration of sample solution, CCl4 in olive oil was intraperitoneally injected, and acute liver damage was induced. Then, 24 hours after CCl4 injection, the animals were sacrificed, and determined the specific activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and lactate dehydrogenase (LDH) as markers for hepatic injury and the level of thiobarbituric-acid reactive substances (TBARS), the specific activities of detoxification enzymes such as cytochrome P450 2E1 (CYP2E1) and glutathione S-transferase (GST), and those of antioxidant enzymes such as superoxide dismutase (SOD).

Results: Pretreatment with extracts from PE, LB and RM significantly suppressed the elevation in serum AST, ALT and LDH activities, and hepatic TBARS level, and the reduction in hepatic GST and SOD activities although it did not restore the CYP2E1 activity.

Conclusions: These results indicate that PE, LB and RM possess suppressive effect on hepatic injury induced by CCl4Their hepatoprotective effect would be attributed to the antioxidant activities. Antioxidants in them would have eliminated active oxygen and free radicals formed by CCl4, which led to the reduction in lipid peroxidation and oxidative stress.

Key words: Lamiaceae plants, Hepatoprotective effect, antioxidant

PO2779

IN VIVO EVALUATION OF THE REDUCED ALLERGENICITY OF DEAMIDATED WHEAT GLIADIN

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Background and objectives: Deamidation is the reaction that converts glutamine and asparagine into glutamic acid and aspartic acid. Deamidation of food protein is an effective way to improve their functionalities. Our previous study showed that wheat gliadin was effectively deamidated without peptide-bond hydrolysis just by being mixed with cation-exchange resins of the carboxylate type, and the solubility and digestibility of gliadin were enhanced by deamidation. In addition, the reactivity of wheat gliadin with sera of wheat-allergy patients was reduced by deamidation because some tandem sequence repeats having glutamine residues constitute the primary structure of IgE-binding epitopes in wheat gliadin. Therefore, the allergenicity of deamidated wheat gliadin might be furthered reduced during digestion when it is orally administered. The present study aimed to evaluate the in vivo allergenicity of deamidated gliadin by using a mouse model of wheat gliadin allergy.

Methods: Mice were sensitized by intraperitoneal injection of untreated gliadin with the presence of aluminum hydroxide as an adjuvant. After the sensitization, untreated or deamidated wheat gliadin were intragastrically administered to mice at 7 times every other day. After the final oral challenge, the peritoneal cells, blood and small intestine were collected. The levels of histamine and gliadin-specific IgE in serum were measured by ELISA. Immunocyte from peritoneal cells were categorized by flow cytometer, and intestinal permeability was determined by a closed loop experiment.

Results: The levels of histamine and gliadin-specific IgE in plasma were lower in deamidated-gliadin group than in untreated-gliadin group. Oral challenge of deamidated gliadin down-regulated the expression of FceRI on peritoneal mast cells. Untreated gliadin enhanced the intestinal permeability, while deamidated gliadin did not change it.

Conclusions: These results indicate that oral administration of deamidated gliadin did not present the allergic reactions in a mice model of wheat allergy.

Key words: deamidation; wheat gliadin; reduced allergenicity

PO2780

THE SYNERGIC EFFECT OF DAIDZEIN AND KIWIFRUIT ON BONE LOSS AND EQUOL PRODUCTION IN OVARIECTOMISED RATS.

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Background and objectives: Equol, a metabolite of one of the major soybean isoflavones called daidzein, is produced in the gastrointestinal tract by certain intestinal microflora. Habitual dietary patterns may influence the metabolism of isoflavones and the production of equol, with its production shown to be promoted by dietary fibre. Kiwifruit is a rich source of dietary fibre and there is evidence linking kiwifruit consumption to improved gut health. In this study, we investigated the synergic effects of daidzein, known to affect bone health, and kiwifruit on bone loss and equol production in female rats.

Methods: Female Sprague-Dawley rats, aged 5 months, were randomly assigned to one of five groups and either sham operated (Sham) or ovariectomised (OVX) (n = 15 per group): OVX-control, OVX fed 0.1 % daidzein-supplemented diet (OVX + Dz), OVX fed 0.1 % daidzein- and green kiwifruit-supplemented diet (OVX + Dz + GRK), OVX fed 0.1 % daidzein- and gold kiwifruit-supplemented diet (OVX + Dz + GOK).

Results: Whole body Bone mineral density (BMD) week-8 in the Sham, the OVX + Dz + GRK and the OVX + Dz + GOK groups were not statistically lower compared to baseline. In contrast, whole body BMD was significantly decreased in the OVX and OVX + Dz groups at week-8 compared to baseline. Consequently, Dz and both of the green and gold kiwifruit treatments prevented the OVX-induced decline in BMD. Kiwifruit supplementation however, did not affect serum equol concentrations or the urinary ratios of equol to daidzein.

Conclusions: These results suggest that the combination of daidzein and kiwifruit may prevent bone loss caused by oestrogen deficiency, but it may be not mediated by equol production. Further studies are required to confirm the synergic effect of isoflavones and kiwifruit.Acknowledgements: MBIE NZ; JST; Zespri International Ltd.

Key words: Soy isoflavones, kiwifruit, bone

PO2781

EFFECTS OF ARTEMISIA CAPILLARIS ON THE DISORDERS OF HEPATIC FUNCTIONS AND LIPIDS-METABOLISM IN RATS TREATED WITH 2,3,7,8- TETRACHLORODIBENZO-P-DIOXIN

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Background and objectives: Dioxin that is a endocrine disrupter, causes various diseases to human and intimidates human health. This study was conducted to investigate theeffects of Artemisia Capillaris(AC) on the disorders of hepatic functions and lipid metabolism induced by 2,3,7,8- tetrachlorodibenzo-p-dioxin(TCDD), using male rats.

Methods: experimental animals(SD, five weeks old) were divided into four groups and were intaked pure experimental diets for three weeks. AC was added as 1.5% or 3% levels to basal diets, respectively. TCDD(40ug/kg B.W) was intraperitoneally injected into rats at the beginning of the experiment.

Results: AC decreasedrelative liver weights of rats were increased by TCDD. Their thymus were apparently shrunken by about 80% in all rats treated with TCDD. The levels of white blood cells were significantly increased by TCDD tended to decrease by AC diets. the elevation of glutamic oxalacetic transaminase activities by TCDD was diminuated by AC diets. Serum HDL-cholesterol levels were significantly elevated by AC diets. The apparent increaing of the triglyceride levels of rat livers induced by TCDD was significantly suppressed by AC diets. The hepatic cytosolic catalase activities were significantly decreased by TCDD, showed recovering trend by AC diets. In histochemical observation, the fat droplets and apoptosis of hepatocytes by TCDDwere markedly alleviated by AC diets.

Conclusions: These results indicated that AC could exert recovering effects on some disorders of hepatic functions, lipids metabolism and antioxidant activities by TCDD.

Key words: Artemisia Capillaris, TCDD, hepatic functions.

PO2782

ORANGE AND PEACH-APPLE FRUIT JUICES REDUCE CARDIOVASCULAR RISK IN MODERATELY HYPER- AND NORMO-CHOLESTEROLAEMIC IRON DEFICIENT WOMEN

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Background and objectives: Hypercholesterolaemia and iron deficiency are very common in Western populations and may affect the same individuals. Our aim was to investigate the influence of the consumption of an iron-fortified fruit juice, known to increase iron status (1), on different biomarkers of cardiovascular risk in a group of iron-deficient women.

Methods: A group of 122 iron-deficient women participated in a randomised double-blind placebo-controlled study of 16-weeks (ClinicalTrials.gov:NCT01135576). They consumed 500mL/day of a placebo fruit juice (P) or iron-fortified fruit juice (F). The beverages were orange and peach-apple juices, 100% from concentrate with no added sugars. Blood lipids and cardiovascular risk indexes were determined at baseline and every 4 weeks. Moderately hypercholesterolemia (MHC) was defined as total cholesterol (T-chol) >200mg/dL.

Results: No differences were found between P and F in lipids changes during intervention. Forty seven women presented MHC (38.5% of total). T-chol levels significantly decreased in MHC from week 4 to 16 ($p<0.001$) but did not change in normocholesterolaemic (NC) women. LDL-chol decreased in both groups during the study ($p<0.001$). HDL-chol significantly increased from baseline to the end of the study in NC ($p=0.05$) but not in MHC women. Serum triacylglycerols did not vary during the intervention. Cardiovascular risk indexes, T-chol/HDL-chol and LDL-chol/HDL-chol, markedly decreased in both groups ($p<0.001$).

Conclusions: Daily consumption of iron fortified orange and peach-apple juices by both moderately hyper- and normocholesterolaemic iron deficient women could have additional beneficial cardiovascular effects besides improvement of iron status, in the context of a health promoting diet.Supported by Project AGL2009 11437 and Grupo Leche Pascual. Blanco-Rojo R. and Toxqui L. were supported by JAE-predoc grants from European Social Fund. 1Blanco-Rojo R, Perez-Granados AM, Toxqui L, Gonzalez-Vizcayno C, Delgado MA, Vaquero MP. Br J Nutr. 2011;105(11):1652-9.

Key words: Iron deficiency anaemia, fruit juice, cardiovascular risk, menstruating woman.

PO2783

INTAKE OF AN IRON OR IRON AND VITAMIN D-FORTIFIED SKIMMED MILK AND IRON METABOLISM IN WOMEN

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Background and objectives: Iron deficiency anaemia has been identified as one of the most common and widespread disorders in the world. The present assay was designed to know if an iron-fortified flavoured skimmed milk improves iron metabolism in iron-deficient menstruating women and if the supplementation with vitamin D involves an additional effect.

Methods: A randomized, controlled, double-blind, parallel design trial of 16 weeks duration was performed following the guidelines of the Consolidated Standards of the Reporting Trials and registered at ClinicalTrials.gov: NCT01739907. Subjects were randomized into two groups that consumed, as supplement to their usual diet an iron (Fe, n=55) or iron and vitamin D-fortified (Fe+D, n=54) skimmed flavoured milk. The daily portion was 500mL/day, and provided 15 mg iron/day in the form of microencapsulated ferric pyrophosphate. The Fe+D fortified-milk provided 5 μg of vitamin D3/day. At baseline and monthly, dietary intake, body weight, haematological and iron metabolism parameters were determined.

Results: Serum ferritin displayed significant variations during time in Fe and Fe+D groups ($p=0.045$ and 0.009 respectively) but at the end of the assay it recovered baseline levels. Significant increases ($p<0.05$) were observed in serum iron and transferrin saturation at week 4, and in erythrocytes, haematocrit and haemoglobin at week 8 in Fe+D group compared to Fe group.

Conclusions: The iron-fortified skimmed flavoured milk did not improve iron status in iron-deficient women. These results are attributed to the presence of casein and calcium in the milk. However, the addition of vitamin D produced a slight improvement in several haematological parameters.This study was financed by Project AGL2009-11437Toxqui L and Blanco-Rojo R were supported by a JAE-predoc grant from CSIC and European Social Found.

Key words: ferric pyrophosphate, fortification, skimmed milk, iron-deficiency, women.Acknowledgments:

PO2784

CHANGES IN BONE REMODELLING IN IRON-DEFICIENT WOMEN BY THE CONSUMPTION OF AN IRON OR IRON AND VITAMIN D-FORTIFIED SKIMMED MILKS

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Background and objectives: Vitamin D is essential for calcium absorption and bone mineralization and a number of new functions have been reported in the last years. Recently, a relationship has been proposed between vitamin D deficiency and iron deficiency anaemia. The aim of this assay was to know if the supplementation with iron or iron and vitamin D involves an effect on bone remodelling in iron-deficient women.

Methods: Young menstruating women with low iron stores (serum ferritin <30ng/mL) and haemoglobin ≤11g/dL, were included in this study. A randomized, controlled, double-blind, parallel design trial (ClinicalTrials.gov: NCT01739907) of 16 weeks duration was performed following the guidelines of the Consolidated Standards of the Reporting Trials. Serum 25-hydroxyvitamin D (25OHD), as the vitamin status marker and compliance biomarker, parathormone (PTH) and biochemical bone markers (P1NP, NTx), were analysed at baseline and bimonthly.

Results: A total of 109 women completed the study and consumed 500 ml/day of an iron (Fe group, n=55) or iron and vitamin D-fortified (Fe+D group, n=54) skimmed flavoured milk. Serum 25OHD baseline levels indicate that 34.9% of the women were deficient, 38.5% insufficient and 26.6 % sufficient. In Fe+D group, serum 25OHD significantly increased during the assay and it was higher at weeks 8 and 16 compared to Fe group, indicating a good compliance. P1NP and NTx decreased in the Fe+D group (p=0.004 and p<0.001, respectively) and did not change in the Fe group during the intervention.

Conclusions: The majority of the iron deficient women (73.4%) presented vitamin D deficient or insufficient status and supplementation with an iron and vitamin D-fortified skimmed milk reduces bone remodelling and could improve bone health.Study financed by Project AGL2009-11437L. Toxqui and R. Blanco-Rojo were supported by JAE-predoc grants from CSIC and European Social Found.

Key words: Vitamin D, fortification, bone remodelling, women.

PO2785

LACTOBACILLUS RHAMNOSUS CNCM I-4036 DECREASES INFLAMMATORY CYTOKINE RELEASE IN HUMAN INTESTINAL EPITHELIAL CELLS CHALLENGED WITH SALMONELLA TYPHI.

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Background and objectives: Intestinal epithelial cells, as important participants in the mucosal immune response, must respond to a variety of stimuli, including commensal and pathogenic bacteria. Interleukin- 8 (IL-8) and tumor necrosis factor alpha (TNF-alpha) are cytokines produced by macrophages and other cells types such as enterocytes, involved in the mucosal immune response. Probiotic bacteria may provide protection against intestinal damage induced by pathogens, but the underlying mechanisms are still largely unknown.The aim of the present study was to investigate whether Lactobacillus rhamnosus CNCM I-4036, isolated from exclusively breast-feeding infant feces, protected intestinal Caco-2 cells from the inflammation-associated response induced by Salmonella typhi CECT 725, causative agent of typhoid fever, by modulating cytokine secretion.

Methods: Caco-2 cells were exposed to Salmonella or co-incubated with Salmonella and Lactobacillus rhamnosus CNCM I-4036 for 4 hours. IL-8 and TNF-alpha secretion by Caco-2 was measured by immunoassay, with a MILLIplexTM kit using the Luminex 200 system based on the xMap technology. Statistical differences for secreted IL-8 and TNF-alpha between treated and untreated cells were assessed by the U-Mann Whitney test.

Results: Lactobacillus rhamnosus CNCM I-4036 prevented increased secretion of IL-8 and TNF-alpha in human intestinal epithelial cell Caco-2 S. typhi-induced, which was significantly reduced by 99% and 77%, respectively (p<0.05).

Conclusions: The beneficial effects of Lactobacillus rhamnosus seem to be associated with a decrease in the secretion of IL-8 and TNF-alpha levels by enterocytes. This strain showed the potential to protect enterocytes from an acute inflammatory response and is a potential candidate for the development of new functional foods helpful in counteracting enteropathogen infections.

Key words: gut immune response, Lactobacillus rhamnosus, probiotics, typhoid fever

PO2786

ANIOXIDANT EFFECT OF BREAD USING BLACK RICE (ORYZA SATIVA L. JAPONICA VAR. SBR)

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Background and objectives: Black rice contains a dark purple pigment derived from cyanidin-3-O-beta-D-glucoside (C3G), which is the most abundant form of anthocyanin in foods. C3G has versatile physiological functions including antioxidant, anti-inflammatory, and antiarteriosclerosis effects. Previously, we demonstrated that a large amount of C3G in black rice is degraded to protocatechuic acid (PCA) by heat, suggesting that cooked black rice no longer retains its physiological function. However, the effect of thermal processing on antioxidant effect of C3G in black rice remains to be elucidated. In this study, we investigated the process of baking bread with black rice flour, and studied the change of its antioxidant effect and C3G levels.

Methods: Breads replaced 20% of wheat flour with rice flour (black, pearled and brown rice flours) were prepared. No rice flour bread was also prepared as a control. Acidic ethanol extraction of these breads and its raw materials were subjected to analysis. The amounts of C3G and PCA in the extracts were quantified by HPLC-PDA. Furthermore, total phenol in the extracts was measured with folin-ciocalteu method. Antioxidant effects of the extracts and purified C3G and PCA were evaluated by hydrophilic oxygen radical absorbance capacity (H-ORAC).

Results:H-ORAC value of the extract from black rice flour bread showed the highest value among all extracts. Approximately 80% of C3G in the black rice flour was decreased by baking, whereas PCA was increased. H-ORAC value and total phenol in the extracts indicated positive correlation. Interestingly, the H-ORAC value of purified PCA was higher than that of C3G.

Conclusions: The black rice flour bread has high antioxidant that is attributed to PCA. These findings suggest that black rice flour bread is useful to prevent chronic diseases as a functional food.

Key words: cyanidin-3-O-beta-D-glucoside, protocatechuic acid, antioxidant effect

PO2787

THE INFLUENCE OF DIET WITH ELDERBERRY FRUITS ON MORPHOLOGICAL PARAMETERS IN SERUM OF RATS OVER INTOXICATION WITH LEAD

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Background and objectives: The elderberry fruits are a very good source of vitamins (especially vitamin C, B) and biologically active non-nutrient components – polyphenols. These compounds may reduce the harmful effects of various factors. The aim of the study was to determine the influence of diet with elderberry fruits on morphological parameters in serum of rats over intoxication with lead.

Methods: Wistar rats were divided into 4 group (n=6) and fed with experimental diet (I) AIN-93G, (II) AIN-93G with lyophilised elderberry fruits (5%), (III) AIN-93G with lead (0.025 mg/ kg body weight), (IV) AIN-93G with elderberry fruits and lead. After 4 weeks rats were anaesthetized and blood was collected. The morphology (content of red and white blood cells, platelets, hemoglobin and hematocrit) and the content of creatinine, uric acid and bilirubin were measured according to the protocol. Additionally, the activity of asparagine aminotransferse (AST) and alanine aminotransferase (ALT) were measured.

Results: The lead intoxication caused a reduction of hematocrit and decreased the hemoglobin level. The content of creatynine is at about 59 umol. Rats fed AIN-93G diet with lead intoxication had highest urine acid and bilirubin amounts. The addition of elderberry fruits contributed to decreased bilirubin level. The ALT activity declined in the serum of rats fed standard diet with fruits, while AST activity is increased, both in AIN-93G with elderberry fruits and in AIN-93G with fruits and lead.

Conclusions: The addition of elderberry fruits to the experimental diet improves the morphological and selected biochemical parameters in rats' blood.This study was supported by the National Science Centre; decision no DEC-2011/01/B/NZ9/07177.

Key words: rats, elderberry fruits, lead, biochemical parameters.

PO2788

CONTENT OF TOTAL POLYPHENOLS AND ANTIOXIDANT ACTIVITY OF INFUSIONS FROM SOME VARIETIES OF DRIED BUCKWHEAT'S LEAVES

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Background and objectives: Numerousstudies have shown that products made frombuckwheathave nutritional, dietary and health benefits. There are no data in the literature on the content of total polyphenols and antioxidant capacity ininfusions madefrom the driedleaves of buckwheat.The aim of the study was to determine the total polyphenols and antioxidant activity ofinfusions from some varieties of driedbuckwheat's leaves.

Methods: Four varieties of buckwheat' leaves were harvested in June and July. Leaves were dried, grinded andcovered with boiling water.The content of polyphenols in dried leaves and in infusionswas determined by Poly-Swain and Hills method and the antioxidant activity was measured by determining the ability of elimination the free radical ABTS•+.

Results: In any case, harvest time had a significant impact on the content of total polyphenols. It has been shown that dried buckwheal's leaves are rich in polyphenols, especially Panda variety harvestedin July (602,4 mg/100 g). The highest antioxidant activity has Green Corolla variety harvested in June (1743,3 umol Trolox/ 1 g),Red Corolla and Panda variety harvested in June (~1303,1 umol Trolox/ 1 g)Into infusions goes80-100%total polyphenols contained in the dried leaves. The largest and at the same time similar antioxidant activity has been demonstrated in the infusions made from Panda and Kora varieties (harvested in July) 402,2 and 409, 2 umol Trolox/ 1 ml respectively.

Conclusions: These investigated varieties of buckwheat's leaves,as a good source oftotal polyphenols andantioxidant activity, may be a adequatematerial for making infusions.

Key words: buckwheat leaves, infusions, polyphenols, antioxidant activity

PO2789

THE EFFECT OF SELECTED BIOACTIVE FOOD COMPOUNDS IMPLEMENTATIONIN LONG-TERM DIETETIC THERAPY IN PATIENTS WITH OBESITY

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Background and objectives: The obesity is related to many diseases such as carbohydrate metabolism disorders, dyslipidemia, atherosclerosis or hypertension. In this case some bioactive food compounds may be useful in the weight-loss dietotherapy. Morus alba L.,Urticadioica L.andViciafaba L. improve glucose tolerance, whereasBrassica oleracea L. var. sabellica L. and inulinum show serum-lipid lowering properties. The objective of this study was to investigate whether selected bioactive food compounds implementation positively affects metabolism disorders and supports weight-loss.

Methods: The food products with bioactive compounds were selected by nutritive value, composition and glycemic index (GI) and included in the weight-loss diet for obese patients. The weight-loss diet was prepared according to Polish National Food and Nutrition Institute dietary guidelines. The dietary intervention took 9 weeks. The body mass, anthropometric indicators, body composition, and bone density were measured every week. Moreover every patient was obligated to keep a nutrition diary, which was used for nutritional value of daily food ration estimation. The results have been compared to control group which followed low-calorie diet including placebo food products (free from bioactive compounds).

Results: The implementation of bioactive food in weight-loss dietetic therapy enhanced the weight loss and improved lipid and carbohydrate metabolism by lowering total serum cholesterol and blood glucose level.

Conclusions: The results support the correctness of bioactive components'choice for supporting weight loss, as well as lipid and carbohydrate metabolism improvement in obese patients. They also give an impulse to implement bioactive components in 'functional food' production.

Key words: weight-loss therapy, Morus alba L.,Brassica oleracea L. var. sabellica L.,Viciafaba L.,Urticadioica L.

PO2790

ANTIOXIDANT PROPERTIES OF BLACK ELDERBERRY (SAMBUCUS NIGRA L.) AND SEA BUCKTHORN (HIPPOPHAË RHAMNOIDES L.) FRUITS

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Background and objectives: Many studies have shown that as a result of environmental factors increases the intensity of free radical reactions in the human body, with all health implications.The aim of this study was to determine the contents of antioxidant components in the wild - grown fruits and their ability to quench free radical ABTS.

Methods: The research material consisted of fresh fruits, gathered in the places free from industrial pollution. Measurements of vitamin C and beta-carotene were performed according to Polish standards [PN-A-04019, PN-90/A-7510112]. The content of anthocyanins was determined by Benvenuti et al., [2004], the ability to quench free radical ABTS by Re, Pellegrini et al., [1999] and the tannin content by spectrophotometric method [Farmakopea, 2002]. Results of the analyses were presented as mean values with standard deviations (sd).

Results: The content of vitamin C [mg / 100 g] in the sea buckthorn fruits (58.72 ± 4.4) was higher than in elderberry fruits (33.99 ± 2.32). The amount of beta-carotene in elderberry fruits (0.28 ± 0.04 mg/100 g) was six times lower than in sea buckthorn (1.75 ± 0.23 mg/100 g), while the tannins content [mg/100g] was higher in elderberry fruits (68.97 ± 0.04), compared to sea buckthorn (63.7 ± 0.05), and anthocyanins [mg/100g] in elderberry fruits (302.88 ± 37.9) exceeded more than two hundreds the content presented in the sea buckthorn (1.25 ± 0.6). Greater ability to quench free radical ABTS [umol Trolox/g] was characterized by elderberry fruits (99.49 ± 0.72), compared with sea buckthorn fruits (10.77 ± 0.3).

Conclusions: The inclusion of elderberry and sea buckthorn fruits or their preparations may help to diversify and increase functional properties of the daily diet.This study was supported by the National Science Centre; decision no DEC-2011/01/B/NZ9/07177.

Key words: wild-grown fruits, bioactive components, antioxidants

PO2791

THE INFLUENCE OF DIET WITH AN ADDITION OF ELDERBERRY FRUITS AND LEAD ON SELECTED BIOCHEMICAL PARAMETERS IN SERUM OF RATS

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Background and objectives: Heavy metals may represent a significant threat to human health and cause an acute poisoning and far adverse effects. The aim of the study was an investigation of lead and elderberry fruits addition to a diet of laboratory rats on the selected biochemical parameters.

Methods: The experimental rats (male, Wistar strain) were divided into four groups (n=6) and fed for 5 weeks with the following diets: (1) AIN-93G as control, (2) AIN-93G with an addition of lead, (3) AIN-93G with an 5% addition of freeze-dried elderberry fruits and (4) AIN-93G with an addition of both, lead and 5% of freeze-dried elderberry fruits. Lead was added to the diet at a dose of 0.025 mg/kg body weight. The contents of total cholesterol and triacylglycerols were measured by using enzymatic kits, while the glucose level was monitored by glucometer.

Results: The body mass gain was highest in rats fed control diet (1), while an addition of lead to the diet (2) caused a decrease in the body mass gain. In the groups of rats fed diets with an addition of elderberry fruits (3,4), the body gains were lowered compared to diets without an addition of this fruit but a decreasing effect of lead on the body gain was not seen. The addition of lead into a control diet (2) led to an increased glucose and triacylglycerols levels, while an incorporation of this metal into a diets containing elderberry fruits (3, 4) did not change those parameters.

Conclusions: The addition of lead to rats' diet contribute to some adverse changes on the tested biochemical parameters, while elderberry fruits seem to posses protective effect in the living organism.This study was supported by the National Science Centre; decision no DEC-2011/01/B/NZ9/07177.

Key words: elderberry, lead, cholesterol, glucose, triacylglycerols

PO2792

COOKING EFFECT ON OXALATE CONTENT IN MALAYSIAN SOY BASED DISHES.

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Background and objectives: Legumes have been found to contain some inherent anti-nutritional factors which limit their nutritive value by exerting certain deleterious effects. Some studies investigated the effect of food processing and preparation methods on bioactive food components and ingredients such as oxalate.Recently, researches on soy bean products have been attracted by many health and industrial stakeholders.As the first study in Malaysia, this study aimed to determine the effect of cooking on oxalate content and the negative effects of oxalate on calcium availability in eight Malaysian soy based dishes.

Methods: A total of eight types of Malaysian soy based dishes were home cooked.Oxalate was analyzed by using anion-exchange column (AEC), while calcium content was determined using Atomic Absorption Spectrophotometer (AAS).

Results: Oxalate concentration of studied samples was in the range of 6.43-19.40 mg/100 g for whole cooked dish samples, 9.03-11.90 mg/100g for raw soy products and 4.36-7.99 mg/100g for cooked ones. There were 5 out of 12 samples containing oxalate which was significantly lower ($p<0.05$) in cooked soy products compared to the raw ones. The rest of samples were also lower in oxalate but was not significantly different ($p>0.05$). Oxalate in raw and cooked fermented soy products (tempeh) was slightly lower compared to the non-fermented ones. However, there was no significant difference ($p>0.05$) in oxalate content between fermented and non-fermented soy products.

Conclusions: Oxalate/Calcium ratio among all samples was below 1 which showed that oxalate did not have an effect on availability of calcium in studied samples. Thus, cooking and optimal food processing might be effective in reducing oxalate content in soy bean products. As a final point, further researches on the effect of cooking and fermentation on anti-nutrients in other Malaysian soy based dishes may provide more useful information.

Key words: Calcium, cooking, Malaysian, Oxalate, soy products

PO2793

UHPLC-ESI-QTOF-MS TO IDENTIFY PHENOLIC COMPOUNDS FROM A GRAPE (VITIS VINIFERA) SEED EXTRACT

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Background and objectives: Grapes (Vitis vinifera) are considered as the world's largest fruit crops, with an approximate annual production of 58 million metric tonnes. The presence and distribution of flavonoids of grape seeds have been studied by several authors. Grape seeds are rich sources of monomeric phenolic compounds, such as (+)-catechins, (-)-epicatechin and (-)-epicatechin-3-O-gallate as well as dimeric, trimeric and tetrameric procyanidins. These compounds act as antimutagenic and antiviral agents. Grape seeds are used as a dietary supplement and natural food additive in the USA, Australia, Japan, Korea and in many European countries. There has been an increasing consumer demand for this product due to its powerful antioxidant properties and other beneficial biological activities.The aim of the present study was to characterize phenolic compounds in Vitis vinifera seeds extract.

Methods: The characterization was carried out using UHPLC-ESI-QTOF-MS. A reverse phase C18 column was used working in gradient mode using acetic acid 1% in water and acetonitrile as mobile phases. Accurate mass and fragmentation pattern of each peak provided from QTOF instrument were used to determine the compounds.

Results:25 compounds were identified belonging to various structural classes such as flavonols (quercetin, catechin, myricetin and derivatives), benzoic acids (gallic acid and derivatives) and others organic acids (quinic acids and derivatives).

Conclusions: The method described simultaneously separated a wide range of phenolic compounds and the tentative characterization of the major compounds of this extract was carried out. It is important to highlight that, to our knowledge; this is the first time that the phenolic compounds from Vitis vinifiera seeds extract have been characterized.

Key words: Grape seeds, phenolic compounds, Vitis vinifera, UHPLC-ESI-QTOF-MS.

PO2794

PROTECTIVE EFFECTS OF A COMBINATION OF CITRUS AND ROSEMARY EXTRACTS ON UV-INDUCED DAMAGE IN HUMAN KERATINOCYTES

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Background and objectives: UV radiation, absorbed bythe epidermis, isthemajor cause of a variety of cutaneousdisorders includingphotoageing and skin cancers. In recentyears, anincrease in the use of botanicalswithantioxidant and anti-inflammatoryproperties as skin photoprotectiveagentsisemerging. In thepresentstudy, a combination of rosemaryextract and citrus bioflavonoidextract (NutroxSun) has beenchallengedtoinhibit UV harmfuleffectsusing human keratinocytes.

Methods: Theprotectionstudywasperformeddetermining theviability of HaCaTcellsexposedto UVB and theirlevel of DNA damagethrough MTT and Cometassays. In addition, weevaluatedtheantioxidantactivity and attenuation of oxidative stress on UVB-irradiatedcellsbythecombinationextract. Finally, wecarriedout a human trial, inducingerythema in volunteers, and assessedthe skin protectiveeffectagainst UV radiation.

Results: Thecombination of theextracts (NutroxSun) exhibitedhigherprotectiveeffectsoncellsurvivalupon UV radiationthanthe individual extractspointingoutpotentialsynergiceffects. Thecombinedextractalsoshowedthecapacity of scavengingintracellular radical oxygenspecies, especiallyhydrogenperoxide, at non-cytotoxicconcentrations. Theextractwasalsocapabletodecrease UV-induced DNA damage as shownbythecometassay. The oral dailyconsumption of 250 mg of thecombination in human volunteersrevealed a significant UV protectioncomparedtothefirstdayafter 57 days, throughtheincrease of theminimalerythemadoseupon UV radiation. Longertreatmentsachievedstrongerprotection, probablyindicatingthatlongertreatmentsreachhighersteady-stateconcentrations of thechemopreventivecompounds.

Conclusions: Theseresultsindicatethatthecombination of citrus flavanones and caffeoylderivativesfromrosemary (NutroxSun) may be considered as aningredientfor oral photoprotection and theirmechanism of actionmaydeservefurtherattention.

Key words: Botanicals; UV radiation; photoprotection; DNA.

PO2795

PHENOLIC COMPOUNDS IN ROSMARINUS OFFICINALIS L. EXTRACTSAND ANTIOXIDANT ACTIVITIES

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Background and objectives: Rosmarinus officinalis L. (Labiatae) is an aromatic herb used not only to obtain essential oils, but also to prepare various extracts that are increasingly employed to provide natural alternatives to synthetic antioxidant and artificial preservative additives in foodstuffs.The antioxidative properties of the leaves of rosemary are probably due to several phenolic compounds, among them rosmarinic acid, carnosic acid, carnosol, and flavonoids.The aim of this study was to investigate the antioxidant activity of three ethanolic extracts (E-TO, E-PO, E-LI) from rosemary leaves and evaluate the relationship between the observed antioxidant properties and the phenolic content of the extracts.

Methods: The leaves were ground in liquid nitrogen and extracted with ethanol by the alternation of magnetic stirring and sonication in ultrasounds, according to the procedure described in a previous study. The extract E-TO was obtained by this ethanolic extraction, E-PO and E-LI were obtained by purification of this extract using dichloromethane; then the extracts were analyzed by HPLC/DAD/MS. Different radical-scavenging models, DPPH, ABTS, FRAP and DMPD, were used for the characterisation of the activity.

Results: The extracts showed different degrees of radical scavenging capacity and antioxidant activity was dependent on the type of assay used.In most of the assays the extract E-TO, with higher total phenolic content, was superior in activity. The observed antioxidant characteristics were not fully related to the total phenolic content of the extracts in any of the assays, but were presumably strongly dependent on rosmarinic acid concentration, the major phenolic component present in this type of rosemary extract as already described by Dorman et al.

Conclusions: This study indicated that rosemary contains significant free radical scavenging activities suggesting that rosmarinic acid contributes to total antioxidant activities of the extracts.

Key words: Rosemary extract; Rosmarinic acid; DPPH; ABTS; FRAP

PO2796

HIGH-DOSE MUSHROOM INCREASES HEPATIC ACCUMULATION OF TRIACYLGLYCEROL IN RATS FED WITH HIGH-FAT DIET

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Background and objectives: Shiitake mushroom is a functional food that contains active biological components such as beta glucan and eritadenine. The Shiitake has been shown to have health benefits including plasma TAG lowering and the prevention of body weight gain. Yet the underlying mechanisms are largely unknown. The aim of this study was to assess the potential underlying mechanism of Shiitake mushrooms to prevent body weight gain in rats fed a high fat diet (HFD).

Methods: Forty Wistar rats were divided randomly into four groups. Rats in the control group were given HFD only and rats in the treatment group were fed HFD enriched with Shiitake mushroom powder in low dose (LD-M, 0.7% wt:wt), medium dose (MD-M, 2% wt:wt) and high dose (HD-M, 6% wt:wt) for 6 weeks. Diets were isocaloric containing ~50% energy from fat. After 6 weeks' dietary intervention, rats were sacrificed; blood and tissue samples were collected.

Results: The rats fed HD-M showed a significantly higher ratio of liver weight to 100 g body weight ($p < 0.05$), a more severe hepatic steatosis marker such as hepatocyte ballooning ($p < 0.0001$) and more liver triacylglycerol (TAG) content than LD-M and MD-M ($p < 0.05$). HD-M also showed a significantly decreased ratio of phosphatidylcholine (PC) to phosphatidylethanolamine (PE) compared to HFD ($p < 0.05$) but there were no differences compared to HD-M and MD-M. This study also showed a positive association between the dosage, liver TAG and liver ballooning histology. A negative association was found between the dosage of mushroom and the ratio of liver PC to PE.

Conclusion: The study showed that high-dose shiitake mushroom increased TAG accumulation in liver. This could partially explain how consumption of mushrooms lowers blood levels of TAG in rats fed with high-fat diet.

Key words: Shiitake mushroom, Triacylglycerol, Phosphatidylcholine, Phosphatidylethanolamine

PO2797

EFFECT OF IMMEDIATE INTAKE AND SUPPLEMENTATION FOR 6 DAYS WITH BLUEBERRIES ON GLYCEMIA, INSULINEMIA AND REDOX STATUS IN HEALTHY SUBJECTS

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Background and objectives: Western diets, rich in fats and rapidly digestible carbohydrates have been associated with an increased risk of chronic diseases. Blueberries have shown different biological activities being one of the most important their effects on glycemic and insulinemic responses.The aim of this study was to evaluate the effect of two different ways to consume blueberries (an immediate intake and a 6-days supplementation) on glycemia, insulinemia and redox state after a glucose load in healthy subjects.

Methods: Ten volunteers (aged 22 – 31 years) consumed 150-g of white breadalone (control), together with a single dose of 150-g of unprocessed blueberries, and after a 6-days supplementation period with the same amount of fruit daily in a crossover design with a minimum 2 wks between sessions. Blood samples were collected at fasting and at 30 min intervals for 120 min from initiated bread ingestion. Glycemia, insulinemia, red blood cell glutathione, plasma malondialdehyde and antioxidant capacity (FRAP) were determined.

Results: Glucose concentrations were significantly lower at 60, 90 and 120 min after immediate intake compared to control ($p < 0,05$) and at 60 and 90 min compared to supplementation ($p < 0,05$). Blood glucose peak was also significantly lower after immediate intake compared to control and supplementation (102,03 ± 1,41 versus 127,99 ± 7,85 and 130,39 ± 7,48 mg/dL, respectively, $p < 0,05$). Insulin concentrations tended to be lower after both types of blueberries consumption, but there were no significant differences. Redox biomarkers did not significantly differed after blueberries ingestion.

Conclusions: Results suggest that immediate intake of blueberries modulates glucose but not insulin concentrations in response to a 75-g glucose upload in healthy subjects. Anthocyanins actions over carbohydrate digestion enzymes are likely to be responsible.

Key words: Blueberries intake, Glycemic response, Insulinemic response, Redox status

PO2798

RESTRUCTURED SQUID-SURIMI ENRICHED IN GLUCOMANNAN IMPROVES THE ANTIOXIDANT STATUS IN OBESE ZUCKER RATS

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Background and objectives: Zucker Fa/Fa rat is a commonly used model in Metabolic Syndrome (MS) studies. MS leads to an overbalance of reactive oxygen species net level in comparison to the antioxidant capacity. Glucomannan, a soluble highly fermentable fibre, has been suggested to act as antioxidant. Present study aims to assess the effects of the consumption of a high saturated diet -containing a 30% of restructured squid-surimi enriched with glucomannan- on the antioxidant system of Fa/Fa rats.

Methods: Two groups of eight rats each were fed for seven weeks with Control diet (C, AIN-93M enriched with 30% of restructured squid-surimi) or Glucomannan diet (G, 15% of glucomannan into same restructured surimi). Glutathione levels were assessed in liver following the Hissin & Hilf method. Hepatic superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx) and glutathione reductase (GR) levels were determined by Western blot and their expression by qRT-PCR.

Results: High saturated C diet produced oxidative stress. G diet increased reduced glutathione ($p<0.05$), improving redox index ($p<0.05$). SOD expression and levels were reduced with the G diet (both $p<0.05$), suggesting a free radical sequestering capacity of the fiber. CAT and GPx expressions or levels were not affected by diet, while GR levels were increased with the G diet ($p<0.05$), suggesting the stimulation of the glucose-6-phosphate dehydrogenase metabolic pathway due to glucomannan consumption.

Conclusions: Consumption of glucomannan in a squid-surimi matrix exerts an antioxidant effect attending to the observed improvement of some antioxidant status markers. Squid-surimi enriched with glucomannan could be considered as a potential functional food, although more studies are recommended.The present study was supported by the Spanish projects AGL2011-29644-C02-02, Consolider-Ingenio 2010 project # CSD2007-00016, and CONACYT grant.

Key words: Squid-surimi, glucomannan, glutathione, antioxidant-status.

PO2799

IMPROVEMENT OF IN VITRO AND IN VIVO ANTIOXIDANT CAPACITY OF COWPEA (VIGNA UNGUICULATA) BY NATURAL OR CONTROLLED FERMENTATION PROCESS

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Background and objectives: Cowpea (Vigna unguiculata) is a widely cultivated legume that contains appreciable levels of bioactive non-nutritional compounds which may confer this legume great potential as functional food. Furthermore, certain technological treatments like fermentation may enhance its antioxidant capacity. This study aimed to test the antioxidant properties of V. unguiculata, var. Carrilla, and the effect of natural and controlled fermentation with an inoculum of L. plantarum combined with a thermal treatment of dry heat.

Methods: Cowpea seeds. Vigna unguiculata L. var. carrilla was ground and fermented using the endogenous microbiota present in the seed or with an inoculum of Lactobacillus plantarum. Fermented samples were freeze-dried and dry-heated at 120ºC, 1 atm during 20 min. Total polyphenol content, reducing capacity, and antioxidant capacity was determined in the different acetone extracts of V. unguiculata flours.Animals. 60 Wistar rats were divided in 6 experimental groups (n = 10 per group). Each group consumed ad libitum one of the experimental diets formulated to contain raw or fermented cowpea flours as the sole source of dietary protein.Plasma total antioxidant capacity was assessed, and the Liver was selected to determine the activity of GPX, SOD and CAT.

Results: The different fermentation processes increased the total polyphenol content, reducing capacity and antioxidant capacity of cowpea flour extracts. Furthermore, in vivo assessment showed an increase in plasma total antioxidant capacity and in liver GPX, Cu/Zn-SOD, Mn-SOD and CAT activity of rats that consumed fermented cowpea diet when compared to rats that were fed raw cowpea or casein diets.

Conclusions: Fermentation improved the antioxidant capacity of Vigna unguiculata var. carrilla flours measured by in vitro or in vivo techniques, thus exhibiting great potential for the preparation of new legume-derived functional foods with enormous benefits for human health.

Key words: Vigna unguiculata; antioxidant capacity; functional food; fermentation

PO2800

EFFECT OF DIFFERENT CONCENTRATIONS OF PROTEINS IN A SOLUBLE HIGH FIBER FOOD ON THE SHORT-TERM SATIETY IN HEALTHY YOUNG ADULTS

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Background and objectives: The objective of this study was to examine the effect of different concentrations of calcium caseinate on short-term satiety using as a vehicle a food high in soluble fiber.

Methods: The high soluble fiber food was a cake prepared with a mixture whole flaxseed meal and refined wheat meal. 22 healthy young men were selected fromstudents of the University of Valparaíso. Three groups were studied: the control group that consumed the food without protein addition and the other 2 groups received the high fiber food with the addition of a 8% and a 14 % of caseinate, respectively. Short term satiety was determined by two methods one of them used avisual analogue scale (subjective method) and the other applied differential weighing between the amount of foods offered and the left over by the subjects (objective method). Results were analyzed by repeated measures ANOVA, t-paired (parametric) and Kruskal Wallis, Wilcoxon test (nonparametric).

Results: Thefeeling of satietyduring the subjective evaluation was significantlyhighest whensubjects consumed the highestprotein preload whencompared withthe other two preloads and alsofullness and reduced hunger and appetite were observed. When the objective method was appliedfood and energy intakes were significantly lower for the highest protein preload and then satiety was superior.

Conclusions: The results of the study make possible to conclude that addition of proteins to a high soluble fiber food increases satiety response directly related to protein concentration.

Key words: Fiber soluble, caseinate calcium, satiety

PO2802

A NON-BITTER BITTER GOURD DRINK IS READY TO BE TESTED ON HUMANS IN A BLINDED STUDY

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Background and objectives: Bitter gourd (Momordica charantia L.) ameliorates insulin sensitivity in animal studies. However, significant data from human studies are lacking. Its distinctive bitter taste makes it difficult to use bitter gourd in blind placebo-controlled human studies. Therfore, a non-bitter bitter gourd drink (made from bitter gourd powder, a food additive that masks bitterness, and cucumber powder in water) and a placebo (cucumber powder and food additive in water) were developed. These two drinks and one containing only bitter gourd powder were compared for their effect on body weight and blood glucose in mice.

Methods: Forty high fat diet fed mice were treated with water (control), bitter gourd powder in water, non-bitter bitter gourd drink, or placebo. Treatments were given orally six days a week for eight weeks. Bitter gourd dosages were 500 mg/kg body weight, which is equivalent to 150 ml bitter gourd drink for humans.

Results: After eight weeks, average body weight was the highest in the control (35.6 g), followed by 33.9 g after treatment with bitter gourd only, 32.7 g with placebo, and 32.6 g with non-bitter bitter gourd drink. HbA1C levels were 4.7±0.05% and 4.7±0.1% in control and placebo groups, respectively, and 4.6±0.1% in the two bitter gourd groups. Average fasting blood glucose levels were also lower in the groups treated with bitter gourd.**Conclusions:** The food additive seems to prevent excessive weight gain, which led to a lower body weight in mice treated with non-bitter bitter gourd and placebo drinks. The placebo did not show any effect on blood glucose. The bitter taste masking agent did not reduce the antidiabetic effect of the bitter gourd. Thus, recipes for the non-bitter bitter gourd drink and the placebo drink are suitable to be used in a blinded study with humans.

Key words: type-2 diabetes, Momordica charantia

PO2804

OYSTER MUSHROOM (PLEUROTUS OSTREATUS) DECREASES BLOOD CHOLESTEROL LEVELS IN DIET-INDUCED HYPERCHOLESTEROLEMIA MICE

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Background and objectives: Cardiovascular disease is the leading cause of mortality in developed countries. Major risk factors include hypercholesterolemia and hyperglycemia. The objective of this study was to investigate the efficacy of Pleurotus ostreatus (Pleurotus) in lowering total cholesterol concentrations in diet-induced hypercholesterolemia mice.

Methods: For 4 weeks, 16 male C57BL/6J mice were fed a hypercholesterolemic diet (2% cholesterol; 3% fat) with or without 1.5% (wt/wt) Pleurotus extract obtained by the ASE (Acelerated Solvent Extraction) method. Blood samples were collected at the end of the experiments for biochemical analysis.

Results: Total plasma cholesterol levels were significantly lower in the group supplemented with Pleurotus as compared with the hypercholesterolemic control group, although they did not reach normal values. In the hypercholesterolemic control group, high-density lipoprotein cholesterol (HDLc) levels decreased 18% and low-density lipoprotein cholesterol (LDLc) levels increased 79% compared with the normocholesterolemic control group. HDLc and LDLc levels decreased 38% and increased 56% in the group supplemented with Pleurotus, respectively, as compared with the hypercholesterolemic control group.There were no differences in triglycerides and glucose levels between the group supplemented with Pleurotus and the two control groups.

Conclusions: Dietary supplementation with Pleurotus mushroom extract significantly decreased total plasma cholesterol levels, although not to normal levels, in diet-induced hypercholesterolemia mice. The HDLc-LDLc balance was not improved by Pleurotus supplementation. The present study suggests that Pleurotus supplementation may provide health benefits, at least partially, by acting on total cholesterol levels in the hypercholesterolemic condition.

Key words: bioactive food components, mushrooms, hypercholesterolemia

PO2805

DETERMINATION OF ANTIOXIDANT POTENTIAL OF SOME TRADITIONAL NON –ALCOHOLIC BEVERAGES IN BOSNIA AND HERZEGOVINA

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Background and objectives: Oxidative stress is assumed to be one of the risk factors in development of many diseases. In that light antioxidants and functional food containing antioxidants gain rising popularity among consumers. Aside of commercial products some traditionally beverages also have a potential to be classified as functional food.The main aim of our work was to determine antioxidant capacity of some traditional non-alcoholic beverages in Bosnia and Herzegovina.

Methods: Eight samples of traditionally prepared beverages (elder juice with and without lemon, juniper berries juice with and without lemon, blackberry juice, pomegranate juice, and boza). Commercial blackberry juice was also analyzed. The antioxidative effects of fruit juices were determined using the2,2-Diphenyl-1-picryl hydrazyl (DPPH) assay, and ferric reducing antioxidant power (FRAP) assay. In addition total phenolic content was determined by Folin-Ciocalteau method and anthocyanidines by Vanilin-HCl method.Pure compounds (cathechine, ascorbic acid and trolox) were used as control standards.

Results: Total phenolic content was in range of 74.31 mg TEA/L (elder juice with lemon) to 3 365 mg TEA/L (pomegranate juice). Anthocyanidines content ranged from 125,27 mg/L (elder juice without lemon) to 1899 mg/L (traditionally prepared blackberry juice).Pomegranate juiceexhibited the strongest activity against DPPH radicals (75,29 % inhibition), followed by traditionally prepared blackberryjuice(42,86 % of inhibition) with their IC50 values of 5,5 % (v/v) and 6,4 % (v/v), respectively.The DPPH determined antioxidant capacity showed significant positive correlation with total phenolic content as well as with flavonoids content.Analysis by FRAP assay showed stronger antioxidant capacity for most of the samples, compared to ascorbic acid standard.

Conclusions: In conclusion the analyzed traditionally prepared beverages showed strong antioxidant capacity which was even more pronounced than in the commercial juice. Health promotion of potential benefits of such homemade products should be enhanced.

Key words: elder, blackberry, pomegranate, boza, juniper

PO2806

PHYTOSTEROLS OXIDES IN FUNCTIONAL BEVERAGES: MATRIX AND STORAGE INFLUENCE

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Background and objectives: Plant sterols (PS) are currently used as functional food ingredients because of their ability to reduce low-density lipoprotein (LDL)-cholesterol levels. One way of improving the oxidative stability of PS enrichment in a food would be their inclusion in a matrix with natural antioxidant compounds as fruit &skimmed milk.The aim of this study was to evaluate the influence of food matrix, temperature and storage time in the content of phytosterol oxidation products (POPs) in functional beverages with PS added.

Methods: Three beverages (fruit juice, milk and fruit juice + milk) enriched with PS (0.8 g PS/100 mL beverage) were manufactured in a pilot plant by HERO Spain, S.A. Samples were analyzed just after manufacture (time 0) and were then stored at 4, 24, or 37 °C and analyzed at regular time intervals of 2 months until 6 months.

Methods: After identification and determination of POPs by GC-MS and GC-FID, respectively, a three factor ANOVA was applied to total POPs and a simple regression analysis was performed for determining the evolution of total POPs in each matrix during their storage.

Results: Total POPs content was fruit juice and milk (FM) < fruit juice (F) << milk (M). In the first four months of storage a major increase of the total content is observed and an interaction (time x temperature) was also detected. The predictive models obtained were: FM) Total POPs = 213.627 + 55.5914*sqrt(Time); R2 = 71.166 (p = 0.0006); F) Total POPs = 485.821 – 92.8523*sqrt(Time); R2 = 71.8914 (p = 0.0005); M) Total POPs = 325.353 + 97.8143*sqrt(Time); R2 = 79.0188 (p = 0.0003) .

Conclusions: Association of milk and fruit juice improves the stability of PS.

Key words: phytosterols, POPs, functional food

PO2808

FOOD COMPONENTS WITH EC CLAIMS RELATED TO CORONARY HEART DISEASE SUMMARISED IN A ROUND TABLE MODEL

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Background, objectives, methods: In 1993 the first Round Table Model of factors relating to coronary heart disease (CHD) was devised [1]. The model is an 'aide memoire'to illustrate the role that many food components play in risk reduction. It consists of a series of concentric circles, representing food components (outer circle) physiological factors (middle circle) and pathological events (inner circle). Each food component occupies a segment in the outer circle, matched to the corresponding physiological risk factor and to a pathological event: i.e. injury to coronary arteries(a), atheroma and fibrous plaque formation and vulnerability(b), and thrombosis(c).Our aim was to update the model and to see how authorised EC health claims relating to CHD reflect the spectrum of beneficial food components and their matching physiological risk factors. Results and **conclusions:** Twenty years later, the model could include early life events as well as genetic factors as 'uncontrollable factors' in adulthood. 'Less controllable' factors could include an excess of visceral and ectopic fat, and possibly the gut microbiota.The physiological risk factors (with related pathological event- a,b,c) would probably now include increased blood pressure(a,b), increased plasma homocysteine(a,c), increased lipid oxidation(a), impaired endothelial function(a,c), increased inflammation(a), poor atherogenic lipid profile(b), pro-coagulant state(b,c), increased insulin resistance(b) and arrhythmia(c).Food components with authorised claims on the EC register include potassium, antioxidant nutrients such as vitamin C and zinc, folate, B vitamins, betaine, choline, monounsaturated and poly-unsaturated fatty acids, resistant starch, beta-glucans, insoluble and soluble fibres, plant sterol/stanol esters, glucomannnan, chitosan and vitamin K. Matching these, and others, to physiological risk factors reveals many claims showingimprovement of the atherogenic profile, with fewer claims relating to many of the other risk factors.

Key words: diet, CHD, risk factors, EC claims[1.Ashwell M et al: Proc Nutr Soc 2000;59:415-416].

PO2809

IN VITRO POTENTIAL PROPERTIES OF CONVENTIONAL AND HERBAL TEAS AGAINST KEY ENZYMES RELEVANT TO ALZHEIMER`S DISEASE

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Background and objectives: Conventional tea (Camellia sinensis) has been extensively studied for their potential health promotions and benefits. Tea polyphenols possess neuroprotective properties, which can protect brain cells against development of Alzheimer's disease (AD) and related disorders. Acetylcholinesterase (AChE), butyrylcholinesterase (BChE) and α-secretase (BACE1) are key enzymes that control the termination of physiological role of cholinergic synapses and formation of β-amyloid plaque, the systems that suggested possible developments on AD. Therefore, the inhibitors of these enzymes could be targeted as anti-AD's agents. In this study, tea infusions were investigated regarding their inhibitory activities toward cholinesterase and BACE1 in order to extend fundamental knowledge on tea nutraceutical properties and to potentially discover future anti-AD's agents.

Methods: Five conventional teas and fifteen Thai herbal teas were prepared as tea infusions before being investigated their inhibitory properties toward AChE and BChE using an enzymatic coupled assay with 5,5'-dithiobis(2-nitro benzoic acid) (DTNB) and BACE1 using BACE1 activity assay kit (Sigma–Aldrich, Singapore Science Park II, Singapore).

Results: As results, the inhibitory activities of AChE suggested that the conventional teas possessed approx. 70-90% inhibition, while Thai herbal teas exhibited lower and wider range of inhibitory capacity. Among these, tea infusion from Pandanus amaryllifolius Roxb. provided the highest yield of approx. 60% inhibition. As well, Pandanus amaryllifolius Roxb. and Zingiber officinale Roscoe exhibited the highest BChE inhibitory activity (approx. 50%). Interestingly, tea infusion of Stevia rebaudiana Bertoni was the only tea extract that exhibited anti-BACE1 activity (20% inhibition).

Conclusions: Thus, Pandanus amaryllifolius Roxb., Zingiber officinale Roscoe and Stevia rebaudiana Bertoni are three herbal teas that possess high potential of anti-AD agents. These in vitro screening potential activities against key enzymes relevant to AD would be useful for future development of anti-AD's food and beverage as well as potentially drug discovery.

Key words: Anti-Alzheimer activities, conventional teas, Thai herbal teas

PO2810

PHENOLIC PROFILE AND CYTOTOXIC ACTIVITY OF PLANTAGO HOLOSTEUM SCOP.

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Background and objectives: Ancient use of plantains (genus Plantago L., Plantaginaceae) as herbal remedies is a consequence of their astringent, anti-toxic, antimicrobial, expectorant and diuretic properties. While there are no exhaustive data about bioactivity of many plantains, as part of our continuing valorization of medicinal use of Plantago holosteum Scop., some tests on cytotoxic activity of methanol extract of this species collected from mountain Kopaonik (Serbia) have been undertaken. As numerous studies showed that phenolics could influence cancer development, phenolic composition of the extract has been evaluated.

Methods: The presence of 44 phenolics was studied using LC-MS/MS, cytotoxic activity was studied by SRB (Sulforhodamine B) assay [1].

Results: 24 Compounds were found, the most dominant being: vanillic and protocatechuic acid (0.5 and 0.8 mg/g of dw, respectively), with apigenin, luteolin and luteolin-7-O-glc (1.12, 1.3 and 3.4 mg/g of dw, respectively). While some of these compounds are known as potent anticancer agents [2], they could be, at least partially, responsible for cytotoxic activity seen in this extract. The extract showed good cytotoxic activity against HeLa (cervix epitheloid carcinoma) and low activity against MCF7 (breast adenocarcinoma) cell lines (IC50=335 and 964 ug/mL, respectively), but no cytotoxicity against HT-29 (colon adenocarinoma) and low cytotoxicity against MRC-5 (human fetal lung, IC50=712 ug/mL) cell lines.

Conclusions: We report for the first time about detailed phenolic profile and cytotoxic activity of P. holosteum. Considering previously determined antioxidant and antiinflammatory activity of this species [3], overall results implicate potential use of P. holosteum as source of health-beneficial phytochemicals.[1] Beara I. et al. (2012) LWT-Food Sci. Technol. 47: 64-70.[2] Havsteen B.H. (2002) Pharmacol. Therapeut. 96: 67-202[3] Beara I. et al. (2009) Planta. Med. 75: 877-1904.
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Key words: Plantago, phenolics, cytotoxicity.

PO2811

COUNTERACTION OF OXIDATIVE DAMAGE BY POMEGRANATE JUICE. INFLUENCE OF THE CULTIVAR

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Background and objectives: Pomegranate (Punica granatum) has gained widespread popularity as potential functional food. In different studies, pomegranate juice (PJ) has been shown to exert antiatherogenic, anti-inflammatory, and antioxidant effects, which have been attributed to its high phenolics content. The differences in polyphenols contents and antioxidant activities of commercial PJ, related to cultivar and/or industrial processing [1], must be carefully taken into accounts in evaluating the health effects of PJ. The aim of this study was to rank PJ from different cultivar according to their total phenolic content and antioxidant capacity. According to the ranking three PJ (Wonderful, Hicaz and G2) were then chosen, characterized for their phenolic composition, and used for HepG2 cells supplementation to evaluate their biological protective activity.

Methods: Cells were supplemented with PJ at two different medium concentration, and an oxidative stress was determined in some experiments by cell exposure to H2O2. Results obtained in PJ supplemented cells were compared to unsupplemented controls (stressed and not stressed) and to cells supplemented with tocopherol.

Results: In stressed condition, all PJ but Hicaz at the highest concentration counteracted H2O2 induced cytotoxicity. Furthermore, the oxidative damage was effectively counteracted by all PJ in a dose and cultivar-dependent manner.

Conclusions: Our results point out the importance of the cultivar in the degree of protection that can be achieved in cells after PJ supplementation, in some cases comparable to vitamin E.This work was in part funded by the TEPASS Project - Technologies for Safe and Sustainable Food, co-financed by the Emilia-Romagna Region within the call 'From Industrial Districts to Technology Clusters" and realized by Interdepartmental Centre for Industrial Agri-Food Research with the support of POR FESR 2007-2013 found for the realization of Emilia Romagna region technopole.[1] Tezcan F. Food Chem. 2009;115:873-7.

Key words: pomegranate juice, HepG2, oxidative stress

PO2812

NATURAL POLYPHENOLS FROM RED PROPOLIS ATTENUATE ANGIOGENESIS IN ATHEROSCLEROSIS

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Background and objectives: Propolis, a polyphenol-rich resinous substance collected by honey bees, is believed to exert health benefits on various conditions including inflammation. We investigated the effects of polyphenols from red propolis (PRP) on angiogenesis in atherosclerosis.

Methods: The LDL receptor gene (LDLr-/-) knockout mice received a cholesterol-enriched diet and PRP (250mg/Kg/day) by gavage during 4 weeks. Migrations of ECs, ECs sprouting from murine aortic rings, formation of new blood vessels in the chorio-allantoicchiken embryo (CAM) and differentiation of stem cell (SCs) in CD-31 positive cells were used as angiogenesis models.

Results: PRP decreased atherosclerosis lesion (AL) area and expression of inflammatory factors in LDLr-/-. Furthermore, the expression of the pro-angiogenic factors FGF, VEGF and PECAM was downregulated by PRP. In agiogenesis model PRP (10 μg/ml) inhibited the angiogenic process in all protocols. Specifically, PRP reduced HIF-1 protein half-life, from ~58 to ~38 min under hypoxic conditions. The reduced protein half-life was due to increased von Hippel-Lindau (pVHL)-dependent proteasomal degradation of HIF-1?, which was correlated with PRP-evoked downregulation of Cdc42 but a subsequent pVHL increase.

Conclusions: PRP are atheroprotective through mechanisms including modulation of inflammatory and angiogenic factors mailing modulating HIF-1 stabilization.

Key words: polyphenols, red propolis, nutrigenomics, angiogenesis

PO2813

ANTIPROLIFERATIVE ACTIVITY OF BUTTERMILK, MILK FAT GLOBULE MEMBRANE AND ISOLATED LIPID FRACTIONS ON TEN HUMAN CANCER CELL LINES

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Background and objectives: Buttermilk, a by-product obtained during the production of butter, contains high amounts of residual milk fat globule membrane (MFGM) which has been assessed for its immunomodulatory, antimicrobial and anticarcinogenic capacity. Besides glycolipids and membrane specific proteins buttermilk is a major source of milk polar lipids (60-70%), although their proportions vary greatly depending on the milk specie, treatment and the procedure used for the isolation and analysis.The objective of this preliminary study is to evaluate the antiproliferative impact of buttermilk and different fractions isolates on ten human cancer cell lines.

Methods: Antiproliferative capacity of powder buttermilk (PB) and four isolated fractions as MFGM, total lipids (TL), and neutral (NL) and polar lipids (PL) obtained by SPE fractionation, were assayed on up to ten human cancer cell lines. Concentrations between 1 ng/mL and 100 µg/mL of all samples were assayed. Doxorubicin was also included as a positive control at same concentrations.

Results: Lipid classes of the assayed samples, analyzed by HPLC-ELSD, revealed an increased amount of phospholipids percentage, accounted for about 43%, 50% and 72% of the PB, MFGM and NL respectively. The preliminary results of the experiments carried out showed a slight cytotoxicity effect of the studied samples in all cancer cell lines at the concentrations employed.

Conclusions: Under the experimental conditions of this preliminary study, none of the buttermilk and lipid fractions samples assayed confirmed a significant inhibiting proliferation of the ten human cancer cell lines employed.This work has been supported by CENIT-SENNIFOOD and CYTED-IBEROFUN Projects.

Key words: antiproliferative activity, buttermilk, MFGM, cancer cell lines

PO2814

BIOACTIVE FATTY ACIDS OF PUFA-ENRICHED BUTTERS FROM THE PARMIGIANO REGGIANO CHEESE AREA, AND COMPARISON WITH SOME EUROPEAN COMMERCIAL BRANDS

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Background and objectives: Butter is one of the most complex of all edible fats with a wide range of fatty acids (FA) identified to date. The saturated fraction (SFA) account for the majority of all the FA, followed by mono- and poli-unsaturated fraction (MUFA and PUFA). Furthermore, butter contains minor FA considered bioactive for humans for their health giving properties, such as butyric acid, rumenic acid (CLA), the essential linoleic and α-linolenic acid (n-6, and n-3). Their content in dairy fat can be improved mostly by feeding strategies contemplating the supplementation of unsaturated fat sources. The aim of this investigation was to study the FA composition of experimental butters produced in the Parmigiano-Reggiano Cheese Consortium (CFPR) area, in response to extruded linseed supplementation to dairy cows, and compare the ameliorating effect with commercial butters.

Methods: 32 butter samples were analyzed by fast gas-chromatography. Italian and foreign butters, 21 and 7 respectively, were collected at local markets in Europe, while 4 experimental butter samples where produced at a local dairy farm in the CFPR area, from fresh outcrop milk creams obtained by supplementing the traditional diet of dairy cows with 300 g d-1 of extruded linseed.

Results: With the respect to the Italian and foreign butter samples, experimental butter showed a lower content of medium-chain SFA (-8.5% and -8.6%), a better SFA/UFA ratio (1.78), a higher content of CLA (+32% and +15,3%), total n-3 PUFA (+56,4% and +28,8%) and trans fatty acids (+23.8% and +11.1%).

Conclusions: This study support the feasibility for a sustainable production of value-added by-product of dairy industry. The feeding strategy adopted, could be conveniently applied to achieve a high level of bioactive fatty acids, leading to the production of dairy products that may be more beneficial to consumers.

Key words: butters, enrichment, bioactive fatty acids.

PO2815

CHEESE WHEY PROTEINS AND THEIR HYDROLYSATES AS DIETARY SUPPLEMENT TO AGED RATS: MUSCLE PROTEIN, BONE CALCIUM AND BIOCHEMICAL PARAMETERS ANALYSIS

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Background and objectives: Cheese whey proteins and their hydrolysates are composed of high biological value due to the presence of bioactive peptides and high concentration of essential amino acids, and different hydrolysates can be obtained depending on the specificity of the used proteases.

Methods: In this work, cheese whey proteins and their hydrolysates of medium and high degree of hydrolysis were used as dietary supplement of aged Wistar rats (age 17 months). It was analyzed the weight gain, muscle mass and bone mass of the animals, as well as biochemical tests for glucose, cholesterol, triglycerides, HDL, TGO, TGP, urea, creatinine and serum calcium. Four experimental groups were used: control group without supplement (G1), supplemented with integral proteins group (G2), supplemented with protein with low degree of hydrolysis (G3) and group supplemented with protein with high degree of hydrolysis (G4).

Results: All supplemented groups presented increase ($p<0.05$) of total muscle protein and bone calcium. G3 group presented the best results (6.33±0.4mg/100g-1 and 498.87±6.0mg.g-1, respectively). G2 and G3 groups presented a 20% and 17% decrease in triglycerides in relation to control group G1 and G4HDL, TGO and TGP did not differ between the groups, but it was verified a tendency of increase of HDL in groups supplemented and a tendency of decrease of TGO and TGP, mainly in G3; this same group also showed significant increase in serum calcium compared to other groups (about 15%). Other biochemical analysis did not show changes between G2, G3 and G4 groups compared to G1By these results we conclude that dietary supplementation for aged rats with cheese whey proteins with medium degree of hydrolysis improved liver functions of the animals; they also showed a gain of muscle mass, suggesting that their use may reduce sarcopenia. Acknowledgements: CNPq, FAPESP, CAPES, PNPD/CAPES

Key words: cheese whey proteins hydrolysates; dietary supplementation; sarcopenia.

PO2816

ORAL ABSORPTION OF RUMENIC, VACENIC AND ALFA-LINOLENIC ACID AFTER DIETARY INTAKE OF MILK FAT NATURALLY ENRICHED IN PUFA

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Background and objectives: Milk fat naturally enriched in PUFAs have been tested in animals and humans reporting a positive effect on cardiovascular risk factors. Despite the evidences, little data exist about oral bioavailability of CLA, trans-vacenic (TVA) and alfa-linolenic (ALA). This knowledge constitutes valuable information to adjust the dosage in future population and clinical studies. The aim of the present research is to know if the Rumenic acid (RA) (major CLA isomer), TVA and ALA of an enriched goat milk fat (EDF) after oral administration in rats are absorbed.

Methods: Goat milk fat (EDF) naturally enriched in RA, TVA and ALA was administered orally by gavage (3g EDF/kg b.w. equivalent to 153 mg TVA/kg b.w., 46.14 mg RA/kg b.w., 31 mg ALA/kg b.w.) to Wistar rats. Serial blood samples were collected after oral administration. Plasma concentrations of RA, TVA and ALA were determined by GC/MS.

Results:TVA, RA and ALA were rapidly absorbed through the gastrointestinal in rats. The plasma concentrations of TVA, RA and ALA appeared to reach maximal concentrations at 2 h. The absorption grade was not dose-dependent. The maximal plasma concentrations were 65.5±12.5 μg ALA/mL, 45.9±5.9 μg TVA /mL and 21.1±5.8 μg RA/mL.In addition, while both TVA and RA were detected until 24 h after dose, ALA was still present at 48 h showing a plasma concentration of 10.4±2.2 μg /mL.

Conclusions: The present study indicates that when given orally a goat milk fat naturally enriched in RA, TVA and ALA, these components were absorbed and likely distributed throughout the body by the circulation blood to exert systemic effects. Further research is needed to complete the kinetic characteristics of RA, TVA and ALA.Acknowledgements: This work has been supported by CONSOLIDER FUN-C-FOOD Project.

Key words: Milk fat, fatty acid bioavailability

PO2817

EVALUATION "IN VITRO" AND "IN VIVO" OF THE ANTIOXIDANT CAPACITY OF THE BOVINE CHEESE WHEY PROTEINS AND THEIR HYDROLYZATES

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Background and objectives: The whey, a by-product of the manufacture of cheeses, although potent environmental pollutant, has a high nutritional value and an undeniable amount of bioactive peptides. The objective of this work was to evaluate the antioxidant capacity of cheese whey proteins and their hydrolysates and its effects as dietary supplements on oxidative stress in Wistar rats.

Methods: All rats were treated with diet AIN 93M and water ad libitum. Supplemented groups received 110 mg prot/animal/day of integral whey proteins (IWP), or hydrolysates with low or high degree of hydrolysis (LDH and HDH, respectively). The antioxidant capacity of the hydrolyzates and four groups of rats blood serum (control, IWP, LDH and HDH) was evaluated by the reduction of 2,2-diphenyl-1-picrylhydrazyl (DPPH) and lipid peroxidation of the serum of these same groups was assessed by thiobarbituric acid reactive substances (TBARS).

Results: The results showed that in spite of the hydrolyzates show a tendency to decrease lipid peroxidation, this change was not significant. The antioxidant capacity of LDH and HDH hydrolysates increased 71.4% and 134.1%, respectively, compared to IWP. However, there was a significant decrease (approximately 70%) in the antioxidant capacity of the animals serum treated with LDH and HDH in relation to the control and the IWP groups ($p>0.05$) after 43 days of supplementation.

Conclusions: These results showed the production of an expressive amount of bioactive peptides and/or amino acid with antioxidant activity by different conditions of hydrolysis, but in the gastrointestinal tract these compounds can be degraded, resulting in the reduction of its antioxidant activity. However, in another work of our group, the amino acids released under these same conditions of hydrolysis showed positive results 'in vivo' for the synthesis of muscle mass.Acnowledgements: CNPq, FAPESP, CAPES, PNPD/CAPES.

Key words: antioxidant capacity; lipid peroxidation, bioactive peptides.

PO2818

PRODUCTION OF MARGARINE AND SOYA/SUNFLOWER OIL WITH LYOPHILIZED TOMATO PEEL POWDER AS A NATURAL ADDITIVE

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Background and objectives: Through derived fat products we understand the fats that have a different composition and structure than their original ones. The largest part of the derived fat products can be conditioned through nutritive elements incorporation, colorants, antioxidants, preservatives etc. Such incorporation is not similar to the chemico-structural derivation.Although, the use of the chemicals additives is limited because of their toxic effect. Natural additives are believed to be healthy and are of good quality. The studies have shown that the increased consumption of tomatoes decrease the risk of occurrence of cardiovascular diseases, and prostate, lung and digestive system cancers.The main point of the research was to determine the antioxidant activity of freeze-dried tomato peels and the oxidative resistance of soya/sunflower oil and margarine rich with lycopene tomato peel waste.

Methods: Tomato peel from the industry was freeze-dried, ground with a milland stored at -10 °C. The margarine was manufactured according to a industrial formula for Fleurial Cevital product: fat (80%) and water (20%). The colour was measured with a Chroma Meter CR-200. The oxidative resistance of soya/sunflower oil and margarine rich in lycopene was measured with rancimat test.

Results: A margarine and soya/sunflower oil enriched in lycopene, of good sensory quality has been produced containing a level of lycopene (0.17-0.45 mg/100g), that can increase the intake of this carotene in the diet.

Conclusions: The direct use of this by-product, avoiding lycopene extraction has obvious advantages. The use of dry tomato peel has successfully inhibited lipid oxidation (2.61 mg malonique dialdehyde/100g), and improved the oxidative resistance (30 % / control)and color of margarine and soya/sunflower oil rich in lycopène during storage, hence possibility of partial replacement of chemical additives (coloring/antioxidant) by tomato peel in margarine and other fat derived.

Key words: tomato peel, lycopene, margarine, edible oil, antioxidant activity

PO2819

A METABOLITE PROFILING APPROACH ALLOWS THE CHARACTERIZATION AND CLASSIFICATION OF THREE COMMERCIAL VARIETIES OF CUCUMIS MELO.

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Background and objectives: A positive correlation between consumption of fruits and protection against chronic diseases has been observed. Fruit represents one of the major source of phytochemicals and other useful compounds such as amino acids and fatty acids. Melon (Cucumis melo L.) belongs to the Cucurbitaceae family. It is a typical fruit presents in most of the world diets.In this work, we present a complete and exhaustive metabolite profile of 15 methanolic extracts from three different melon varieties (Piel de sapo, Galia and Cantaluz) recollected in different ripening period.

Methods: HPLC-ESI-Q-TOF-MS analyses were carried out to characterize the phenolic and others polar compounds. The mass accuracy and true isotopic pattern in both MS and MS/MS spectra provided by QTOF-MS made possible the tentative identification of many well-known compounds present in melon.Multivariate analysis was carried out using principal component analysis (PCA) to determine which compounds contributed more to draw distinctions within the different varieties.

Results: More than 40 compounds were tentatively characterized. Some of them have never been described before in melon or cucurbitacae family. PCA showed a separation between the three varieties. In the PCA scores plots (PC1 vs. PC2), the separation of groups according to the varieties may be clearly observed and the loadings plot indicates the masses and retention time values responsible for this separation. In this way, five compounds were found as the main responsible for the groups' segregation.

Conclusions: Those methods have allowed to profundize about the metabolite profile of Cucumis melo. To our knowledge, it is the first time in which tandem mass spectrometry is used to characterize melon samples and molecular markers of Piel de sapo, Galia and Cantaluz varieties are established.

Key words: Cucumis melo, metabolite profile, PCA.

PO2820

ANGIOTENSIN I-CONVERTING ENZYME INHIBITORY AND ANTIOXIDANT PEPTIDES FROM SALMON PROTEINS OBTAINED VIA HYDROLYSIS AND DIGESTION

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Background and objectives: Fish proteins are considered as an interesting source of bioactive peptides. The aim of this study was to identify ACE inhibitory and antioxidant peptides in hydrolysates of salmon myofibrillar and sarcoplasmic proteins, obtained via different ways of human digestive tract conditions simulation.

Methods: The study covered the in silico part – with the use of UniProt database, BIOPEP database and tools available within, Fragment Ion Calculator and Sequence Specific Retention Calculator application. The next step was in vitro hydrolysis - with the use of commercial enzymes, and ex vivo digestion - with the use of human digestive juices isolated from human individuals. Bioactive peptides in the obtained hydrolysates were identified using RP-HPLC with MS detector based on the expected retention times.

Results: Peptide sequences, which from the theoretical point of view, should be released during the hydrolysis, were selected from the results of the in silico part of study. The identification of bioactive peptides in hydrolysates of salmon protein isolates was possible via the expected retention times for each of the selected sequence calculation. The comparison of theoretical and experimental retention times of searched peptides was the basis for identification and analysis. For example the predicted retention time of antioxidative peptide FIKK was 19.15 min and the retention time observed during the study was 19.06 min and 20.13 min for in vitro and ex vivo samples respectively.ACE inhibitory peptides ALPHA, IVY, IW, TVY, HL and antioxidative peptides FIKK, PHL, PW, HL were identified in both kinds of hydrolysates but ACE inhibitory peptides IWHHT and GL were presented only in ex vivo hydrolysates.

Conclusions: During in vitro hydrolysis and ex vivo digestion different products were released. Salmon proteins can be the source of ACE inhibitors and antioxidant peptides.

Key words: bioactive peptides, salmon, digestion, hydrolysis

PO2821

EFFECTS OF STARCH ON THE ANTIOXIDANT CAPACITY OF GUARANA POWDER (PAULLINIA CUPANA) UNDER CONDITIONS OF IN VITRO DIGESTION

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Background and objectives: Epidemiological evidence suggests that the antioxidant properties of polyphenols may impart health benefits, but the information concerning the antioxidant capacity of polyphenols in the presence of dietary nutrients is limited. The aim of this work was to evaluate the effects of starch on the antioxidant capacity of guarana powder (Paullinia cupana) under conditions of in vitro gastrointestinal digestion.

Methods: Samples of guarana and guarana associated with starch were subjected to an in vitro enzymatic digestion with pepsin, pancreatin and bile salt (stomach and small intestine). These samples were analyzed for total phenolics (TP) by Folin-Ciocalteu, procyanidins (PC) by butanol-HCl hydrolysis, Trolox equivalent antioxidant capacity (TEAC) assay with ABTS radical anion and oxygen radical absorbance capacity (ORAC) using fluorescein as the fluorescent probe. Analysis of variance (ANOVA) and significance test ($p<0.05$) were realized using the SAS software.

Results: The yield from enzymatic digestion of guarana powder showed the highest statistically significant values of TP (110.38mg GAE/g) and ORAC (3254.60μM Trolox equivalents/g). The decrease in antioxidant capacity observed when guarana was associated with starch, may be attributed to physicochemical interactions of guarana polyphenols and this nutrient. There was no statistical difference between values found of PC from the yield of guarana and guarana associated with starch; probably procyanidins do not interact with starch. However, the highest statistically significant value of TEAC was found in the yield of enzymatic digestion from guarana associated with starch (725.37μM Trolox equivalents/g).

Conclusions: The results obtained indicate that starch affect the antioxidant capacity of guarana powder, decreasing to TP and ORAC, increasing to TEAC, but does not affect the bioaccessibility of procyanidins from guarana powder.

Key words: Antioxidant capacity, in vitro digestion, guarana powder, starch.

PO2822

CITRUS FLAVONOIDS INHIBIT LDL OXIDATION AND MONOCYTE ADHESION IN ENDOTHELIAL CELLS

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Background and objectives: LDL oxidation and monocyte adhesion to endothelial cells are critical and initiating factors in the pathogenesis of atherosclerosis. Citrus fruits are one of the most popular fruits in the world, and contain many antioxidants such as flavonoids. In this study, we examined whether citrus flavonoids could inhibit LDL oxidation and monocyte adhesion to endothelial cells.

Methods: The effects of citrus flavonoids on human umbilical vein cells (HUVEC)–mediated LDL oxidation were determined by TBARS production and LDL mobility. The static monocyte adhesion assay was carried out using HUVECs and THP-1 cells. The protein expression of adhesion molecule and eNOS was detected by western blot assay.

Results: Eriodictyol, hesperetin and naringenin inhibited HUVEC-mediated LDL oxidation. Citrus flavonoids decreased TNF-α-induced monocyte-endothelial adhesion (eriodictyol: 61.1 %, hesperetin: 59.8 %, naringenin: 79.5 %). The ICAM-1 protein expression and NFkB activation were suppressed by citrus flavonoids.

Conclusions: These results suggest that citrus flavonoids may have anti-atherogenic effect through inhibiting LDL oxidation and monocyte adhesion to endothelial cells.

Key words: Flavonoids, LDL oxidation, endothelial cells

PO2823

EVALUATION OF ESSENTIAL OIL-DERIVED COMPONENTS FOR PREVENTION OF LIFESTYLE-RELATED DISEASES TARGETED TO COX-2 AND PPAR

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Background and objectives:COX-2, the rate-limiting enzyme in prostaglandin biosynthesis, plays a key role in inflammation and circulatory homeostasis. PPARs, ligand-dependent transcription factors belonging to the nuclear receptor superfamily, regulate lipid matobalism, cell proliferation and inflammation, and are involved in the control of COX-2 expression,

and vice versa. Several natural food-derived components such as resveratrol have been identified as suppressors of COX-2 expression and activators of PPARs (Neurosci. Lett. 2003, Nutr. Metab. 2010, Biol. Pharm. Bull. 2012). These two properties targeted to COX-2 and PPARs will be useful in evaluating functional food components against lifestyle-related diseases.

Methods: We evaluated essential oils from various plants using the in vitro cell-based transfection assay, and found that several chemical components have these properties (J. Lipid Res. 2010, Biochim. Biophys. Acta 2010, Biotech. Biochem. Biophys. 2011).

Results: From thyme, lemongrass and rose oils, we identified carvacrol, citral and citronellol/geraniol as major components of the activator of PPARα and γ and suppressor of COX-2 expression, respectively. PPARγ -dependent suppression of COX-2 promoter activity was also observed in response to carvacrol and citral treatments.

Conclusions: These results will be important in understanding the anti-lifestyle-related disease properties of food-derived functional components. We are now working on this study from in vitro cell culture to in vivo PPARγ knockout mice. Supported by Grants-in Aid for Scientific Research (Nos. 24300217 and 21700753) from the Ministry of Education, culture, Sports, Science, and Technology, Japan.

Key words: COX-2, PPAR, essential oil, anti-lifestyle-related disease

PO2824

COOPERATIVE EFFECTS OF SOY ISOFLAVONES AND CAROTENOIDS ON OSTEOCLAST FORMATION.

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Background and objectives: Osteoclasts play a major role in bone resorption. The functional food components that act on bone metabolism are poorly understood. Soy isoflavones and carotenoids are present in food such as soy beans and fruit, respectively, and are reported to inhibit osteoclast formation. Cooperative effects of these components on bone metabolism, however, have not been clarified. Thus, this study aimed to investigate the cooperative effect of soy isoflavones and carotenoids on osteoclast formation in vitro.

Methods: Bone marrow cells (BMC) from ddy mice (male, 6-9 wk old) were cultured in alpha-MEM containing 10% FBS and 1% Penicillin-Streptomycin medium. For osteoclast formation, 100 ng/ml recombinant human RANKL and 100 ng/ml recombinant mouse M-CSF were added with or without soy isoflavones (daidzein, genistein and R,S-equol) and carotenoids (zeaxanthin and lutein). Cells were stained for tartrate-resistant acid phosphatase (TRAP) after 6 days since induction of osteoclast differentiation by RANKL and M-CSF. TRAP positive cells containing three or more nuclei were counted as TRAP-positive multinuclear osteoclast like cells (MNC).

Results: While addition of genistein and R, S-equol did not have a significant effect, daidzein, zeaxanthin and lutein significantly decreased the number of TRAP-positive MNC in a dose dependent manner. The combination of either 10-5M daidzein or genistein with 10-5M of the carotenoids, enhanced the effect of either compound on the number of TRAP-positive MNC significantly.

Conclusions: It is the first report of possible cooperative effects by soy isoflavones and carotenoids on osteoclast formation. These results suggested that combination of soy isoflavones and carotenoids have the ability to enhance their individual inhibitory effects on osteoclast formation. These findings are of importance indicating a possible effect of functional foods containing these components on bone metabolism and prevention of bone loss.Acknowledgements: JST; MBIE NZ.

Key words: Soy isoflavone, Carotenoid, Osteoclast formation, Bone

PO2825

HYDROLYZABLE TANNINS IN THE LEAF EXTRACT OF EUCALYPTUS GLOBULUS SUPPRESS FRUCTOSE ABSORPTION IN THE CACO-2 CELL LINE

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Background and objectives: Fructose consumption has increased in the past three decades due to the use of high-fructose corn syrups as sweeteners in beverages and processed foods.

Excess fructose intake induces adiposity and insulin resistance syndrome, which can lead to non-alcoholic fatty liver disease, diabetes mellitus, and hypertension. Inhibition of fructose absorption may suppress diseases caused by fructose ingestion. It was previously demonstrated that Eucalyptus globulus leaf extract (ELE) inhibited intestinal fructose absorption (but not glucose absorption) in humans and rats. However, the active ingredients in ELE have not yet been identified.

Methods: To identify the constituent that inhibits fructose absorption in the intestine, ELE was subjected to bioactivity-guided fractionation through column chromatography and preparative high-performance liquid chromatography. Further, human intestinal epithelial Caco-2 cells were cultured in vitro on membrane filters and the apical sides were exposed to 1 mM fructose with or without ELE for 4 h. The fructose absorption was measured by analyzing the fructose concentration in the medium on the basolateral side.

Results: A 1 mg/mL dose of ELE inhibited 65% of fructose absorption. A hydrolyzable tannin, tellimagrandin I, was isolated as an inhibitory component (yield, 0.13%) with an inhibition rate of 49% at a dose of 0.005 mg/mL. Related compounds casuarictin, oenothein B, pedunculagin, strictinin, tellimagrandin II, 1,3-O-digalloyl-4,6-hexahydroxydiphenoyl-ƒÀ-D-glucose, and tri-, tetra-, and penta-O-galloyl-ƒÀ-D-glucoses exhibited inhibitory activity similar to that of tellimagrandin I. These compounds did not affect glucose absorption. In contrast, the aglycones of these tannins, ellagic acid and gallic acid, and other types of polyphenols (e.g., (+)-catechin, (-)-epigallocatechin 3-O-gallate, and quercetin) showed a low or no inhibitory activity.

Conclusions: Hydrolyzable tannins, such as tellimagrandin I, are the primary constituents of ELE responsible for inhibition of fructose absorption.

Key words: intestinal fructose absorption, eucalyptus, hydrolyzable tannin, glucose transporter, GLUT5

PO2826

SUBCELLUALR LOCALIZATION OF MIRACULIN AND ITS FUNCTIONAL EXPRESSION IN E.COLI

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Background and objectives: Losses or modifications of taste and smell are common in the elderly and result from aging and environmental stresses, which also represent risk factors for nutritional and immune deficiencies. However, little is known about the molecular mechanism of losses or modifications to these tastes.Miraculin isolated from red berries of Richadella dulcifica, a native shrub of West Africa, has the unusual property of modifying a sour taste into a sweet one. This homodimer protein consists of two glycosylated polypeptides that are cross-linked by a disulfide bond and belongs to the Kunitz-type soybean trypsin inhibitor (STI) family.

Methods: To clarify the functional relation of miraculin with Kunitz-type STIs, we investigated its subcellular localization and trypsin inhibitory activity.

Results: In transgenic Arabidopsis thaliana, miraculin, fused to yellow fluorescent protein, localized to and outside the plasma membrane depending on the putative secretion signal peptide. When transgenicseedlings were cultured in liquid medium, miraculin was present in the supernatant only after cellulase treatment. No trypsin inhibitory activity was detected in native or recombinant miraculin. From these results, miraculin is secreted outside the plasma membrane through the function of a signal peptide, conserved in some Kunitz-type STIs, whereas its trypsin inhibitory activity was lost during its functional evolution related to its dimer formation.Functional expression of miraculin was reported in host cells with the ability to glycosylate proteins, such as lettuce, tomato and the microbe Aspergillus oryzae, but not E. coli.

Conclusions: Thus, a question remains as to whether glycosylation of miraculin is essential for its taste-modifying properties. We find that recombinant miraculin expressed in E. coli has a taste-modifying property as a homodimer, not as a monomer, demonstrating that glycosylation is not essential for the taste-modifying property (J. Biochem. 2009 145, 445-50).

Key words: miraculin, taste, taste-modification, trypsin inhibitor

PO2827

MOLECULAR MECHANISM OF PPARγ ACTIVATION BY RESVERATROL

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Background and objectives: Resveratrol, a phytoalexin and antioxidant polyphenolic compound found in red wine and various plant products, has long been suspected to have cardioprotective effects and to be a contributor to the so-called 'French paradox' (i.e., the relatively low incidence of coronary heart disease in France compared to other developed countries with comparable diets). We found that resveratrol is a triple activator for nuclear receptor PPAR,/and, and that daily oral intake of resveratrol protects brain in a mouse ischaemic stroke

model but not in PPAR? knockout mice (Neurosci Lett 2003 & Nutr Metab 2010). These dates suggested that PPAR? may be a potential molecular target for the treatment of coronary heart disease and stroke (Biol Pharm Bull 2012).

Methods: We indicated that 4'hydroxy group of resveratrol plays a key role in activation of PPAR by (1) comparison with structure-activity relationship among various polyphenols and a synthetic resveratrol analogue in cell-based reporter assays, (2) docking mode simulation based on the reported crystal structure of PPAR? ligand binding domain with its agonist, and the following verifying mutation analyses, and (3) PPARactivation by a resveratrol analogue in vitro and in vivo.

Results: An examination of the structure-activity relationships of resveratrol-related compounds revealed that the 4?-hydroxyl group of resveratrol is functionally important for the direct activation of PPAR?. This finding was confirmed by a docking model simulation with a subsequent experiment using the crystal structure of the PPAR LBD, as well as by an in vivo investigation of PPAR activation by resveratrol analogs.

Conclusions: These results suggest that PPAR? is one of the direct molecular targets for resveratrol.Supported by Grants-in Aid for Scientific Research (Nos. 24300217 and 21700753) from the Ministry of Education, culture, Sports, Science, and Technology, Japan.

Key words: resveratrol, PPAR, polyphenol

PO2828

COOKING PROCESS DECREASES IODINE CONTENT BUT INCREASES PHENOLIC COMPOUNDS IN IODINE SUPPLEMENTED CARROTS

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Background and objectives: A lot of people around the world suffer from iodine deficiency. The major reason for iodine deficiency its low amount in daily diets.The objective of this study was to assess of iodine, phenolic compounds concentration and antioxidant activity of raw and cooked carrots which were biofortified with the iodine during cultivation.

Methods: Carrots (Ducus carrota L.) were cultivated in heavy soil in 2012; including the following treatments: 1- control (without iodine application), 2- KI fertilization (2.5 kg ha-1 pre-sowing and 2.5 kgha-1 as a top dressing).Carrots storage roots from both treatments were washed (half of them was peeled) and cooked for 20, 30 and 40 min. The proportion of water to vegetables was 2:1The concentration of iodine was determined by the ICP-OES with the use of the cold vapor generator technique. The antioxidant activity was determined by the measurement of the ability of scavenging free radical ABTS. The level of phenolic compounds was measured by the Poly-Swain and Hills method.

Results: Biofortification of carrots with KI significantly increased the concentration of iodine compared to the control. The time of cooking had affected the concentration of iodine in the biofortified carrots (peeled and unpeeled). The lowest concentration of iodine was measured in carrots cooked for 40 min. The highest capacity of scavenging free radicals was found in unpeeled control and biofortified carrots. The concentration of phenolic compounds was higher in control unpeeled cooked for 20 min. carrots.

Conclusions: The best source of iodine is raw carrots but the higher concentration of phenolic compounds was measured in unfortified unpeeled and fortified carrots cooked for 20 min.This work was financed by Polish National Science Center, project no. UMO-2011/03/D/NZ9/05560 (2012-2015).

Key words: iodine, antioxidant activity, carrots, biofrtification.

PO2829

CHEMICAL COMPOSITION OF WHOLE, HUSKED GRAIN ADN HUSK OF SELECTED VARIETES OF BUCKWHEAT

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Background and objectives: Buckwheat is a gluten free grain and may be used in preparation of gluten free products. This grain is a good source of proteins, carbohydrates and fiber. The aim of this study was to determine the chemical composition of whole, husked grains and husk of selected varieties and lines of buckwheat.

Methods: Verities of buckwheat were obtained from Breeding Station of Palikije, Lublin Poland. Following cultivars were used for study: Panda, Kora, 8/2008, 9/2006, 5/2006, 21/2002Fractions of buckwheat, previously grounded, were used to measure the content of proteins, fat, ash, total dietary fiber using the AOAC methods.

Results: The results showed that the whole grain of buckwheat, husked grains and husk, differed in terms of the content of chemical components. These differences also occurred

between the particular variants and families of buckwheat varieties.In all fractions of buckwheat, carbohydrates accounted for the largest percentage of whole determined chemical components and the richest source of them was husked grains especially Kora varieties. The content of proteins in whole and husked buckwheat grains was comparable. The richest in minerals was a fraction of whole buckwheat grains, whereas the smallest amount in the studied fractions appeared fat. The highest content of dietary fiber was found in husk.

Conclusions: Buckwheat is a rich source of carbohydrates and dietary fiber especially not husked grains. This wheat should be more often used for preparation of food products.

Key words: buckwheat, proteins, carbohydrates, dietary fiber

PO2830

EFFECTS OF FERMENTED SOY FOOD CONTAINING S-EQUOL (SE5-OH) ON BONE LOSS, BLOOD FLOW, AND MAMMARY ESTRADIOL LEVELS IN OVARIECTOMIZED RATS

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Background and objectives: We have developed a fermented soygerm food containing S-equol (SE5-OH) using equol-producing lactic acid bacteria (Lactococcus strain 20-92). Since S-equol has estrogen-like effects, there has been focused on its health benefits for postmenopausal women. In this study, we examined the effects of SE5-OH on bone mineral density (BMD), vascular function, and estradiol (E2) level in breast tissue in ovariectomized (OVX) rats.

Methods: Eleven-week-old female SD rats underwent either a sham operation (sham group) or OVX. The OVX rats were divided into those groups: OVX+SE5-OH (SE) group), OVX+ S-equol (EQ) group, and OVX groups. The OVX+SE and the OVX+EQ groups were fed a same dose of 0.06% S-equol. Tail blood flow was measured weekly. At 6 week, 24-hour urine was collected for measurement of isoflavone and equol concentration and BMD of the lumbar spine and femur were measured by DXA. The breast fat tissue was collected and E2 level was measured.

Results: Tail blood flow was significantly decreased in the OVX group compared with the sham group at weeks 4, 5, and 6Tail blood flows were higher in the OVX+SE and the OVX+EQ groups compared with the OVX group at weeks 5 and 6The BMDs of lumbar spine and femur in the OVX + SE and the OVX + EQ groups were higher than those in the OVX group. Consequently, SE5-OH and S-equol prevented the OVX-induced decline in BMD. The E2 levels in the breast fat tissue in the OVX+SE and the OVX+EQ groups were lower compared with the OVX group.

Conclusions: SE5-OH and S-equol improved BMD, vascular function, and E2 level in breast tissue, suggesting that these may have health benefits for postmenopausal women including low breast cancer risk.

Key words: equol, soy, bone mineral density, blood flow

PO2831

REDUCED LIPID PEROXIDATION IN THE HEART OF DATE SEED POWDER FED RATS

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Background and objectives: Date seeds have been shown to contain high amounts of polyphenols and a high antioxidant capacity. In a previous study we showed that date seed powder reduced lipid peroxidation in rat liver and serum. The purpose of this study was to determine the effect of date seed powder on lipid peroxidation in rat heart.

Methods: Male Wistar rats (six weeks old) were fed a basal diet with 0%, 7% or 14 % date seed powder for 30 days. All three diets were isonitrogenous and isocaloric. At the end of the feeding period, rats were killed and heart homogenate was analyzed for the levels of the lipid peroxidation product malondialdehyde (MDA). Additionally, the levels of the antioxidants glutathione (GSH), ascorbic acid, and vitamin E were also determined.

Results: Compared with the control group, rats fed either 7% or 14% date seed powder had significantly ($p<0.05$) lower levels of heart MDA, and rats fed the 14% date seed powder diet had significantly lower heart MDA than those fed the 7% date seed powder diet. Date seed powder increased the levels of heart GSH and vitamin E in a dose-dependent manner, however, this effect was only statistically significant ($p<0.05$) for GSH.Ascorbic acid levels were not affected by any of the dietary treatments.

Conclusions: The results obtained clearly showed that date seed powder reduced heart lipid peroxidation most likely due its high content of polyphenols. Date seeds are increasingly being demonstrated to exert ameliorative effects on oxidative damage, thus a potential for protection from diseases in which oxidative stress is involved.

Key words: Date seed, lipid peroxidation, antioxidant status, heart, rat

PO2832

EFFECTS OF ORIENTAL PLUM EXTRACT ON THE CONGNITIVE FUNCTION AND NEURODEGENERATION-RELATED PROTEIN EXPRESSION IN DIET INDUCED TYPE 2 DIABETIC RTAS

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Background and objectives: Recent studies have indicated that Type 2 diabetes mellitus (T2DM) is one of the risk factors of Alzheimer's disease (AD). An impaired insulin signaling caused by insulin resistance may result in abnormal protein expressions in the brain and neuron damages. The study aimed to investigate the prevention of AD-type neurodegeneration by consuming polyphenols-rich oriental plum (Prunus salicina Lindl) extract on T2DM rats.

Methods: A 20-week period of high-fructose-high-coconut oil diet was given to induce T2DM on male Wistar rats, followed by an 8-week oriental plum extract (OP) feeding intervention.

Results: The results showed that OP intervention significantly reduced insulin resistance by improving the Homeostasis model assessment-insulin resistance (HOMA-IR). The Morris water maze test results indicated the spatial learning function was improved after the OP consumption. The intervention also reduced amyloid-£] (A£]) and phosphorylated tau (p-tau) protein levels in the cerebral cortex and reduced A£] deposition in the hippocampus of the T2DM rats.

Conclusions: The oriental plum extract decreased the cognitive decline and reduced the expressions of AD-type pathological proteins A£] and p-tau in T2DM rats.

Key words: Alzheimer's disease, Diabetes, Polyphenols

PO2833

EXPERIMENTAL OBSERVATIONS OF ANTI-DIABETIC ACTIVITY OF ZINC COMPLEXES WITH THEANINE

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Background and objectives: The insulinomimetic activity of the Zn2+ ion has been reported, and the zinc complexes are less toxic compared to free zinc-ion, and is known to have insulinomimetic activity at lower concentration than the simple Zn2+ ion.Theanine is one of the main components of Japanese green tea, has been suggested to reduce fat tissue in rodents. Therefore we expected the theanine may strengthen the anti-diabetic action of Zn(II) complex. Observations of anti-diabetic activity of the Zn(II) complexes with Theanine have done.

Methods: Zinc complexes with Theanine (L-ƒÁ-glutamylethylamide = gln-e) and L-ƒÁ-glutamylmethylamide (gln-m), Zn(gln-e)2 and Zn(gln-m)2 synthesized respectively, andinsulinomimetic activity were compared to that of Zn(gln)2in an in vitro study using isolated rodent adipocytes treated with epinephrine in the presence of glucose, expressed as IC50 value (50% inhibition concentration) of free fatty acids (FFA) released from fat cells. Then the anti-diabetic activity of Zn(gln-e)2 was examined in an in vivo experiment on KK-Ay mice, the model animals of type 2 DM, by intra-peritoneal (i.p.) injection of 3-4 mg Zn/kg b.w./day for 13 days.

Results: Zn(gln-e)2 were found to have higher insulinomimetic activity than that of Zn(gln-m)2, the IC50 values being 0.56 and 0.61, respectively. The blood glucose level of the group treated with a Zn complex, Zn(gln-e)2, decreased significantly after 13 days compared to those of non-treated and gln-e treated groups. The serum concentrations of triglyceride (TG) and HbA1c decreased significantly in the Zn(gln-e)2 treated KK-Ay mice compared to those of the gln-e treated group, respectively. Furthermore, the improvement in glucose tolerance was confirmed by an oral glucose tolerance test.

Conclusions: Result of anti-diabetic activity of Zn(II) complexes with Theanine expresses the possibility of useful compound to prevent or improve the diabetic conditions.

Key words: anti-diabetic activity,zinc complexes,Japanese green tea,theanine,

PO2834

EFFECTS OF DIETARY LACTOBACILLUS GASSERI SBT2055 ON GLUCOSE METABOLISM IN RATS

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Background and objectives: We have already published that Lactobacullus gasseri SBT2055 (LGSP) as a probiotic has the effects of anti-obesity in rats (Br J Nutr. 99, 1013-1017, 2008) and human subjects (Eur J Clin Nutr. 64, 636-643, 2010). In this study, we focused on glucose metabolism in rats fed

LGSP.**Methods:** We used two rat strains that were Sprague-Dawley (SD) rats as a non-diabetic model and Goto-Kakizaki (GK) rats as a diabetic model. The SD and GK rats were fed diets containing skim milk (control diet) or skim milk fermented by LGSP (LGSP diet) for 4 weeks. Oral glucose tolerance test (OGTT) was performed at 3 week. After feeding, serum basic biomarkers for diabetes and glycogen levels in muscle and liver were measured.

Results: In the SD and GK rats, fasting serum glucose and insulin concentrations were not different between the control and LGSP groups. The area under the curve (AUC) following the OGTT in the SD rats fed the LGSP diet was smaller than in the SD rats fed the control diet. There was no difference in the AUC of the GK rats, but, in detail, the AUC after the peaks of the glucose level in the OGTT tended to decrease ($P < 0.059$) in the LGSP group. As the fate of glucose incorporated into the cells, we measured glycogen levels in muscle and liver. The glycogen levels in muscle and liver of SD rats did not differ between the groups. In the GK rats, the glycogen levels in the both tissues of the LGSP group were higher than those of the control group.

Conclusions: LGSP have different effects in the glucose metabolism depending on developmental diabetic status. This probiotic may prevent diabetic development in the early stage, mainly via improvement of insulin resistance.

Key words: probiotics, diabetes

PO2835

SYNTHESIS OF FOLATE BY KEFIR STARTER CULTURE

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Background and objectives: Folate is relative to the nutritional needs of human, frequently among the most limiting of all vitamins. Important sources of folate in dietcan be dairy products. Although,milk is not a rich source of dietaryfolate, many dairy products are processed using microbial fermentations in which folate can be synthesized.The purpose was to evaluate the main folate forms present inkefir produced with kefir granules consist of different strains of lactic acid bacteria and yeast.

Methods: Folates were extractedin the 0.1 M phosphate buffer (pH=7.0), followed by deconjugation withconjugase and destruction of matrixbyprotease. The folates were separated by HPLC .

Results: The folate forms found in analyzed milk and kefirwere5-methyltetrahydrofolateandtetrahydrofolate. The results indicated great differences in the content of that forms in kefirs produced with kefir granules consist of different strains of lactic acid bacteria and yeast. The amount of 5CH3FH4and THF forms in UHT milk (2% of fat) were4.22 and 0.67 micg/100 g., respectively.Total folate contentin analyzed samples of kefir varied between 6.15 and 9.51 micg/100 g of product. However, the distribution of the individual folate forms in kefir differed clearly: the 5-methyltetrahydrofolate form from 2.98 to 7.18 and tetrahydrofolate from 1.64 to 2.73 micg/100 g. The results indicated that not each kefir had significantly higher level of total folate compared to UHT milk. This may indicate the importance of using kefir granules with suitable yeast and bacteria strains.

Conclusions: Producers should pay more attention to choose appropriate starter culture to improve the stability of folates during fermentation and storage and thus to increase the folate content in fermented dairy products.

Key words: folate, kefir, starter culture, HPLC

PO2836

FOLATE CONTENT IN DIFFERENT BRANDS OF BEER

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Background and objectives: Folates have identified as one of the most important vitamins for normal human metabolic function. They are required for the DNA and RNA synthesis, which are primary events for cellular replication and growth. There have been several reports of beer as a source of B-vitamins. Thiamine is relatively deficient in beer, but the others may be present in significant quantities.

Methods: In this work folate levels in arange of different brands of beer have been measured using HPLC with fluorescence detection. Folates were extracted in a 0.1 M phosphate buffer (pH 6.1), followed by deconjugation with conjugase (rat serum) and destruction of matrix by amylase and protease.

Results: Only one formof folate - 5- methyltetrahydrofolate (5MTHF) was identified. 5MTHF content in nine examined beers ranged from 0.26 to 5.10 micg/100 g of beer. One imported beer contained trace of folate. Higher levels of 5MTHF in no pasteurized beers were found and also in wheat beers with secondary fermentation in the bottle. It is possible that folates can be released from the yeast into the beer during subsequent maturation.

Conclusions: It is believed that by selection of raw material (barley, wheat) and some changing in the brewing process, beer with enhanced folate content could be produced.

Key words: folate, beer, HPLC

PO2837

EFFECTS OF LUPINUS ALBUS PROTEIN HYDROLYZATE AND INSOLUBLE FIBER IN A DIET-INDUCED HYPERCHOLESTEROLEMIC MODEL LIVER AND COLON HISTOLOGICAL EXAMINATION

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Background and objectives: The high content of protein, dietary fiber and bioactive compounds of Lupin (Lupinus spp) makes it a high nutritional value legume with promising antioxidant and hypocholesterolemic effects. We aimed to study the possible beneficial effects of lupin protein hydrolyzate, combined or not with lupin insoluble fiber, on the hepatic lipid profile and histological changes of liver and colon in an experimental animal model of rats fed a diet rich in cholesterol and coconut oil.

Methods: Lupin protein hydrolyzate (LPH) was prepared by alkaline water extraction and protein hydrolysis using recombinant proteases. The final insoluble fiber residue (LIF) was collected after the extraction process and freeze-dried. Thirty Wistar rats were divided into 5 groups (n = 6 per group): Casein-Cellulose normolipidemic control group (CT), and four high-fat hypercholesterolemic experimental groups: Casein-Cellulose group (HC), Casein-LIF group (HCF), LPH/Cellulose group (HID), and LPH/LIF group (HIDF). Caecum content, liver and colon were extracted to analyze pH of caecum and hepatic cholesterol and triglycerides. A portion of liver and colon was fixed in 10% phosphate-buffered formalin (PBF), embedded in paraffin, and sectioned for microscopy histological examination.

Results: Hepatic cholesterol and triglycerides levels were higher in animals fed with caseine-based diets (HC, HCF) compared to those fed with lupin protein hydrolyzate-based diets (HID, HIDF). Caecum hyperthrophy was directly related to the inclusion of lupin protein hydrolyzate in diets. There was a decrease in caecum content pH values in animals fed with HCF and HIDF diets. Significant changes in liver and colon histology were apparent due to different diet administration.

Conclusions: Lupin protein hydrolyzates and insoluble fiber improved the hepatic lipid profile and significant morphological changes in liver and colon of rats fed a high fat diet, thus showing promising potential health benefits.

Key words: Lupin, high-fat diet, protein hydrolyzate, insoluble fiber, liver, colon

PO2838

ENZYMATIC ASSAY FOR THEANINE USING γ-GLUTAMYLTRANSPEPTIDASE AND AMINE DEHYDROGENASE

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Background and objectives: Theanine, γ-glutamylethylamide, is a non-protein derived amino acid that was first isolated from green tea leaves in 1940s. It is known as its distinctive umami taste, and furthermore there is a considerable demand for theanine as a supplement or food ingredient because of its beneficial effects such as relaxation effects, improvement in learning ability, cancer prevention, prevention of vascular diseases and improvement of immune system. For measurement of theanine in commercial tea beverage and biochemical samples, simple enzymatic determination is useful as an easier and environmentally friendly process with lower costs. Here we report an enzymatic assay for theanine using the coupled-reaction of γ-glutamyltranspeptidase and amine dehydrogenase.

Methods: γ-Glutamyltranspeptidase from Pseudomonas nitroreducens NBRC 12694 (PnGGT) and amine dehydrogenase from Paracoccus denitrificans NBRC 12442 (PdAmDH) was used for quantification of theanine in several commercial tea beverages. Phenazine ethosulfate and 2, 6-dichloroindophenol (DCIP) were used as electron acceptors. Theanine solutions (5, 10, 20, 40, 60, 80, 120, 160, and 200 μM) were used as standards. The assay was performed by measuring absorbance change at 600 nm derived from DCIP with a simple spectrophotometer.

Results: The calibration curve was linear between 0 to 200 μM of theanine with R^2 = 0.998. The use of ascorbate oxidase in addition to the combination of laccase and polyvinylpolypyrrolidone was very effective for removal of antioxidants

from tea sample as pretreatment. No effect of the pretreatment even for 5 min on theanine was observed. Consequently, the values of theanine in the samples of commercial tea beverage in pet bottle obtained by the current method were close to the values with the pre-column derivatization high performance liquid chromatography.

Conclusions: Combination of PnGGT and PdAmDH can be used for L-theanine determination in food control and biological research.

Key words: theanine, tea, assay, γ-glutamyltranspeptidase, amine dehydrogenase

PO2839

EFFECTS OF SOYBEAN SOLUBLE POLYSACCHARIDE DERIVED FROM "OKARA" ON JAPANESE WOMEN WITH CONSTIPATION

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Background and objectives: The purpose of this study was to estimate effects of soybean soluble polysaccharide (SSPS) derived from "Okara" on women with constipation.

Methods: A double-blind crossover study was conducted on 42 students (mean age of 19.1 ± 0.6 years) and 33 adults (mean age of 58.7 ± 13.8 years) with weak constipation. Each subject was given SSPS beverage (contains 5.0mg /100ml drink) or placebo beverage, one time a day for 2 weeks. The effect of SSPS was assessed after and before the intake of it using the questionnaire, Japanese GSRS (gastrointestinal symptom rating scale) and eating habits. Dietary intake was estimated with three-day records method.

Results: The defecation frequency of subjects following the intake SSPS period was significantly increased as compared with the observation period ($p<0.01$); however, significantly increase was not observed with the placebo period.According to the intake of dietary fiber, the two groups were classified; group A was low intake (<11.7 g) and group B was high intake (≥11.7g). In group A, it was showed the defecation frequency of subjects following the intake SSPS period was significantly increased ($p<0.01$); however, the placebo period was not significantly increased.The constipation scores which calculated from the GSRS in the intake SSPS period significantly decreased from 9.77 ± 4.08 to 7.53 ± 3.54 ($p<0.01$). Also, the rate of change of the overall scores in the intake SSPS period significantly decreased ($p<0.01$).

Conclusions: Based on these results, it was suggested that the SSPS beverage was effective for inducing defecation by subjects with constipation. The intake of the SSPS wad considered as one of the effective methods to improve the QOL of the person who have a gastrointestinal symptom.

Key words: soybean soluble polysaccharide, constipation, GSRS

PO2841

IMPROVEMENT OF LIPID METABOLISM AND LIFE SPAN BY RESVERATROL VIA PPARALPHA ACTIVATION

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Background and objectives: Long-term moderate consumption of red wine is associated with a reduced risk for cardiovascular diseases. Resveratrol, a phytoalexin contained in grapes, red wine and various plants, has been shown to be an antioxidative polyphenol, thereby exerting beneficial effects upon cardiovascular and central nervous systems. PPARs, ligand-dependent transcription factor belonging to the nuclear receptor superfamily, are considered molecular target against lifestyle-related diseases by regulating lipid metabolism. We found that resveratrol activates PPARalpha, beta/delta and gamma in cell-based reporter assays, and that daily oral intake of resveratrol protects brain against ischemic stroke in mice through a PPARalpha-dependent mechanism, suggesting that PPARalpha will be a potential molecular target for resveratrol (Neurosci. Lett. 2003, Nutr. Metab. 2010, Biol. Pharm. Bull. 2012).Methods and

Results: We showed that four-weeks intake of resveratrol as well as fenofibrate, the synthetic PPARalpha agonist, with normal diet reduces plasma triglyceride, and upregulates hepatic expression of SIRT1 and PPARalpha-responsive genes such as acyl CoA oxidase, carnitine palmitoyltransferase 1, and fatty acid binding protein 1 in the wild-type but not PPARalpha knockout mice. Moreover, long-term intake of resveratrol with high-fat diet prevented body weight gain and accumulation of lipid in both white adipose tissue and liver, and improved the life span in the wild-type, but not in PPARalpha knockout mice.

Conclusions: These findings indicate that PPARalpha activation by resveratrol is one of the providing beneficial effects against lifestyle-related diseases and aging.Supported by Grants-in Aid for Scientific Research (Nos. 24300217 and 21700753) from the Ministry of Education, culture, Sports, Science, and Technology, Japan.

Key words: resveratrol, PPAR, lipid metabolism, life span

PO2842

REDUCTION IN MYELOPEROXIDASE LEVELS AFTER CONSUMPTION OF READY-TO-EAT MEALS SUPPEMENTED WITH COCOA EXTRACT WITHIN A HYPOCALORIC DIET

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Background and objectives: Myeloperoxidase (MPO) is a biomarker positively associated with oxidative stress, inflammation and hypertension. Cocoa polyphenols provide protection in blood pressure but the effect on MPO levels remains untested. Therefore, the aim of this study was to assess if the daily consumption of cocoa-extract, integrated into ready-to-eat meals, within a hypocaloric diet, could have specific benefits on MPO and blood pressure in overweight/obese elderly subjects.

Methods: Forty seven subjects (mean age 57.53±5.27 y) participated in a randomized, parallel, double-blind study. The trial consisted on the consumption of ready-to-eat dishes (10 varieties) and desserts (4 varieties) without (control group) or containing 1.4g of cocoa extract (cocoa group) integrated in a calorie-restricted diet (15% E) during 4 weeks. Food record questionnaires, blood samples, blood pressure and body composition data were collected.

Results: Both groups improved significantly ($p<0.05$) anthropometric variables without losing significantly lean mass. Also, subjects in both dietary interventions significantly lowered total cholesterol, LDL-c (low density lipoprotein-cholesterol), TG (triglycerides), insulin and HOMA (homeostasis model assessment) levels. Interestingly, MPO decreased significantly only in the cocoa group ($p=0.007$), however no differences were found between groups ($p=0.171$). Regarding blood pressure, it decreased significantly in both groups ($p=0.001$). All of the participants reported similar adherence to meal consumption.

Conclusions: Cocoa extracts could be a suitable bioactive compound to improve pathologies related to inflammation, oxidative stress and hypertension, since MPO levels were specifically reduced after cocoa consumption.The authors acknowledge the financial support of the CDTI within CENIT-SENIFOOD as well as the University of Navarra LE/97Also, thanks to Tutti Pasta S.A and the National Center for Food Safety and Technology of Navarra. Idoia Ibero-Baraibar gratefully acknowledges the scholarship from Navarra University.

Key words: Cocoa, polyphenols, myeloperoxidase, nutritional intervention, ready-to-eat meals.

PO2843

EFFECTS OF CONSUMING CHEESE NATURALLY ENRICHED IN PUFAS ON BODY COMPOSITION IN OVERWEIGHT AND OBESE DYSLIPIDEMIC PEOPLE.

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Background and objectives: The association of conjugated linoleic acid and omega 3-polyunsaturated fatty acids present in milk fat may have a preventive role in the cardiovascular risk mainly through the reduction of total body fat. We evaluated the combined effects of those fatty acids in a naturally PUFA enriched cheese on body composition.

Methods: Prospective, randomized, double-blind, placebo-controlled clinical trial. A total of 62 adults, were randomized to receive during a 12 weeks period the functional enriched cheese (group B) vs. placebo cheese (group A) in the context of an individualized hypocaloric diet and a physical activity promotion programme. We analyze the results of body weight change and body composition measured by DXA.

Results: 53 participants were included in the intervention study (68% were female, aged 49.26±9.65 year-old). At the end of the study group B showed a significant decrease ofandroid fat percentage (A: -1.67±3.66% vs. B: -3.68±3.3% $p<0.05$), gynoid fat percentage (A: -0.65±1.69% vs. B: -2.22±2.47% $p<0.01$), total body fat mass (A: -0.76±1.83% vs. B: -1, 98±1.77% $p<0.01$), body weight (A: -1.01±2.51 kg vs. B: -3.10±2.44 kg $p<0.05$), waist circumference (A: -1.75 2,6 cm vs. B: -2.58±2.05 cm $p<0.05$) andbody mass index (A: -0.40±0.92 kg/m2 vs. B: -1.15±0.90 kg/m2 $p<0.05$.

Conclusions: This functional cheese modified positively the body composition of the overweight and obese patients, being a useful food in Dieting Programs.This work has been supported by CENIT-PRONAOS Project (CEN-20081004).

Key words: functional cheese, PUFA-enriched cheese, Obesity.

PO2844

SEARCH FOR FOODS WITH DPP-4-INHIBITORY ACTIVITY

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Background and objectives: Dipeptidyl peptidase (DPP) -4 inhibitors are promising new therapies for type 2 diabetes, since DPP-4 is an enzyme that inactivates incretin with an insulinotropic action.Foods containing a substance with DPP-4-inhibitory activity are also believed to be useful to dietary cure for type 2 diabetes.Therefore, we determined the inhibitory activity of 70% ethanol extracts from foods.

Methods: DPP-4 enzyme assays were carried out using 96-well microplates.For screeningsof DPP-4 inhibitory activity, a sample extract, buffer(0.1M Tris-HCl), and the enzyme (the extract from rat intestinal mucosa) were mixed, shaken, and incubated for 5 min at 37(final volume 50µl).Then, the enzyme reaction was started by the addition of 50 µl of the assay buffer containing a substrate (2.5 mM Gly-Pro-pNA).Absorbance at 405 nm of the reaction mixtures was continuously determined with a microplate reader at 3min time intervals. The inhibition was estimated by subtracting the reaction velocity ofDPP-4 with a sample from the velocity of the enzyme without a sample.

Results and Conclusions: The ethanol extracts from about 70 kinds of food were tested and 6 extracts were found to have a significant inhibitory activity.Among these extracts, the extracts from black tea, oolong tea, and green tea leaves showed higher inhibitions than the others. The tea extracts also showed strong inhibitions against porcine and human DPP-4s.

Key words: DPP-4, Inhibitory activity, Diabetes, Tea

PO2845

CYTOTOXIC EFFECT OF AQUEOUS EXTRACTS OF SAFFRON FLORAL BIO-RESIDUES

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Background and objectives: Saffron (Crocus sativus L.) production is aimed to obtain the saffron spice which is the dried stigma of its flowers. For every kg of spice produced, about 63 kg of floral bio-residues are usually thrown away [1]. Saffron floral bio-residues proved to have high antioxidant contents [2] and a suitable nutritional composition [1] for using them as food ingredients. However, toxicity studies to demonstrate the safety of consuming these products have not been performed. Therefore, as a first study of its overall toxicity, the aim of this work was to determine the cytotoxic effect of aqueous extracts of saffron floral bio-residues to contribute to their potential use as functional ingredients.

Methods: Two aqueous extracts of freeze-dried floral bio-residues harvested in Castilla-La Mancha, Spain in 2010-2011 were prepared: 5 g in 150 ml of water (E1) and in 150 ml of water:HCl (100:1, v/v) (E2). They were filtrated through a Buchner funnel, concentrated under vacuum and freeze-dried. Total polyphenols and anthocyanins were determined [3, 4]. Cell viability and cytotoxicity were assayed with the 3-(4,5–dimethylthiazol–2–yl)–2,5–diphenyltetrazoliumbromide (MTT) test [5].

Results: Aqueous extracts showed very high polyphenol and anthocyanin contents, being greater in E1 than in E2The citotoxicity induced after 3 days exposure to E1 and E2 was very low. Only the E1 at the highest tested concentration (900 µg/ml) caused a decrease of 38% in the cell viability. E2 did not cause any decrease in any of concentrations tested, even increased the cell viability. This could be due to their high sugar content or bioactive compounds such as polyphenols.

Conclusions: Aqueous extracts of saffron floral bio-residues are not cytotoxic at concentrations lower than 900 µg/ml.Thanks to JCCM-FEDER (POIC10–0195–984).

Key words: Crocus sativus L.; Flower waste; Phenolic content; Cell viability assays.

PO2846

A COMPARATIVE STUDY ON FUNCTIONAL FOOD REGULATION BETWEEN CHINA AND THE EUROPEAN UNION

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Background and objectives: With the rapid development of functional (health) food market in the world, the supervision and management of it is facing a tremendous challenge. Aims: The purpose of this paper is to promote the development of functional food by contrasting the approval and supervision of functional foods in China with that in Europe.

Methods: The main path of obtaining information in the study were from academic journals, books, magazine and newspaper articles, market reports, proceedings, and web pages of relevant regulatory authorities and regulatory consultants etc.

Results: Based on the six specific comparative analyses, include definition, laws and regulations, application and supervision, evaluation, claims and labels, and product management, there are similarities and differences on the regulation processes between two countries.

Conclusions: These results could offer reference for learning from each other and further boost international cooperation and exchanges

PO2847

NEW SPL ON PHYTONUTRIENTS AND FUNCTIONAL FOOD REGULATION IN CHINA

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Background and objectives: With the rapid development of functional (health) food market in the world, the Science and management of it is facing a tremendous challenge. The purpose of this paper is to describe the New SPL (specific proposed level) for some phytonutrientsand approval process on food claims in China.

Methods: The main of relevant regulatory analysis,evidenceon proposed level of some phytochemicals,function claim regulatory systems in China.

Results: Introduce the six specific comparative analyses, include definition, laws and regulations, application and evaluation, claims and labels, and product management.And introduce the new recommendation for 21 SPLof phytochemicals.

Conclusions: These results could offer reference and further boost international cooperation and exchanges.

Key words: Function claims,specific proposed level, phytochemicals

PO2848

BIOACTIVE FATTY ACIDS ANALYSIS ON DAIRY PRODUCTS BY FAST-GAS CHROMATOGRAPHY: A COMPARATIVE APPROACH BETWEEN TWO HIGHLY POLAR CAPILLARY COLUMNS

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Background and objectives: Bovine milk fat contains a large number of fatty acids (FA) exhibiting positive and negative physiological effects to human health. Special attention is placed on FA having a potential anti-atherogenic/carcinogenic role such as butyric acid and conjugated linoleic acid (CLA), and those essentials for the human metabolism such as linoleic and α-linolenic acid (n-6 and n-3). Conversely, milk fat encompasses FA ascribed to be detrimental for human health because leading to a high risk of cardiovascular diseases, such as the medium chain saturated FA and trans-FA.The advent of fast gas-chromatography (GC) has led to a significant reduction in analysis time. Therefore, in this investigation two fast GC methods were developed for the analysis of FA methyl esters (FAME) in diary fat.

Methods: The analyses were performed with a fast GC-FID using a SLB-IL111 15m x 0.10mm i.d. 0.08µm df (ionic liquid stationary phase), and a BPX70 10m x 0.1mm i.d., 0.2 µm df (cyanopropyl stationary phase) column, respectively. Complex commercial mixtures of FA and butter fat, were used for FA identification, method optimization and validation.

Results: About 50 FA were separated in less than 8 minutes by both columns. The SLB-IL111 and BPX70 showed an R2 value for the accuracy and linearity of 0.95, 0,99 and 0,99, 1,00 respectively. The limit of quantitation and limit of detection were less than 0,63 and 0,19 ppm in both the columns, and the RSD% value for the inter/intra day precision were higher than 10% on SLB-IL111 while less than 10% on BPX70.

Conclusions: The BPX70 capillary column showed the best analytical performances during the method optimization and validation. Furthermore, the BPX70 was able to resolve more complex coelutions than SLB-IL111, such as those relatives to the trans FA.

Key words: bovine milk, fast gas chromatography

PO2849

PHLORETIN SUPPRESSES THROMBIN-MEDIATED INTERACTIONS AMONG ENDOTHELIAL CELLS, MONOCYTES AND PLATELETS

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Background and objectives: The rupture of atherosclerotic plaques can cause arterial thrombosis by releasing thrombin. There is an association between hypercoagulability and increased atherosclerosis. Thrombin may influence the onset and progression of atherosclerosis as a pro-inflammatory mediator. This study investigated whether phloretin, a dihydrochalcone found in apple tree leaves, severed a linkage between thrombosis and atherosclerosis through blocking protease activated receptor (PAR).

Methods: Endothelial cells were pretreated with 1-20 uM phloretin and stimulated with 10 U/ml thrombin. Cellular expression of several target gene proteins including PAR-1 was determined by Western blot analysis. Interaction of THP-1 monocytes onto activated endothelial cells was elucidated by using in vitro cell adhesion assay.

Results: Non-cytotoxic phloretin at the doses of 1-20 uM attenuated adhesion of monocytes and platelets to thrombin-inflamed human endothelial cells in a dose-dependent manner, dampening endothelial expression of CD40 and P-selectin up-regulated by thrombin. Additionally, the phloretin supplementation inhibited thrombin-enhanced secretion of monocyte chemotactic protein-1, interleukin-6 and interleukin-8 proteins in THP-1 monocytes by interfering with rapid cellular expression of PAR-1Thrombin-promoted production of plasminogen activator inhibitor-1 and tissue factor in THP-1 cells was attenuated by phloretin through blocking PAR-1. When 1-20 uM phloretin was supplemented to thrombin-exposed endothelial cells, the rapidly enhanced expression of endothelial COX-2 was reduced. Accordingly, increased thrombosis may entail early atherogenesis accompanying endothelial interaction with monocytes and platelets.

Conclusions: Phloretin prevented inflammatory atherosclerosis highly activated in the hypercoagulation state through blocking the thrombin receptor PAR-1Phloretin would be a potential alternative treatment for prevention of atherothrombotic diseases. Supported by National Research Foundation of Korea through the Human Resource Training Project for Regional Innovation and by Core Project of National Research Foundation of Korea.

Key words: phloretin, CD40, protease activated receptor-1, P-selectin, thrombin

PO2850

OLEANOLIC ACID SUPPRESSES VISFATIN INDUCTION VIA DISTURBING TRAF6-NF-¥ÊB SIGNALING OF ADIPOCYTES

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Background and objectives: Oleanolic acid is a pentacyclic triterpenoid naturally present in foods and medicinal plants with anti-cancer, anti-oxidant, and anti-aging properties. The current study elucidated that oleanolic acid inhibited the production of insulin-mimetic and inflammatory adipokine of visfatin during adipogenic differentiation of 3T3-L1 adipocytes.

Method: Adipocytes were cultured in an adipogenic media with and without 1-25 μM oleanolic acid up to 8 d for differentiation. Cellular expression and secretion of visfatin and activation of nuclear factor (NF)-κB were determined with Western blot analysis. Secretion of interleukin (IL)-6 and macrophage inflammatory protein (MIP)-2 was measured by using ELISA kits.

Results: The cellular expression and secretion of visfatin was markedly enhanced in differentiating adipocytes, which was dose-dependently attenuated by 1-25 μM oleanolic acid. Secretion of IL-6 and MIP-2 was highly elevated during differentiation, which was much earlier that visfatin production of adipocytes. The visfatin production was secondary to inflammatory IL-6 and MIP-2. This study further elucidated that NF-κB signaling was responsible for cellular production of visfatin. NF-κB was activated by translocating into the nucleus with increased phosphorylation of IκB, which was disturbed by oleanolic acid. Cellular expression of TNF receptor associated factor 6 (TRAF6) and receptor activator of NF-κB, was upregulated in parallel with transactivation with NF-κB, in which oleanolic acid inhibited such upregulation. These results demonstrate that oleanolic acid inhibited visfatin and its inflammatory response during adipocyte differentiation through blocking TRAF6-NF-κB signaling.

Conclusions: Oleanolic acid may be a potent therapeutic agent targeting against adipogenesis and visfatin-linked inflammation.

Supported by National Research Foundation of Korea through the Human Resource Training Project for Regional Innovation and by Core Project of National Research Foundation of Korea.

Key words: Adipocyte differentiation, obesity, oleanolic acid, visfatin, NF-κB

PO2851

EVALUATION OF ANTIOXIDANTS AND ANTIMICROBIAL ACTIVITIES OF A MIXTURE OF POLYPHENOLS EXTRACTED FROM TEA, MINT AND LEMON LEAVES IN VITRO

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Background and objectives: Our objective was to determine the natural polyphenol extracts from green or black tea decoction (GTD, BTD), mint (MI) and lemon leaves (LL) to prepare a mixture of bioactive substances giving an optimal antioxidant and antimicrobial activities.

Methods: The relative proportions of different polyphenolic mixture (DPM) were determined using a biostatistics experimental plan (BEP). The antioxidant and the antimicrobial activities were determined by the anti-radical "DPPH and ABTS" methods and range of microorganisms commercially available, respectively.

Results: Results showed the relative superiority of certain extracts and mixtures designed (0, 5 GTD + 0, 5 MI / 0, 5 BTD + 0, 5 MI). However, there is a considerable decrease in antioxidant activity in the case of mixtures (0, 5 GTD + 0, 5 LL / 0, 5 BTD + 0, 5 LL).

Conclusions: The approach adopted by the BEP was justified by the intermolecular synergistic or antagonistic effects of DPM which allowed us to check the best optimal activities to be taken in application scale.

Key words: Tea; mint; lemon leaves; antioxidant; biostatistics experimental plan

PO2852

CHANGE IN CARBOHYDRATE COMPOSITION OF FRESH YACON (SMALLANTHUS SONCHIFOLIUS) ROOTS DURING STORAGE

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Background and objectives: Yacon (Smallanthus sonchifolius) is an Andean root, which is recognized for its prebiotics potential due to its high concentration of Fructooligosaccharides (FOS). Changes in the carbohydrates concentration, FOS, glucose, fructose and sucrose, occur during storage. The aim of this work was to evaluate the changes of carbohydrates content in fresh yacon roots stored at 25 ºC and 4 ºC, on 3, 17 and 31 days post-harvest.

Methods: Sugar and FOS in fresh yacon roots stored at 25 ºC and 4 ºC were extracted with water and analyzed in Ion Chromatograph on 3, 17 and 31 days post-harvest.

Results: Results indicate high variability in the carbohydrate content during 31 storage days. The content of FOS and sucrose decreases and fructose and glucose, increases at the tubers storage at 25 ºC and 4 ºC. At 25 ºC, the FOS and sucrose content decrease from 74% to 26% and from 32% to 27% dry matter, respectively, whereas fructose and glucose increase from 12 to 60% and from 9 to 22% dry matter, respectively. At 4oC, the FOS and sucrose content decreases from 74 to 30% and from 32 to 14% DM, respectively, whereas the content of fructose and glucose increase from 12 to 55% and from 9 to 20% DM, respectively. At 4oC a reduction in FOS content was greater after 17 days of storage.

Conclusions: Fresh Yacon has a high content of FOS. The FOS and sucrose content of yacon roots decreases with storage days, whereas the content of fructose and glucose increases, consequently unsuitable for diabetics. The decrease of FOS content of yacon root storage at 4 ºC was in less proportion than at 25 ºC. To preserve the FOS content of fresh yacon roots appropriate handling methods post-harvest must be developed.

Key words: fresh roots yacon, carbohydrate composition, post-harvest, fructooligosaccharides, storage

PO2853

DOES THE LACTIC ACID BACTERIA FERMENTATION PLAYS A SIGNIFICANT ROLE ON TOFU PHENOLIC COMPOUNDS COMPOSITION?

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Background and objectives: The high nutritional value and low cost of soybean products make them a suitable solution for malnutrition problems for poor people living on grain centred diets. Tofu, a fundamental part of Asian food culture, is a traditional oriental soybean food and it may be the most popular food made of soy worldwide. Thousands of studies (in vivo and in vitro, with animals and human subjects) have shown that soybeans and soy components have many health-promoting effects; some of them were attributed to the isoflavones. In particular, various forms of isoflavones have been shown to possess different antioxidant activities. The aim of the study was to investigate the effect of lactic acid bacteria (LAB) fermentation on the free and bound phenolic fraction of tofu.

Methods: The fermentation process was established using specific strains of lactic acid bacteria. Free and bound phenolic compounds from soybean, traditional tofu and tofu obtained by soymilk fermentation were studied by HPLC-DAD-ESI-MS.

Results: Important effects of fermentation were seen on isoflavone profile: in fact, isoflavones content of fermented tofu showed significant differences compared to soybean and to traditional tofu. In particular, fifteen isoflavones were identified as aglycones and glycosides: the aglycone forms were significantly higher in fermented tofu compared to the traditional one. The ratio of aglycones/glycosylated isoflavones was 0.34 and 2.55 for the traditional and fermented tofu, respectively. Soy and traditional tofu presented the same content of bound phenolic compounds (mainly phenolic acids), instead fermented tofu showed a bound phenolic content 34 % higher than traditional tofu.

Conclusions: These results suggest that fermentation by LAB plays an essential role in the increase of the content of aglycone isoflavones and bound phenolic compounds with important biologically implications on human health.

Key words: tofu, fermentation, isoflavones, soybean, LAB

PO2854

PERSIMMON JUICE AS A SOURCE OF BIOACTIVE COMPOUNDS

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Background and objectives: Plant based diets rich in phytochemicals have been correlated with the decreased diseases such as cancer, cardiovascular diseases and so on. In this regard, fruit juices and particularly persimmon juice are an easily available and affordable source of bioactive compounds and arise as an effective complement to the diet and nutrition. For this reason, a complete characterization and identification of phytochemicals have been performed on a pilot plant produced persimmon juice to substantiate its potential health benefits in human nutrition.

Methods: Persimmon juice was obtained at pilot plant scale and underwent clarification and centrifugation after juice pressing. Juice samples were extracted using a liquid-liquid extraction procedure with a mixture of methanol:water (80:20) and then was filtered. These extracts were characterized through High Pressure Liquid Chromatography (HPLC) coupled to Elesctrosptray Time of Flight Mass Spectrometry (ESI-TOF-MS).

Results:A total of 51 compounds were detected, among these, 37 compounds belonging to different chemical classes such as sugars, organic acids, protein derivatives, vitamins, polyphenols (mainly flavonoids and hydroxybenzoic acids) and their derivatives were tentatively identified in the persimmon juice extracts.

Conclusions:A complete characterization of persimmon juice produced at pilot plant-scale was performed in order to elucidate its chemical composition. A wide variety of phytochemicals belonging to different chemical classessuch as sugars, organic acids, protein derivatives, vitamins, polyphenols mainly flavonoids and hydroxybenzoic acids have been found in persimmon juice, emerging as a potential source of bioactive compounds.

Key words: Persimmon juice, bioactive, HPLC-MS

PO2855

FUNCTIONAL FOOD RESEARCH AND DEVELOPMENT CENTRE (CIDAF), HEALTH SCIENCE TECHNOLOGICAL PARK, AVDA. DEL CONOCIMIENTO S/N 18016 GRANADA, SPAIN

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Background and objectives: Asparagus is a vegetable that has traditionally been appreciated for its organoleptic and nutritional characteristics. This product is also a good source of phytochemicals which have been suggested to exert a protective effect against chronic diseases. Because health-promoting characteristics are increasingly demanded by consumers more concerned with human health, the investigation of the bioactive compounds responsible of its beneficial effects is of great interest for its revalorization. For this reason, we have developed a powerful bucketing algorithm to perform a complete and thorough characterization of four asparagus varieties based on mass spectra data.

Methods: Freeze-dried asparagus samples of four varieties (Purple-green, hybrid-green, NJ-953 and HT-801) were extracted by maceration with ethanol for 30 minutes and then filtrated. These extracts were analysed by High Pressure Liquid Chromatography (HPLC) coupled to Elesctrosptray Time of Flight Mass Spectrometry (ESI-TOF-MS). After that, an intelligent bucketing algorithm for identifying relevant elution time-m/z peaks in mass spectrometry data based on rectangular bucketing was developed. It included mass calibration in order to allow appropriate high resolution bucketing, noise reduction in order to discard no relevant data of mass spectra and automatic and intelligent bucketing.

Results: Sugars, organic acids, protein derivatives, vitamins, polyphenols, and their derivatives have been tentatively identified in the four asparagus varieties, being polyphenols predominant. Comparison among varieties has been made.

Conclusions: This innovative tool has demonstrated its potential to characterize vegetable samples at a deeper level, providing a detailed list of potential bioactive compounds and thus enhancing asparagus value as food itself and as a new platform to develop functional foods.

Key words: Asparagus, HPLC-ESI-MS, bioactive, bucketing

PO2856

IDENTIFICATION OF BIOACTIVE COMPOUNDS IN FOUR ASPARAGUS VARIETIES THROUGH AN INTELLIGENT BUCKETING ALGORITHM USING MASS SPECTRA DATA

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Background and objectives: Asparagus is a vegetable that has traditionally been appreciated for its organoleptic and nutritional characteristics. This product is also a good source of phytochemicals which have been suggested to exert a protective effect against chronic diseases. Because health-promoting characteristics are increasingly demanded by consumers more concerned with human health, the investigation of the bioactive compounds responsible of its beneficial effects is of great interest for its revalorization. For this reason, we have developed an intelligent bucketing algorithm to perform a complete and thorough characterization of four asparagus varieties on HPLC-MS data.

Methods: Freeze-dried asparagus samples of four varieties (Purple-green, hybrid-green, NJ-953 and HT-801) were extracted by maceration with ethanol for 30 minutes and then filtrated. These extracts were analysed by High Pressure Liquid Chromatography (HPLC) coupled to Elesctrosptray Time of Flight Mass spectrometry (ESI-TOF-MS). After that, an intelligent bucketing algorithm for identifying relevant elution time-m/z peaks in mass spectrometry data based on rectangular bucketing was developed. It included mass calibration in order to allow appropriate high resolution bucketing, noise reduction in order to discard no relevant parts of the HPLC-MS and automatic and intelligent bucketing.

Results: Sugars, organic acids, protein derivatives, vitamins, polyphenols, and their derivatives have been tentatively identified in the four asparagus varieties, being polyphenols predominant. Comparison between varieties has been made.

Conclusions: This innovative tool has demonstrated its potential to characterize vegetable samples at a deeper level, providing a detailed list of potential bioactive compounds and thus enhancing asparagus value as food itself and as a new platform to develop functional foods.

Key words: Asparagus, HPLC-MS, bioactive, bucketing

PO2857

EFFECTS OF WALNUT CONSUMPTION ON SELECT VASCULAR BIOMARKERS IN HYPERCHOLESTEROLEMIC POSTMENOPAUSAL WOMEN

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Background and objectives: Walnuts contain a number of nutrients that may benefit vascular function.

Methods: We compared the effects of two levels of walnut consumption (5 g vs. 40 g) after a single intake and after daily intake for 4 wks.Assessment was conducted after an overnight fast without any dietary preloading. Thirty-six hypercholesterolemic postmenopausal women were randomly assigned in a parallel-arm design. Outcomes were measured at baseline and at 4 hr after walnut intake on the first day (D1) and after 4 wks (D2) and included microvascular function as assessed by peripheral arterial tonometry (PAT), platelet function as assessed by PFA-100, and serum lipids. Data are presented as mean ± SD.

Results: No significant changes in microvascular function were noted in the 5 g/d group. A significant increase in PAT was observed 4hr after intake of 40 g of walnuts on D1 (2.32 ± 0.39 vs. 2.82 ± 0.39; p=0.001).Daily intake of 40 g of walnuts for 4 wks was associated with an increased baseline PAT response compared to the baseline level at the start of the study(D1: 2.32 ± 0.39 vs. D2: 2.70 ± 0.31; p=0.008). No change inPAT was observed on D2 between baseline and 4 hr. No changes were noted in platelet reactivity for either group.LDL concentrations decreased significantly 4 wks after 40 g/day of walnut intake (D1: 154.76 ± 16.79 mg/dL vs. D2: 146.06 ± 17.33 mg/dL; p=0.046).No other changes were observed in serum lipids in either group. Reported dietary intake of n-3 and n-6 lipids was significantly increased in the 40 g group after 4 wks.

Conclusions: The results suggest that a single intake of 40 g of walnuts, as well as daily intake of 40 g for 4 weeks,can result in favorable vascular effects.This work was supported by the California Walnut Commission.

Key words:walnuts, vascular, women, lipids

PO2858

ENZYMATIC TREATMENT IN FLOUR RYE AND THE COMPARATIVE STUDY OF ANTIOXIDANT CAPACITY ORAC, WITH AND WITHOUT EDTA

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Background and objectives: Rye is a cereal rich in bioactive compounds, as the polyphenols, but contains anti-nutrients, such as tannins. The tannase hydrolyzes tannins and increases the release of phenolics compounds. In addition, there is an increase in the antioxidant activity of the cereal, resulting in a product with high nutritional value. The oxygen radical absorbance capacity (ORAC) is a method widely used in the scientific scope for determination of the antioxidant activity. The literature recommends, the use of a metal chelator, Ethylenediaminetetraacetic acid hydrate (EDTA),for avoid phenolics autoxidation by metal traces present in foods. The study evaluated the antioxidant capacity of rye hydrolyzed with tannase from Paecilomyces variotti obtained under solid state fermentation and the influence of EDTA in the ORAC method.

Methods: The rye grain was milled and the obtained flour was hydrolyzed with tannase at 40°C, 200 rpm for 2 hours. The ORAC assay was conducted for two tests: in the presence and absence of EDTA (80 uM). The results were expressed in uM Trolox equivalents per 100 g of rye.

Results: The tannase from Paecilomyces varioti was effective in increasing the antioxidant capacity of rye because the antioxidant activity of the sample treated doubled compared to control. Samples were compared by ORAC method, without and with EDTA. The increase in antioxidant activity was greater in all flour tested in the presence of EDTA. Increases in antioxidant activity of 45% and 10% were observed for the control and the treated flour, respectively, compared to the performed test without the chelating agent. This occurs because the EDTA is able to reduce metal and, therefore, to preserve the power of polyphenols and others antioxidants.

Conclusions: It is interesting adding EDTA as chelating of metals in rich in mineral sample to assess the true capacity of the antioxidant.

Key words: (3-5 key words): Antioxidant activity, ORAC, tannase, rye, EDTA

PO2859

SYNERGIC ANTIBACTERIAL BEHAVIOR OF THE MAJOR POLYPHENOLSDERIVED FROM SPANISH CISTUS SPECIES

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Background and objectives: Cistaceae is a large family of shrubs commonly distributed in the Mediterranean ecosystem. We have recently reported the antimicrobial capacity of extracts derived from several Spanish Cistus species. The aim of this study was to deepen on the antimicrobial properties against E. coli and S. aureus as models for Gram-negative and Gram-positive bacteria, respectively, of different Cistus extracts and their major polyphenolic compounds.

Methods: Fourteen extracts were obtained for maceration and then dried by lyophilization or spray-drying. The bacteriostatic capacity of these extracts and their composition was compared by Folin-Ciocalteu assay, determination of flavonoids, antioxidant capacity measurements and RRLC-ESI-TOF-MS analysis (rapid-resolution liquid chromatography coupled with electrospray ionization time-of-flight mass spectrometry). Furthermore, we studied in-depth the potential synergistic interaction of the main compounds.

Results: The aqueous extracts of C. salviifolius exhibited potent bacteriostatic effects against Gram-positive bacteria compared with the other Cistus species tested. The polar fraction of C. salviifolius showed bacteriostatic and bactericidal activity against both bacteria tested. Up to forty-eight compounds were found in the aqueous extract of C. salviifolius. Moreover, pair combinations of some major compounds selected from C. salviifolius showed a potential synergistic behaviour.

Conclusions: The analysis of the composition of the extracts revealed that the inhibitory activity against E. coli may be related to the presence of galloylated flavanols and specific flavonols, whereas the inhibitory capacity against S. aureus may be related primarily to polar compounds and to other flavonols. The synergic antimicrobial properties observed for the compounds of C. salviifolius extract deserve further. These extracts may serve as an alternative source of antimicrobial ingredients focused on medical devices or cosmetics.

Key words: Antibacterial, Cistus, polyphenols, synergy, RRLC-ESI-TOF-MS.

PO2860

IODINE FORTIFICATION OF FARMED FISH FILLETS: A HEALTHY WAY TO PREVENT IODINE DEFICIENCY

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Background and objectives: Data from WHO estimate that iodine intake of 42.7% (22.2 million) of school-age children in Europe is insufficient and extrapolations to the general population announce 244 million European individuals with insufficient iodine intake. Marine fish are a rich source of iodine in the human diet. Farmed fish, relying on exogenous feeding open the possibility to tailor fish composition with health valuable nutrients, such as iodine, and establish it as a functional food.

Methods: A 16 weeks study was undertaken to test the efficacy of various dietary iodine forms on the growth performance of gilthead seabream, the resulting iodine deposition in fish muscle and overall sensory criteria. Besides a detailed characterization of iodine species on fresh fillets, the influence of a culinary treatment on iodine chemical forms was also assessed. Four experimental diets were formulated: the control; a diet supplied with an inorganic form – potassium iodide (KI); another diet containing an organic form – ethylenediaminedihydroiodide (EDDI); and a fourth diet (LAM) formulated with Laminaria, an iodine-rich macroalgae.

Results: At the end of the trial, the overall performance of fish was not affected by dietary iodine supplementation level or form. Iodine deposition in muscle was significantly higher with Laminaria diet (3-fold increase) while EDDI and KI diets showed no differences in comparison with the control. Iodine content of seabream fillets was affected by culinary treatment

(steam-cooking). Trained panelists were able to differentiate fish fed the EDDI diet, but not LAM or KI from those fed the CTRL diet. Sensorial attributes of fillets from Laminaria enriched diet were closer to the control ones.

Conclusions: The use of marine macroalgae, as a dietary constituent, enabled the natural biofortification of farmed fish with iodine and may be an effective way to ensure higher iodine intake of human population.

Key words: iodine, macroalgae, functional fish, biofortification

PO2861

SELENIUM, GERMANIUM AND HEAVY METAL CONTENTS IN REPRESENTATIVE NORTH KOREAN CROP

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Background and objectives: This study was conducted to investigate selenium, germanium and heavy metal contents in 27 North Korean crops and edible mushrooms. These kinds of nutrition information are hardly to find up to these days.

Methods: Therefore, to investigate safety and usefulness of these 27 crops as food resources, we measured selenium, germanium and four heavy metal (As, Cd, Cr, Pb) contents by ICP-MS after thorough homogenization.

Results: The mean selenium content was 25.1 μg/kg and rich sources of selenium were oak mushroom (130 μg/kg), Pimpinella brachycarpa, Aster scaber, Aralia elata, and mulberry mushroom. The mean germanium content was 13.5 μg/kg and rich sources of germanium were Aster scaber, fern, mulberry mushroom and Aralia elata. Especially Aralia elata (33 μg/kg), Aster scaber and mulberry mushroom showed rich sources in selenium and germanium and can be regarded as potential useful trace element nutrition crops in North Korea.The mean cadmium (Cd) content was 0.22 mg/kg and osmund fern and mulberry showed 5 times higher than the mean content and needs caution to consume them. Also the mean lead (Pb) content was 1.01 mg/kg and Chinese matrimony vine, Aralia elata and mulberry mushroom had higher content than the safety guideline standard (2.0 mg/kg).

Conclusions: As and Cr results showed that all tested crops were under the safety guideline standard.

Key words: North Korean food, selenium, germanium, heavy metal

PO2862

IDENTIFICATION OF CYTOTOXIC EFFECT OF BIBIMBAP ON HUMAN COLON CANCER CELLS

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Background and objectives: Bibimbap, most interested Korean cuisine, literally means 'mixed rice'. Bibimbap is served as a bowl of warm white rice topped with seasoned vegetables, meat and chili pepper paste. This study was investigated the mechanisms underlying the cytotoxicity of the Bibimbap on human colon cancer cell line, HT-29 in vitro and in vivo experiments, for the development of high-valued Korean cuisine.

Methods: Bibimbap was prepared with rice and vegetables with biological activities on human colon cancer cells. The anti-proliferative activity of Bibimbap on HT-29 was identified through cell viability, MTT, western blot, RT-PCR and animal test.

Results: In our study, Bibimbap was inhibited the growth of HT-29 in a dose-dependent manner (IC50: 13.0, 11.7, 9.7 mg/ml on 24, 48, 72 hours, respectively). Concomitant activation of the mitochondria-dependent apoptotic pathway of Bibimbap occurred via modulation of Bax and Bcl-2 expression, resulting in activation of cleaved caspase-3 and caspase-8. As a result of animal experiments, the size and weights of tumor of colon were decreased with 2.7%, 4.0% and 38.9% ($p<0.001$), and 3.8%, 6.1%, 37.4% ($p<0.001$), respectively, treatment with 0.5, 1.0 and 2.0 mg/kg Bibimbap groups, compared to control group.

Conclusions: This is the first report to demonstrate the cytotoxic effect of Bibimbap on human colon cancer cells and to provide a possible mechanism for this activity.

Key words: BIBIMBAP, Korean Cuisine, HT-29, Apoptosis, Animal test

PO2863

POMEGRANATE SEEDS AS SOURCE OF BIOACTIVE LIPIDS

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Background and objectives: According to literature the whole cold-pressed lipid fraction extracted from pomegranate seeds, if assumed through diet, can improve immune function in vivo, reduce hepatic triacylglycerol accumulation and act as a chemopreventive agent against hormone-related human cancers. Pomegranate seed oil comprises 10–20% of total seed weight, with an ideal highly unsaturated fatty acid content, mainly constituted by the rare conjugate linolenic acid isomer punicic acid, which activities against inflammation and metabolic syndrome have been confirmed by various in vivo experiments. However, besides several very encouraging studies on the possible beneficial effects of this oil, little is known about the composition of its minor fraction. Therefore, in this work, the main lipidic classes of 17 pomegranate varieties were determined.

Methods: The pomegranate oil was extracted by Folch method and several chromatographic techniques were used to determine fatty acid, tocopherol, sterol and phospholipid composition.

Results: The total lipid content of pomegranate seeds varied between 7.9 and 16 %. Pomegranate seed oil contained higher amount of CLnA (punicic acid) in the range of 73.6-85.0 % of total fatty acid content. Other major fatty acids were oleic, linoleic and palmitic acid, respectively. Pomegranate seed had high contents of tocopherol (0.6-2.6 mg/g of fat). Delta-tocopherol was 91.2-96.7 % of total tocopherols. The major phytosterols analyzed were delta5-avenasterol, campesterol, stigmasterol, and â-sitosterol. Moreover some triterpene compounds as betulin, botulino and cyclolanostanol were identified. Three different phospholipids were detected; phosphatidylethanolamine was the first compounds in the range of 44-91% of total phospholipids. Phosphatidylinositol and phosphatidylcholine were, also, quantified.

Conclusions: In summary, these data indicated that pomegranate seeds are rich sources of CLnAs, tocopherols, phospholipids and sterols with potential beneficial physiological activities. In addition, different pomegranate cultivars may differ in their seed components and health properties.

Key words: pomegranate seed, lipid composition, punicic acid

PO2864

ANTIOXIDANT PROPERTIES OF ILEX PARAGUARIENSIS

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Background and objectives: Yerba mate (Ilex paraguariensis) beverages have been consumed as popular infusions in South America for years. This plant attracts the scientific community for its beneficial effects on health. The aim of this work was to evaluate Yerba mate antioxidant properties in human lymphocytes exposed in vitro to oxidative damage, using the Comet assay, a sensitive and rapid method for DNA strand break detection in individual cells.

Methods: Two commercial brands were analyzed using 5% infusions, filtered and stored at -20°C (infusion 1 and 2). Lymphocytes were exposed in vitro to 10µM H2O2 for 10 min and then allowed to repair with increasing concentrations of the infusion for 30 min at 37°C: repair I (RI: 10 l/ml),repair II (RII: 100 l/ml) and repair III (RIII: 1000 l/ml), and a control with norepair (CWR), without the addition of the infusions. As a positive control, cells were exposed to 50µM H2O2 whilethe negative control remained without H2O2Comet assay was performed following standard protocols. Samples were stained with Ethidium Bromide, analyzed under a fluorescent microscope and Damage Index (DI) and the percentage of reduction (%R) were calculated.

Results: Both commercial brands showed similar protective effects ($p>0.05$). Differences were found among treatments of yerba mate used in the DI. For the infusion 1, results revealed that RI, RII and RIII showed a lower DI related to CWR ($p<0.05$). In the infusion 2, RII and RIII groups presented less DI than CWR, while RI showed more damage than RIII ($p<0.05$). The %R indicated a decreased in oxidative damage as infusion concentration increases ($p<0.05$).

Conclusions: This study demonstrated an important protective properties attributed to yerba infusions. Thus we conclude that theregular ingestion of Ilex paraguariensis infusions could contribute to antioxidant defense on humans.

Key words: Ilex paraguariensis, Antioxidant, Comet Assay.

PO2865

DETERMINATION OF DIFFERENT PHENOLIC COMPOUND CLASSES IN POMEGRANATE JUICES BY HPLC-DAD-ESI-QTOF-MS

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Background and objectives: Traditionally, pomegranate (Punica granatum L.) has been consumed as fresh fruit or as pomegranate juice and it has been described as a rich source of phenolic compounds. Several recent studies have shown that drinking pomegranate juice contributes to significant potential health benefits, and, today, it is known, that the positive health properties of pomegranate are due to the presence of bioactive compounds like, flavonoids, phenolic acids and tannins contained in it. Therefore, in this work, the main phenolic compounds of 17 pomegranate varieties were determined by HPLC-DAD-ESI-qTOF-MS.

Methods: A new chromatographic HPLC-DAD-ESI-qTOF-MS method, using a C18 fused-core column, was established and the analyses were performed in less than 20 minutes.

Results: Eight anthocyanins and fourteen other phenolic compounds were tentatively identified and quantified in the pomegranate juices. As far we are concerned, a new flavonol-glycoside has been tentatively identified for the first time in pomegranate juices. Total phenolic content ranged from 573.6 to 2519.8 mg/mL. Anthocyanins varied between 110.9 to 1925.5 mg/mL and they represented the 17-86 % of total phenolic content.Flavonoids were the 1.6-24.4 % of total phenolic compounds. Phenolic acid and ellagitannins were in the range of 300.9-810.2 mg/mL.

Conclusions: The results confirmed, as reported in literature, that the pomegranate variety influences substantially the phenolic composition. It is important to highlight that, as far we are concerned, a new flavonol-glycoside has been tentatively identified for the first time in pomegranate juices thanks to this method.

Key words: Punica granatum L., pomegranate, phenolic compounds, HPLC-DAD-ESI-qTOF-MS

PO2866

DISTRIBUTION OF FENOLIC COMPOUNDS AND OTHER POLAR COMPOUNDS IN SOLANUM TUBEROSUM L AND STUDY OF THEIR ANTIOXIDANT ACTIVITY

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Background and objectives: Potato (Solanum tuberosum L.) is the most widely grown crop around the world and the fourth largest in terms of fresh produce after rice, wheat, and maize. It represents the staple source of nutrients and energy and it is an important source of carbohydrates, quality proteins, minerals, vitamins and, even some varieties of potato are a rich source of polyphenolic compounds. Thus, the aim of this work was to identify and characterize different polar compounds in three fractions of potato: pulp, skin and whole tuber of two varieties: Bluebell and Melody by using UPLC-DAD-ESI-Q-TOF-MS/MS. Furthermore, to quantify the majority phenolic compounds by UV and to measure the antioxidant activity of the three fractions in the two varieties of potato by FRAP, TEAC and ORAC.

Methods: Samples were freeze-dried and extracted in methanol/water before being analyzed by UPLC-DAD-ESI-Q-TOF-MS/MS in positive and negative ionization modes. Quantification was carried out by UV and three standard calibration curves were built with standards: caffeic acid, ferulic acid and chlorogenic acid. FRAP, TEAC and ORAC methods were carried out.

Results: 27 polar compounds were identified in potato. Three caffeoylquinic acid isomers, caffeic acid, a di-caffeoylquinic acid isomer and N-[2-hydroxy-2-(4-hydroxyphenyl) ethyl]ferulamide were the main phenolic compounds in the three fractions in the two varieties of potato. Peels were the part which presented the highest content of phenolic compounds and Bluebell potato was the variety which presented the largest content of phenolic compounds.

Conclusions: Potato concentrates the most of the phenolic compounds in the outside of the tuber, the peel. This fact makes potato peel an interesting by-product of the potato industry because it can be used as a source of recovery and reutilization of phenolic compounds for the production of functional food and/or nutraceuticals.

Key words: Solanum tuberosum L, UPLC-ESI-Q-TOF-MS/MS, phenolic compounds, antioxidant activity.

PO2867

PRODUCTION OF SWEET LOW-LACTOSE YOGURT

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Background and objectives: Lactose intolerance is a metabolic disorder that affects a large portion of world population. The origin of this problem lies in partial absence or deficiency of the enzyme α-galactosidase (lactase) present in the intestine, which disables the body to absorb lactose properly. In order to meet the needs of the population suffering from lactose intolerance, products with reduced lactose content exist in the dairy market.The aim of this study was to investigate the application of α-galactosidase to produce sweet yogurt with reduced concentration of lactose in order to develop a new functional fermented milk product.

Methods: The influence of added amount of sucrose (1% and 8%) in the hydrolysis of lactose was monitored and limiting enzyme concentration (0,016%) was tested to that effect. Biotechnological process parameters for production of yogurt with reduced concentration of lactose have been determined. The concentration of lactose in the samples was assessed indirectly by determining the glucose level using the enzymatic-colorimetric method of Trinder, by analytical hydrolysis.

Results: The obtained results show that the addition of 1% sucrose in the production of sweet yogurt with reduced lactose concentration lowered hydrolysis of lactose by 10%, and the addition of 8% sucrose lowered it by 20%, compared to the hydrolyzed yogurt during the production of standard yogurt with reduced lactose concentration and the same concentration of 0.016% α-galactosidase (v/v).

Conclusions: The method used for this study is selective, simple and effective with additional advantage of having cheap reagents. In yoghurt produced by this method more than 80% lactose has been hydrolysed which makes it suitable for lactose intolerant people.

Key words: Lactose intolerance, α-galactosidase, sweet yogurt

PO2868

INTERACTION BETWEEN PROBIOTIC AND STARTER STRAINS INVOLVED IN THE ELABORATION OF FERMENTED GOAT'S MILK

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Background and objectives: The manufacture of a fermented goat's milk with probiotic properties requires compatibility between different bacteria involved in the fermentation process. The aim of the present research has been to study the interactions between the probiotic strain Lactobacillus plantarum C4 and the starter strains Lactobacillus delbrueckii subsp. bulcaricus and Streptococcus thermophilus.

Methods: We elaborated a probiotic fermented goat's milk with the starter strains and probiotic strain Lactobacillus plantarum C4Viable microorganisms at different times of the fermentation process were enumerated by preparing serial dilutions of the product and culturing them on TSA, MRS and LPSM (Lactobacillus plantarum selective medium) agar plates. Antibiosis between the three different bacteria was investigated using the spot test on TSA, MRS and LPSM agar plates.

Results: When antibiosis was investigated by the spot test, L. plantarum was able to exert inhibitory effect on the growth of L. bulcaricus and S. thermophilus. This inhibition was attributable to acid production from dextrose fermentation. However, when the three strains were co-cultured in goat's milk, L. plantarum C4 did not inhibit the growth of both starter strains. On the contrary, the pH drop due to fermenting action of the starter strains abolished the proliferation of L. plantarum C4, although the viability of this probiotic bacterium was not affected.

Conclusions: Taking into account the behaviour of probiotic and starter strains, the optimal conditions for the fermentation process were fixed.

Key words: Antibiosis, probiotic fermented goat's milk

PO2869

OLEUROPEIN IMPROVES GLUCOSE TOLERANCE OF HIGH-FAT INDUCED OBESE MICE

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Background and objectives: Oleuropein, one of the polyphenols contained in the olive leaves and oil, is known to have various physiological activities such as anti-oxidative, anti-bacterial and hypotensive effects. Oleuropein is also reported to decrease blood glucose levels in the alloxan-induced diabetic mice, however, the effect on type 2 diabetes and the detail mechanism have not been clarified yet. Therefore we investigated the effect of oleuropein on the glucose tolerance in obese mice and also evaluated these effects using cell culture system.

Methods: Oleuropein was added to the medium of C2C12 myotubes, and then glucose uptake in C2C12 cells was measured. Phosphorylation of Akt and AMP kinase and translocation of GLUT4 was evaluated by western blotting. 3T3-L1 pre-adipocytes were incubated in the presence of oleuropein and the effect on the adipocyte differentiation was assessed by Oil-Red stain. C57BL/6J male mice was divided into three groups and fed by the low-fat diet, high-fat diet, and high-fat including 0.038% of oleuropein for 12 weeks.Oral glucose tolerance test (OGTT) and insulin tolerance test (ITT) were carried out. mRNA levels of target genes were measured by a real time RT-PCR and the localization of GLUT4 in skeletal muscle was analyzed by immunohistochemistry.

Results: Oleuropein promoted the phosphorylation of Akt and AMPK in C2C12 cells. It also increased the plasma membrane expression of GLUT4, resulting in the up-regulation of glucose incorporation. Oleuropein inhibited 3T3-L1 adipocyte differentiation. In animal study, OLE suppressed the body weight gain and improved OGTT and ITT. Immunohistochemistry showed that oleuropein significantly promoted the translocation of GLUT4 to membrane.

Conclusions: Oleuropein improved glucose tolerance of high-fat diet induced obese mice by reduction of adipose tissue and induction of insulin sensitivity in skeletal muscle.

Key words: Oleuropein, Obesity, Glucose tolerance, Insulin sensitivity

PO2870

EFFECT OF SHIMOTSUTO (SI-WU-TANG; CHINESE HERBAL MEDICINE TRADITIONALLY USED IN JAPAN) WITH/ WITHOUT IRON ADMINISTRATION ON IRON DEFICIENT RATS.

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Background and objectives: Administration of iron is effective for improvement of iron deficiency, but it is concerned about the intake of the long-term supplement giving the risk of the life-style related diseases such as cancers.Iron supplement should be used with low concentration when we take a supplement for a long term, because it may be associated with development of the oxidative stress. Shimotsu-to (Si-Wu-Tang), a Chinese herbal medicine traditionally used in Japan, is used for anemia and a blood vessel symptom, and an anemia improvement effect promotes is expected that our hematopoietic efficacy are raised through up-regulated expression of erythropoietin. Therefore we examined that an anemia improvement effect is accelerated by giving iron and Shimotsu-to at the same time to anemia rats.

Methods: We used crude herbs with definite locality to obtain reproducibility about effect of the Shimotsu-to administration, and first examined the combination ratio and extract conditions of these crude herbs.Wistar male rats were fed iron-free diet based on AIN-93G for 3weeks to make them anemia. Then anemia rats fed low iron concentrated diet with / without the Shimotsu-to extract, other anemia rats were fed iron-free or AIN-93G diets. For a certain period of time later, the bloods were obtained and we measured a red blood cell count, hematocrit, a serum iron and TIBC. We are measuring serum ferritin and erythropoietin (EPO) concentrations, and EPO mRNA expression in the kidney.Results and

Conclusions: In the anemia rats fed low iron concentrated diet, the red blood cell count, the hematocrit and the serum iron were improved, but lower than the rats fed AIN-93G diet. Shimotsu-to administration with low iron diet slightly improved these measurements.

Key words: Iron deficiency, Shimotsu-to (Si-Wu-Tang), rat, erythropoietin

PO2871

LEAF EXTRACT OF DIETAY BLUEBERRY (VACCINIUM ASHEI READ) PREVENTS FATTY LIVER IN OB/OB MICE

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Background and objectives: Blueberry (Vaccinium ashei), a species of the Ericaceae plant family, has been used in folk medicine for treating lifestyle-related diseases in Asia and Europe. We previously reported that blueberry leaf extract (BLE) exhibits antihypertensive and antidiabetic activities in OLETF rats. Here we examined the preventive effect of BLE on fatty livers in ob/ob mice.

Methods: We cultivated Rabbiteye blueberry plants and harvested their leaves, which were cut into small pieces, freeze dried, and powdered, followed by hot-water treatment; after centrifugation, the supernatant was freeze dried, powdered, and used as BLE.We fed diets with or without BLE to 5-week-old male ob/ob mice. BLE was supplemented at dietary levels of 1% and 3%. The diets were prepared according to the recommendations of AIN-76After a 4 week-feeding period, we determined the serum and liver lipid levels and the activities of enzymes involved in the synthesis and oxidation of fatty acids. Furthermore, a section of the liver tissues was fixed, embedded, and stained with Hematoxylin-Eosin, and the results were compared with those for the mice fed diets without BLE.

Results: Dietary BLE had no adverse effects on food intake or growth; however, it reduced liver weight in a dose-dependent manner. A dose-dependent liver triglyceride-lowering effect of BLE was found in the ob/ob mice. Histopathological analysis of the hepatic tissues confirmed these findings. BLE showed marginal effect on serum lipid levels. We observed a dose-dependent decrease in the activities of fatty acid synthase, glucose-6-phosphate dehydrogenase, and malic enzyme in the liver of mice fed diets with 1% and 3% BLE; however, carnitine palmitoyltransferase activity remained unchanged.

Conclusions: Dietary BLE exerts beneficial effects on fatty liver in ob/ob mice. Reduced fatty acid synthesis is partly responsible for the triglyceride-lowering activity of BLE in the liver.

Key words: Blueberry leaf, fatty liver, ob/ob mice

PO2872

PHYSICOCHEMICAL PROPERTIES OF PLUKENETIA VOLUBILIS L. SEEDS AND OXIDATIVE STABILITY OF COLD-PRESSED OIL (GREEN NUT OIL)

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Background and objectives: The cold-pressed oil from seeds of P. volubilis (GNO) has been shown to be rich in omega-3 fatty acid content as well as flaxseed oil and perilla oil. GNO has a high anti-oxidative capacity, suggesting its potential to reduce oxidative damage to DNA. These fatty acids are readily oxidized at high temperatures and UV irradiation, the ways in which they can be used are limited. We, therefore, set out to clarify the physicochemical properties of green nuts. In addition, in order to explore means of consumption, we investigated the oxidation characteristics of GNO and the effects of oxidation on fatty acids.

Methods: General food composition and dietary fiber contents of green nuts were analyzed. The UV-irradiated GNO, flax oil and perilla oil were prepared by pouring Petri dishes and exposing each of these to UV light on a clean bench for 5, 10, 20 or 25 h. Heat-treated oil was prepared Teflon-coated frying pans on electric hobs, followed by heating at 80~180°C for ten minutes. Oil temperature was measured using a digital thermometerThe peroxide value and carbonyl value were determined by chemical methods. Tocopherol content was analyzed by high-speed liquid chromatography. Fatty acid composition was analyzed by gas chromatography.Results and

Conclusions: Food composition of green nuts was similar to that of dried peanuts. However, the dietary fiber content of green nuts is higher than that of peanuts.GNO was stable up to 140°C and exhibited greater UV resistance than flaxseed and perilla oil. It may be related to the 10% lower α-linolenic acid content of GNO when compared with the other two oils, and the presence of α- and γ-tocopherol. GNO can apparently tolerate a certain degree of heat processing.

Key words: Plukenetia volubilis L. seeds oil (green nut oil), oxidation characteristics, tocopherol, UV resistance

PO2873

TOTAL IRON AND HEME IRON CONTENT OF SOUTH AFRICAN LEAN MEAT (BEEF, LAMB, PORK AND CHICKEN)

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Background and objectives: In South Africa, as in most countries, no reference is made to the specific type of iron found in food sources. Animal foods are considered to be good sources of the more bio-available heme iron with less interference from absorption inhibitors. No data on the heme iron content of South African meat is currently available.This study has determined the total (TFe) and heme (HFe) iron content in South African meat. Evidence suggests that significant differences exist in heme content of meats from different species and even between cuts within the same species.

Methods: Triplicate samples of raw commonly consumed meat cuts (lamb, pork and chicken) were obtained from four retail outlets. Nine beef (Bonsmara) carcasses within each of three age groups were directly sourced for analyses. Duplicate analyses were done on muscle only. Total iron was determined by atomic absorption spectrophotometery. Heme iron was determined by an adapted Hornsey method.

Results: Beef (TFe=2.46±0.41; HFe=1.97±0.19) and lamb (TFe=1.65±0.12; HFe=1.26±0.39) meat have the highest total iron (TFe) and heme iron (HFe) content with chicken (TFe=0.75±0.11; HFe=0.57±0.13) and pork (TFe=0.76±0.09; HFe=0.64±0.08) meat having the lowest values. In this study the percentage heme iron (%HFe) for beef (81%) and lamb (75%) meat was within the reported range, but %HFe for chicken (76%) and pork (84%) was higher than reported.

Conclusions: The meats in this study contain higher percentage of heme iron (>75%) than was used in the Monsen model (40%) to estimate iron availability. This indicated that the heme iron value used in the Monsen-equation, and other calculations, should not be a constant value, but should be different for each particular meat type consumed in the diet. Species, cut, as well as, cooking are all factors that might have an influence on the %HFe.

Key words:total iron content, heme iron, non-heme iron

PO2874

FATTY ACID PROFILE OF SOUTH AFRICAN LAMB AND MUTTON

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Background and objectives: Essential fatty acids play a part in many metabolic processes, and suggest evidence that low levels of essential fatty acids, or the wrong balance of types of fatty acids, may be a precursor for a number of illnesses such as increased blood cholesterol, heart disease and cancer.A study was conducted to determine the fat and fatty acid composition of South African sheep meat.

Methods: Mutton (n=18) and lamb (n=18) carcasses were selected from two different abattoirs, represented from three different production regions in South Africa. The left side of each carcass was kept raw, while the right sides were cooked prior to analysis. Each cut was cooked whole according to standardised cooking methods to an internal temperature of 70°C. The cuts were dissected into meat (muscle, intermuscular and intramuscular fat), bone and subcutaneous fat (SCF). The fatty acid profile was analysed using a GC method.

Results: Raw lamb contained 6.79g fat, 3.62 SFA, 2.92 MUFA, 0.25 PUFA and 3.37 g omega fatty acids /100g edible portion respectively. Raw mutton contained 7.85g fat, 4.18 SFA, 3.35 MUFA, 0.31 PUFA and 3.78 g omega fatty acids /100g edible portion respectively. Nutrients showing the greatest differences between raw and cooked treatments, were total fat, C16:0 saturated fatty acid (SFA) and C18:1n9c monounsaturated fatty acid (MUFA).

Conclusions: Sheep meat contributes consistently to the essential fatty acids, linoleic and á-linolenic acids, as well as C20 and C22 polyunsaturated fatty acids. Although humans have the metabolic capacity to synthesize the latter from the n-6 or n-3 precursors from linoleic and á-linolenic acid respectively, an increase in the consumption of C20 and C22 n-3 PUFA's has the potential to overcome the perceived imbalance in the ratio of n-6:n-3 PUFA's in modern diets.

Key words: Sheep meat, fatty acids

PO2875

SECONDARY METABOLITES FROM RUMEX BALCANICUS RECH. HERB AND ROOT EXTRACTS AS POTENTIAL ANTI-INFLAMMATORY AGENTS

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Background and objectives: Rumex species (Polygonaceae) have a great potential for use as a functional food due to their taste and a high content of secondary metabolites, mostly flavonoid C- and O-glycosides, anthraquinones, stilbenes, tannins and phenolic acids. Compared to other Rumex species, data on R. balcanicus chemical composition and bioactivity are scarce. Therefore, our goals were detailed chemical analysis of ethanol extracts from herb and root ofR. balcanicus species, wildly growing in Balkan region, and evaluation of their anti-inflammatory activities.

Methods: Phytochemical analysis of R. balcanicus extracts included assays for total phenolic, total flavonoid and total anthraquinone content, and LC-MS/MS quantification of 50 phenolic compounds. Anti-inflammatory activity was evaluated by LC-MS/MS monitoring of selected metabolites (12-(S)-HHT, 12(S)-HETE, PGE2, PGF2?, and TXB2) formed in cyclooxygenase and lipoxygenase pathways of arachidonic acid metabolism. Human platelets were used as a source of enzymes, while inflammation was induced by calcimycin.

Results: The obtained results showed that although total phenolic content was similar in herb and root extracts (301±35 vs 324±24mg gallic acid eq./1g d.w.), there is significant difference in total flavonoids (40.2±0.9 vs 1.9±0.6 mg quercetin eq./1g d.w.) and anthraquinones content (17.4 vs 28.9 mg/1g d.w.). Dominant phenolics in herb were quercetin glycosides (up to 3.6% w/w) - quercitrin, rutin and quercetin-3-O-glucoside. Among flavan-3-ols, catechin was dominant in herb, but epicatechin in root extract. The most abundant phenolic acid was gallic acid (1.4 vs 0.7mg/g d.w.). Both herb and root extracts showed dose-dependent inhibition of 12(S)-HETE production (IC50=0.89 and 0.53mg/ml), as well as tromboxan syntase inhibition (IC50(TXB2) = 3.73 vs 0.35 mg/ml).

Conclusions: Root extract, although significantly poor in flavonoids content exhibited higher inhibitory activity towards COX and LOX pathway enzymes than herb extract.Acknowledgements: Ministry of education, science and technological development, Serbia, grant No.172058.

Key words: Rumex balcanicus Rech., phenolics, anti-inflammatory, LC-MS/MS

PO2876

ANTI-INFLAMMATORY PROPERTY AND PHENOLIC PROFILE OF JUNIPERUS COMMUNIS L. 1753 VAR. COMMUNIS NEEDLES AND CONES EXTRACTS

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Background and objectives: Juniperus species are well known in traditional medicine and in cooking and alcoholic beverage industries. The unique taste and aroma of cones of J. communis are an indispensable additive in the manufacture of gin, while needles are well known spice with uniquely 'sharp and clear flavour', mainly used for pickling game birds and meat. However, despite great use of Juniperus representatives, most of them have not been described thus far in terms of biological activity and composition. Thus, the aim of this study was to examine anti-inflammatory properties and phenolic profile of methanol extracts of needles and cones of the Juniperus communis L. 1753 var. communis.

Methods: Anti-inflammatory properties of methanol extracts were determined using assays which measure inhibitory potency toward COX-1 and 12-LOX enzymes in human platelets. In applied assay LC-MS/MS technique is used for the quantification of three products (12-HHT, TXB2 and PGE2) of COX-1 and one product (12-HETE) of 12-LOX metabolism. Furthermore, the presence of 44 phenolics in extracts was studied using LC-MS/MS.

Results: Needles have shown greater potency in inhibition of production of examined metabolites of COX-1 and 12-LOX enzymes, compared with cones. Namely, needles where the most potent towards inhibition of PGE2 production (IC50=2.76 mg/mL). Additionally, the most dominant phenolics in needles were rutin and catechin (103.83 and 103.27 mg/g of dw, respectively). However, in cone extract very low content of examined phenolics was determined, with only catechin (4.13 mg/g dw) found in reasonable amount.

Conclusion: According to obtained results examined J. communis, especially its needles, could be regarded as a promising source of bioactive natural compounds, which can be used both as a food supplement and as a remedy.Aknowledgement:The Ministry of Education and Sciences of Republic of Serbia (Grant No.172058).

Key words: Juniperus, anti-inflammatory activity, phenolics

PO2877

PROANTHOCYANIDIN OLIGOMER CONTENT IN DIFFERENT BARLEY VARIETIES

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Background and objectives: Proanthocyanidins are mixtures of flavan-3-ol units linked mainly via B-type bonds, i.e., C4-C8 or C4-C6 linkages. Occasionally an additional C2-O7 or C2-O5 linkage may exist, leading to doubly bonded A-type. These phenolic compounds are widely present in plants and have been suggested to demonstrate antioxidant, antibacterial, antiviral, anticarcinogenic, anti-inflammatory, and vasodilatory activities. Surprisingly, quantitative information on the proanthocyanidin profiles in plant products is quite lacking, largely due to the absence of appropriate analytical methodology and commercially available standards for oligomers. The study reported here was undertaken to detect and characterise the procyanidins in different type of barley.

Methods: Fourteen barley varieties, four waxy and ten no-waxy, were collected and characterised. Proanthocianidin compounds were extracted and their separation was perfomed by normal phase HPLC-FLD-MS.

Results: Monomers, procyanidin and prodelphinidin dimers, trimers, tetramers, and procyanidin pentamers were identified by mass spectrometry and quantified by fluorimetric detection. The total content of proanthocyanidins in barley samples ranged between 29.3 to 65.3 mg/100g. In all samples, the principal components consisting of procyanidin and prodelphinidin trimers with structure (gallocatechin-catechin-catechin), followed by the procyanidin dimer and representing on average 19, 17 and 16 % of the total content. With exception of some barleys, monomer content was low. Waxy barley varieties reported the higher content of phenolic compounds compared to no-waxy varieties.

Conclusions: These results estabilished that the barley varieties analysed in this work contain proanthocyanidins from monomer to pentamers and how these oligomers are a mixture of procyanidins and prodelphinidins, consisting mainly of catechin units. Moreover the waxy varieties showed the higher content of proanthocyanidins.

Key words: barley, procyanidins, HPLC, ESI-MS

PO2878

LS-MS DETERMINATION OF ALLIIN IN SELECTED ALLIUM SPECIES

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Background and objectives: Members of genus Allium have been used and cultured for thousands of years for their medicinal properties and characteristic flavor, both originating from the presence of organosulfur compounds. The dominant S-alk(en)yl-L- cysteine sulfoxide in garlic (Allium sativum L.) is alliin. To evaluate quality and pharmacological potential of garlic and other Allium species a selective and sensitive method for alliin determination is needed. In this study a rapid, and reliable method for alliin quantification was developed, with very simple sample preparation and requiring no derivatisation.

Methods: To avoid degradation of alliin, alliinase activity in Allium samples cloves was inhibited by microwave irradiation. The samples were homogenized under extraction solvent (80 % aqueous methanol with 0,05 % HCOOH), filtered, evaporated and redissolved. Extracts were analyzed using reversed-phase high performance liquid chromatography coupled with electrospray ionization triple-quad mass spectrometry. Sample components were separated in 10 min on Zorbax Eclipse Plus C8 rapid-resolution column using gradient elution (0.1 % aqueous formic acid and methanol) and constant flow of 0,4 mL/min. Data acquisition was performed in SIM mode using positive polarity. Alliin concentration was determined by external standard method.

Results: Alliin was detected in all investigated samples (21 hybrids of A. sativum L. and four wild-growing species: A. rotundum L.,A. vineale L., A. ampeloprasum L., A. flavum L.). The content ranged from 8.23 mg per g of irradiated clove to 59,1 mg/g for A. sativum, and 0.36-8.61 mg/g for wild-growing species.

Conclusions: The developed LC-MS method was successfully applied for aliin determination. The obtained results indicate that, regarding the alliin content, A. sativum possess superior biological potential in comparison to other investigated species.

PO2879

PHYTOCHEMICAL PROFILE AND BIOLOGICAL POTENTIAL OF ALLIUM FUSCUM WALDST. ET KIT VAR. FUSCUM

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Background and objectives: Members of the genus Allium have been used and cultured for thousands of years as vegetables and herbal remedies. Only two species of genus Allium (A. sativum L. and A. cepa L.) are explored in detail, while data on chemical composition and biological potential of other species, including wild-growing A. fuscum Waldst. et Kit var. fuscum are very rare. Therefore, the objectives of the present study were to investigate chemical composition, antioxidant, anti-inflammatory and antiproliferative properties of methanolic extract of this species.

Methods: Phytochemical profile was determined by measuring total phenolic, total flavonoid and total anthocyanin contents and by LC-MS/MS analysis of the extracts and headspace GC/MS analysis of fresh bulbs volatiles. The antioxidant activity was evaluated by measuring the effect on lipid peroxidation and by DPPH and NO assays, and anti-inflammatory activity by measuring the inhibitory potential on production of arachidonic acid metabolites in COX-1 and 12-LOX pathways. Antiproliferative activity was tested by sulforhodamine B assay in three cancer cell lines (HT-29, MCF-7 and HeLa) and one healthy cell line (MRC-5).

Results: High contents of total phenolics (11.25 mg gallic acid equiv./g of d.e.), total flavonoids (4.42 mg quercetin equiv./g of d.e.) and total anthocyanins (86.8 μg cyanidine-3-glucoside equiv./g of d.e.) were found. The dominant phenolic compounds in the extract were rutine, quercetine-3-O-Glc, kaempferol-3-O-Glc, isorhamnetin and ferulic acid. Dimethyldisulphide was detected as the main volatile compound. The extract inhibited both COX-1 and 12-LOX pathways in a dose-dependent manner. Antioxidant activity was weak compared with synthetic antioxidants. The extract expressed moderate, but not selective antiproliferative activity against HeLa and MCF-7 cells.

Conclusions: A. fuscum is powerful source of bioactive compounds and good anti-inflammatory agent.Acknowledgements: Ministry of education, science and technological development, Republic of Serbia, grant No. 172058.

Key words: Allium fuscum, antioxidant, anti-inflammatory, LC-MS/MS, GC-MS

PO2880

THE PROFILE OF POLYPHENOLS AND ANTIOXIDANT CAPACITY OF SELECTED MEDICINAL PLANTS OF BANGLADESH

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Background and objectives: WHO has estimated conservatively that 60 to 90 percent of the populations of the non-industrialized countries, either totally or partially, rely on medicinal plants to meet their health care needs. Over the last decade, the most interested bioactive compounds with health beneficial role has been polyphenols.The objective of this study was to screen total phenol content (TPC), to estimate polyphenol profile and antioxidant capacity (AC) of 15 medicinal plants of Bangladesh.

Methods: Folin-Ciocalteau method, DPPH Inhibition and Simultaneous determination method of all polyphenols had been used for TPC, AC and individual polyphenols respectively.

Results: TPC ranged from 276.85 (Moringa oleifera) to 15.45 (Zanthoxylum rhetsa) mg per 100g. The % DPPH inhibition in methanol and water extract are high in Zanthoxylum rhetsa (92.86) and Moringa oleifera (91.87) respectively and they also show the lowest IC50 in corresponding solvent system. The lowest % DPPH inhibition is found in Spilanthes calva (24.49) and Centella asiatica (4.88) in methanol and water extract respectively. Ten individual polyphenols are screened (Chlorogenic acid, coumaric acid, caffeic acid, apigenin-7-o-neohesperidoside, apigenin, querectin-3-beta D-gluoside, querectin-3-o-glucopyranoside, kaemperfrol, isoramanetin, lutelion). Amaranthus viridis, Spilanthes calva, Oxalis corniculata, Piper retrofractum, Moringa oleifera contain highest amount of chlorogenic acid, coumaric acid, caffeic acid, apigenin-7-o-neohesperidoside, apigenin respectively. Senna tora contain highest amount of querectin-3-beta D-gluoside, kaemperfrol and isoramanetin respectively whereas querectin-3-o-glucopyranoside andlutelion arehighest in Alternanthera sessilis.

Conclusions: Moringa oleifera, with lowest IC50 and highest %DPPH inhibition and TPC, is the most potent antioxidant sample among analyzed samples.Acknowledgement: The authors wish to acknowledge the support received from the Center for Advance Research in Sciences, University of Dhaka, Bangladesh.

Key words: Polyphenol, antioxidant capacity, medicinal plant, DPPH, IC50.

PO2881

PROTECTIVE ROLE OF WHEAT PEPTIDES IN A NON-STEROIDAL ANTI-INFLAMMATORY DRUGS INDUCED STOMACH DAMAGE MODEL RATS

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Background and objectives: Non-steroidal anti-inflammatory drugs (NSAIDs) are able to produce tissue damage and oxidative stress in animal models of stomach damage. In this study, the putative protective effect of wheat peptides was evaluated in a NSAID induced stomach damage model in rats.

Methods: Different dose wheat peptides or distilled water were administered daily by intragastric administration for 30 days. On the last day of experiment, NSAIDs (aspirin and indomethacin) or physiological saline were given by intragastric administration.Then the rats were sacrificed by cervical dislocation. The blood sample and stomach were collected. Histologic observation, the MDA, NO, NOS and antioxidase activity levels of stomach were detected. And the expression of mRNAs of mu-opioid receptor in stomach was examined using semi-quantitative reverse transcription polymerase chain reaction (RT-PCR).

Results: Wheat peptides administration decreased gastric epithelial cell degeneration. Oxidative stress and NO level were significantly increased after NSAID infusion and were reduced by wheat peptides. Wheat peptides significantly increased SOD & GSH-Px activity and decreased NOS activity in stomach. Mu-opioid receptor mRNA expression significantly decreased in wheat peptides treated rats than in the model control group.

Conclusions: Non-steroidal anti-inflammatory drugs induced stomach damage in rats and wheat peptides administration may be an effective tool for protecting stomach tissue against NSAID-induced stomach damage and oxidative stress.

PO2882

ANTITUMOR ROLRS OF ESSENTIAL OILS FROM CHRYSANTHEMUM MORIFOLIUM RAMAT

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Background and objectives: It is essential to screen new medicines that are less toxic, highly effective and provide better management of the cancer. Traditional Chinese medicines have attracted great interest to researchers recent years as alternative anti-cancer therapies. The aim of study is to explore the anti-cancer role of the essential oil from Chrysanthemum morifolium Ramat both in vitro and in vivo.

Methods: In vitro, cell proliferation inhibition action on human liver cancer HepG-2 of essential oils extracted from Chrysanthemum was examined by MTT method and cell apoptosis was observed using flow cytometry. In vivo, we used S-180 tumor-bearing mice to research antitumor effect of the oils.

Results: The oils showed significant antitumor activity towards HepG-2 cells, with IC50 values 1.4232μl/ml, and increased the apoptotic rates in a dose dependent manner. In addition, the oils inhibited tumor growth of S-180 tumor-bearing mice and the tumor suppressor rate of high dose reached 54.94%. Giving the oils improved the thymus/weight index of tumor-bearing mice which means it increased immune function.

Conclusions: Our findings suggest that the essential oil from Chrysanthemum morifolium Ramat has antintumor activity. It is a candidate for exploring new antitumor agents.

PO2883

A STUDY ON TOTAL POLYPHENOLS CONTENT IN SPENT COFFEE EXTRACTS (BLACK, ESPRESSO AND FILTER COFFEE)

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Background and objectives: Evidence of polyphenols role in the prevention of degenerative diseases such as cancer and cardiovascular diseases is emerging. Coffee constitutes one of

the principal sources of polyphenols. As the one of the most popular beverages, coffee is consumed by millions of people all over the world, several times a day.Spent coffee (SC) that is produced in tons by restaurants and cafeterias, and domestic environment, could be a good opportunity to have an important source of polyphenols as a natural antioxidants, also from an economical point of view.

Methods: In this work, microwave-assisted extraction (MAE) has been used as a potential alternative to conventional solvent extraction for the isolation of phenolic compounds from plants, considering certain limitations in terms of extraction time, energy, solvent consumption and cost. Response Surface Methodology (RSM) has been used for monitor the extraction characteristics, as affected by various extraction conditions. 20% solution of ethanol in distilled water was used as solvent.For optimization and statistical analysis Design Expert 8 (Trial version, Stat-Ease, Inc.) was used. Three independent parameters in the extraction were considered: microwave power (240-550W), extraction time (11-209s) and liquid-to-solid ratio (4.76-13.24ml/g. Total phenols were determined by Folin-Ciocalteu reagent.

Results: The total phenolic content, expressed as mg of GAE per g of dry weight, was for black SC 101.450-572.82mg/g,espresso SC 188,270-798,270mg/g and for the filter SC 161,45–558,270mg/g. Corresponding phenolic content in coffee beverage (black, espresso and filter)was 126,455, 144,436 and 109,182mg/g.

Conclusions: This result strongly supports the possibility of exploiting the remaining solid residue of coffee preparation for turning a waste material into a valuable source of phenolic compounds as a natural antioxidants.Acknowledgment: This work is funding by the Ministry of Education, Science and Technological Development, Republic of Serbia, Project TR31035.

Key words: polyphenols, spent coffee, MAE, RSM

PO2884

IDENTIFICATION AND QUANTIFICATION OF PHENOLIC COMPOUNDS BY HPLC-DAD-ESI-TOF-MS IN DIFFERENT VARIETIES OF EGGPLANT GROWN AT DIFFERENT SEASONS

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Background and objectives: Eggplant (Solanum melongena L.) is an important vegetable for their richness in healthy components such as phenolic compounds. Previous studies have shown that environmental conditions and growing techniques may influence the content in phenolic compounds in plants. Therefore, the aim of this study was the characterization and quantification of phenolic compounds on three eggplant varieties grown at different seasons using HPLC-DAD-ESI-TOF-MS.

Methods: The eggplant samples were crushed and placed on a lyophilizer, which was pre-cooled to -50ºC for 1 h at 1 mbar. The extracts were prepared and recovered using methanol: H2O (80:20, v/v).The analyses of phenolic compounds were carried out by HPLC-DAD-ESI-TOF-MS. The separation was performed with a Poroshell 120 column (EC-C18) and, water with 0.5 % acetic acid and acetonitrile as mobile phases.

Results: Twenty five compounds were identified and quantified by the optimized methodology. Derivates of caffeic, coumaric and ferulic acids, together to delphinidin rutinoside were the major compounds in all varieties of eggplants studied. Chlorogenic acid was the polyphenol found in a highest concentration in all samples, changing in the range 48.16-250.20 µg/g of sample. Furthermore, most phenolic compounds showed significant differences depending on the growing season.

Conclusions: Results obtained have shown that there is a high variability among the content of phenolic compounds in eggplants from different varieties. Besides, samples grown in summer possessed a higher concentration of phenolic compounds than those grown during the cold season. These findings are due to high temperatures that cause stress to the plants and, thus, eggplants accumulate higher concentrations of secondary metabolites such as polyphenols. The control of

the growing season of eggplants will be of interest for food industry due to the benefits of polyphenols in health.

Key words: eggplant, phenolic compounds, HPLC, mass spectrometry, season.

PO2885

DATE FRUIT AND SEED: FIBER, SUGAR, TEXTURE, AND COLOR PROFILES OF EIGHTEEN VARIETIES

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Background and objectives: Date is enjoyed as a fruit and is considered as a basic food commodity in many regions of the world. Date paste came into existence as a storage option for the surplus production of dates, this product is now being used as an ingredient in a few products, but the knowledge is still limited. Same is the case with date pits, which are treated as a by-product. The purpose of this study was to analyze the texture, fiber, color and sugar composition.

Methods: The eighteen date, date paste and date seed varieties were analyzed for their texture, fiber, color and sugar composition.

Results: hardness of the whole date (flesh) decreased considerably during conversion of date paste and the solid rubbery structure has been changed to leathery stage with lower hardness, but increased levels of gumminess and cohesiveness. In comparison to date paste, the insoluble fiber comprising of ADF, NDF, cellulose, hemicellulose and lignin were found in great magnitudes in all the date seed varieties. Date paste varieties had higher values of "L", "a" and "b" Invert sugars, glucose (22.42+/-3.25) and fructose (28.98+/-2.84) were found dominant, however, sucrose content was found very low (1.37+/-0.39) in all the eighteen varieties of date paste. Our study, also focused on the sugar content of date seeds and results concluded presence of fructose (0.46+/-0.35), glucose (0.77+/-0.02), sucrose (0.47+/-0.16) and maltose (0.54+/-0.11).

Conclusions: Date pits had a higher content of ADF, NDF, cellulose, hemicellulose and lignin in comparison to date paste, so that the most interesting aspect of the study was the possibility of use the date pits as a proper functioningredient in the manufacturing of other products.

Key words: Date, Texture, Fiber, Sugar, Color

PO2886

THE ABSORPTION AND THE FATE OF METABOLISM OF BIOACTIVE DIETARY BENZOXAZINOIDS IN MAMMALS

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Background and objectives: Benzoxazinoids are a group of bioactive phytochemicals mostly limited in cereals. In addition to allelopathic effects, benzoxazinoids contain a range of potential pharmacological properties and health-promoting effects including anticancer, immunoregulatory, antimicrobial, antinociceptive, aphrodisiac, appetite suppression, weight reduction, central nervous system stimulating, and reproductive system stimulating activities. These chemicals were recently found in mature cereal grains and bakery products making them interesting compounds from nutritional point of view. Relating the daily consumption of 50 g of rye bread (the major wholegrain product in Northern and Eastern European Countries), the daily total benzoxazinoids intake through a specific brand of wholegrain rye bread can be estimated to be higher than 5 mg/d. However, there is a paucity of information regarding the absorption, distribution, metabolism, and elimination of these bioactive dietary compounds in mammals.

Methods: We fed benzoxazinoids containing rye bread-based diet to pigs (n=6), rats (n=6), and humans (n=20) and analyzed the content of benzoxazinoids and their potential metabolites in plasma, urine, bile, and feces using LC-MS/MS.

Results: The most dominant dietary benzoxazinoid 2-α-D-glucopyranosyloxy-4-hydroxy-1,4-benzoxazin-3-one (DIBOA-glc) was apparently reduced to 2-α-D-glucopyranosyloxy-1,4-benzoxazin-3-one (HBOA-glc), the most dominant circulating benzoxazinoid in the plasma in all three experiments. HBOA-glc being the most dominant urinary benzoxazinoids, 8 different benzoxazinoids and their derivatives including some glucuronide and sulfate conjugates were excreted through the urine.

Conclusions: These studies revealed for the first time that bioactive benzoxazinoids in rye bread are highly bioavailable in mammals including humans. These unprecedented results indicated that benzoxazinoids could be one of the key ingredients contributing to the overall health effects of whole grain consumption.

Key words: Benzoxazinoids, bioactive, metabolism, rye

PO2887

EFFECT OF BIFIDOBACTERIUM ANIMALIS SSP. LACTIS BF-6 (LMG 24384) YOGURT ON COLONIC TRANSIT TIME IN HEALTHY ADULT FEMALES

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Background and objectives: Probiotics have the potential for therapeutic effects on gastrointestinal health. Several strains of bifidobacteria have been investigated for their possible improvements on gastrointestinal function. This study investigated the effect of Bifidobacterium animalis ssp. lactis Bf-6 (LMG 24384) supplemented yogurt versus placebo yogurt on colonic transit time.

Methods: A triple-blinded, randomized, placebo-controlled, two-period crossover trial was conducted with 68 adult women with a self-reported history of straining during bowel movements or hard or lumpy stools in the past two years. Women were generally healthy and not actively constipated due to regulatory requirements for probiotic studies. After a two-week run-in period, both Bf-6 and placebo yogurts were given to all participants for fourteen days each in a randomized order, with a six-week washout period between treatments. The primary outcome, colonic transit time, was assessed using a simplified segmental colonic transit technique via Sitz marker X-rays.

Results: The average colonic transit times observed in this study was 42.1 hours for the active period and 43.1 hours for control period (mean difference of 1.2 hours, 95% confidence interval: -4.9, 7.4). Few adverse events were reported and there were no significant differences in adverse events for the active and control periods.

Conclusions: The analysis showed no significant differences between the active and control groups during the crossover trial. Bf-6 appears to be safe and further trials should be conducted in populations with underlying diseases, as there is a greater chance of probiotic impact in a diseased state.

Key words: probiotics; gastrointestinal function; gastrointestinal transit; crossover trials

PO2888

APPETITE AND FOOD INTAKE AFTER CONSUMPTION OF SAUSAGES WITH 10% FAT AND ADDED WHEAT OR RYE BRAN

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Background and objectives: The use of dietary fibers in sausages gives less energy-dense and thereby healthier foods. Also, dietary fibers have been shown to induce satiety. The objective of this study was to investigate if addition of rye or wheat bran to sausages with 10% (w/w) fat induced satiety and if the effect was affected by the source of dietary fiber used or by food matrix in which the dietary fibers were incorporated.

Methods: This randomized cross-over study in 25 young men compared four test meals each consisting of three sausages and a bread. The test meals contained ~10g fiber per meal and differed in the source of dietary fiber and in the food matrix of the dietary fibers given the four test meals; wheat flour sausages (WFS), wheat bran sausages (WBS), rye bran sausages (RBS) and rye bran bread (RBB). The meals were served after an overnight fast and appetite ratings, evaluated by visual analogue scales (VAS), were assessed for 240 minutes followed by an ad libitum lunch meal where energy intake (EI) was assessed.

Results: Both RBS and WBS increased satiety ($p<0.01$) and fullness ($p<0.02$) and decreased hunger ($p<0.001$) and prospective intake ($p<0.001$) compared to WFS. The effect of RBS tended to be higher than the effect of WBS but did not differ significantly. RBS furthermore increased satiety ($p<0.05$) and fullness ($p<0.02$) and decreased prospective intake ($p<0.01$) compared to RBB. No effect on EI was observed.

Conclusions: Addition of wheat or rye bran to sausages with 10% fat proofed decreased appetite sensations and has thereby potential added health benefits. Additionally the satiating effect of dietary fibers appears to be more pronounced when added to sausages than when added to bread, stressing the importance of food matrix and food processing.

Key words: Rye bran; Wheat bran; Sausages; Appetite; Energy intake

PO2889

DETERMINATION AND COMPARISON OF PHENOLIC COMPOUNDS IN LEAVES FROM SIX IMPORTANT VARIETIES OF OLEA EUROPAEA L TREES BY HPLC -DAD-TOF-MS.

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Background and objectives: The therapeutic benefits of olive leaves (Olea europaea L.) have been claimed by Mediterranean's countries and explored for many centuries. These potential health benefits of olive leaves are mostly related to low molecular weight polyphenols. The characterization of their polyphenols is one of the first steps to evaluate the contribution of the olive to human health. Thus, differences between the phenolic compounds in olive leaves from different cultivars have been examined.

Methods: Leaves from six important olive cultivars: 'Arbequina', 'Arbosana', 'Changlot Real', 'Koroneiki', 'Picual' and 'Sikitita', grown under the same agronomic and ambiental conditions from the same olive orchards were used. Samples were collected in the middle of June, transferred to the laboratory, dried outdoors and processed. Analyses were carried out by HPLC-DAD-(microTOF) MS with a Poroshell 120 EC-C18 analytical column.

Results: Thirty phenolic compounds were identified and quantified being oleuropein and elenolic acid the most important. Significant differences between varieties were observed for all the compounds. 'Arbosana' leaves showed the highest concentration of phenolic compounds while no big differences were observed among the other varieties. 'Arbosana' leaves also presented the highest level of oleuropein and elenolic acid: 20.69 mg/g leaf and 14.19 mg/g leaf, respectively; whereas Arbequina' showed the lowest concentration of oleuropein, 17.08 mg/g leaf, and 'Sikitita' the lowest quantity of elenolic, acid 3.53 mg/g leaf.

Conclusions: Cultivars showing the highest levels of phenolic compounds as 'Arbosana' could be used as a source of phenolic compounds in pharmaceutical and food industry. Further work will be carried out for monitoring the evolution of phenolic compounds across the growth period.

Key words: Olive leaves, phenolic compounds, HPLC-DAD-TOF-MS.

PO2890

OXIDATIVE STABILIZATION OF LINSEED OIL BY INDUSTRIAL GRAPE (VITIS VINIFERA, L.) BY-PRODUCTS

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Background and objectives: The omega-3 polyunsaturated essential fatty acids are a recognized supplement in biofunctional food formulations. Their main current natural source is fish oil, but its use presents some limitations: it is a potential allergen, contains cholesterol and frequently, traces of heavy metals and it has unpleasant odour.The objective of this work was to study some alternative natural sources and procedures for replacement of the fish oil omega-3 fatty acids and the synthetic antioxidants used in functional food formulations by other alternative sources, such as linseed oil and extracts from industrially available grape by-products.

Methods: The grape by-product was obtained at industrial scale by drying of grape pomace (Vitis vinifera L.) with hot air and separation of the seeds by sieving. The "seedless" fraction contained grape skins, stalks, leaves and seeds (63%, 26%, 9% and 2%, dry weight, respectively). Ultrasound-assisted extraction or maceration with shaking at 60 ºC in ethyl butyrate, ethyl acetate, ethanol and ethanol:water 80:20 (v/v) were performed. Antioxidant capacity was determined by the 2,2-diphenyl-1-picrylhydrazyl (DPPH) and Rancimat assays, and polyphenols, by the Folin-Ciocalteu method. The qualitative composition on polyphenols, carotenoids and chlorophylls was studied by HPLC-Photodiode Array Detector.

Results: The highest Efficient Concentration (EC100) and polyphenol content values were found in the extract obtained at 60 ºC with ethanol:water (576.4 micromol Trolox/g and 90.1 mg gallic acid/g, respectively) and ethanol (341.2 micromol Trolox/g and 58.2 mg gallic acid/g, respectively).

Conclusions: The ethanol grape extract obtained at 60 ºC showed the highest stabilization effect of the linseed oil at a ratio of 15% (w/w), increasing 3-fold its induction period (from 4.16 to 12.6 h under Rancimat conditions: 100 ºC and a flow rate of 20 L/h).

Key words: omega-3, grape antioxidants, linseed oil.

Acknowledgments: Torres Quevedo and JAE-Doc Programs cofunded by the European Social Fund.

PO2891

MICROBIOLOGICAL, CHEMICAL AND SENSORY CHARACTERISTICS OF NEWLY DESIGNED SYNBIOTIC FERMENTED BEVERAGES DURING STORAGE

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Background and objectives: The aim of this work was to design new synbiotic fermented beverages. According to the international standards at least one million viable cells of probiotic bacteria per gram of product until the end of the warranty is required. The recommended daily dose of fructans to ensure prebiotic properties is 4-6 g per product.

Methods:A storage test (30 days at 4-6 ºC) was conducted while in 7-day intervals the following parameters were monitored: a) bacterial counts, b) pH, c) prebiotic content, d) sensory evaluation. Probiotic strains: Bifidobacterium animalis subsp. lactis CCDM 94, Lactobacillus rhamnosus CCDM 150,Enterococcus durans CCDM 922Starter culture: CCDM 17 (containing strains Lactococcus lactis subsp. cremoris, Lactococcus lactis subsp. lactis, Lactococcus lactis subsp. diacetilactis). All strains originate from the Culture Collection of Dairy Microorganisms Laktoflora, Czech Republic. Commercially available prebiotic formula on the basis of fructooligosaccharides - Orafti P95 (oligofructose ≥ 93.2%, BENEO, Belgium) was used. Fructan content was measured using HPLC method, bacterial counts were determined by plate method.

Results: In all samples the bacterial counts during storage test decreased, while a slight steadily decrease without significant fluctuations, both in the case of probiotics as well as for the basic culture was observed. Fructooligosaccharide content remained constant during storage. A slight decrease in pH of beverages during storage was detected, which significantly decreased in the first 14 days.

Conclusions: In all samples the viable counts of microorganisms in the end of the storage test was higher than 6,0 log cfu/ml, fructooligosacharide content remained unchanged and all samples were evaluated very positively from a sensory point of view.The study was supported by the Ministry of Agriculture, Czech Republic (Grant No. QI91B274).

Key words: probiotic, fructans, fermented beverages, storage

PO2892

EFFECTS OF APLYSIN ON THE APOPTOSIS OF HUMAN BREAST CANCER FCM-7 CELL

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Background and objectives: To investigate the effects of Aplysin on the apoptosis of human breast cancer FCM-7 cell in vitro.

Methods: The apoptosis of FCM-7 cell lines were determinated by MTT assay. Cell cycle and positive rate of proliferation cell nuclear antigen (PCNA) apoptosis associated protein Fas and Bcl-2 and intracelular calcium ions (IE Ca2+) levels were measured by flow cytometry.

Results: Aplysin could decrease the proliferation significantly in a dose-dependent manner in FCM-7 cell. The IC25 and IC50 of Aplysin on FCM-7cell for 48h were 28.3 and 31.9mg/L. When treating FCM-7 with Aplysin in concentration of 10, 20, 40mg/L for 48h, the growth of the cell was obviously inhibited, typical apoptosis sub-diploid peak was found, and the apoptotic rates of FCM-7 were 10.8%, 23.9% and 33.6%, respectively, which was significantly higher than 1.83% that in control group ($P<0.05$). And cellular quantity increased from 59.3±2.27% to 79.5±2.37% at G0/G1 phase, respectively, which was significantly higher than 48.6±2.92% that in control group, meanwhile, cellular quantity decreased from 27.3±1.63% to 15.0±1.34% at S phase, respectively, which was significantly lower than 31.5¡À1.72% that in control group ($P<0.05$), cell cycle was arrested in G0/G1 phase. Compared with control group, Aplysin groups could effectively increase Fas expression and IECa2+ levels, and inhibited the expressions of PCNA and Bc1-2 significantly in FCM-7 cells ($P <0.05$).

Conclusions: Aplysin can inhibit the proliferation and induces apoptosis of FCM-7 cells.

Key words: Aplysin; FCM-7 Cell; Apoptosis

PO2893

EFFECTS OF APLYSIN ON THE TUMOR GROWTH AND EXPRESSION OF VEGF AND PCNA IN H22 MICE

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Background and objectives: To investigate the effects of Aplysin on the tumor growth and expression of VEGF and PCNA in H22 mice.

Methods: KM mice were randomly divided into five groups: the model group, the Aplysin groups (25, 50, 100 μg/kg/d), the cyclophosphamide control group and each group had ten mice. H22 Cells were inoculated subcutaneously into left anteromedial of KM mice. Animals of four groups (except the model group) were treated with ig Aplysin of different dosage and pi CTX on the second day and executed after 15 days. We weighed the tumor which was stripped completely and calculated the tumor inhibition rate. Simultaneously the expression of VEGF and PCNA in tumor tissue was determined by immunohistochemistry.

Results: In vivo, the increase of H22 tumor weight in the Aplysin groups was slower than that in model group ($P<0.05$), and the tumor inhibition rate was 28.3%, 33.8%, 42.9% respectively. The treatment with mid and high-dose Aplysin inhibited the expression of VEGF ($P<0.05$), while there is no significant changes in low-dose group. Different dose Aplysin inhibited the expression of PCNA within tumor ($P<0.05$).

Conclusions: Aplysin inhibits tumor growth possessing higher tumor inhibition rate. The depressant effect may be related with inhibiting the expression of VEGF, PCNA in H22 tumor.

Key words: Aplysin; H22 cell; VEGF; PCNA; Mice

PO2894

UPLC-ESI-Q-TOF-MS FOR CHARACTERIZATION OF PHENOLIC AND OTHER POLAR COMPOUNDS IN LOQUAT (ERIOBOTRYA JAPONICA L.) FRUIT EXTRACT

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Background and objectives: Loquat (Eriobotrya japonica L.) belongs to Rosaceae family and it probably had its origin in south-eastern China. Currently, it is also cultivated in the Mediterranean area, amongst other regions. Both loquat fruit and leaf are often included in Chinese herbal remedies for cough and asthma as the latter contains many phenolics and some triterpenes which exhibit anticancer, anti-inflammation and hypoglycemic effects. Therefore, due to the important role that these naturally occurring antioxidants play in human health, the aim of the present work was to reveal the phenolic profile of the loquat edible portion.

Methods: In order to characterize the polyphenolic compounds in an extract of Eriobotrya japonica L. cultivated in Andalucía, a simple and rapid method was developed. This method used Reversed-Phase Ultra-Performance Liquid Chromatography coupled to Electrospray Ionization Quadropole Time-of-Flight Mass Spectrometry (RP-UPLC-ESI-Q-TOF-MS).

Results: The accuracy of mass data generated by Q-TOF-MS together with the fragmentation pattern of the full scan run of MS/MS analysis have been an useful tool to tentatively characterize many well-known phenolic compounds such as glycosilated species of flavonols (Kaempferol-3-O-rhamnoside) and phenolic acids such as p-hydroxybenzoic acid glucoside. Other polar compounds such as quinic acid, citramalic acid and pyridoxine were also identified.

Conclusions: In conclusion, data reveals that loquat is qualitatively an abundant source of phenolic compounds.

Key words: Eriobotrya japonica L.; loquat; phenolic compound; UPLC-ESI-Q-TOF-MS.

PO2895

COMPARATIVE STUDY OF ANTIOXIDANT ACTIVITY OF THIRTEEN VEGETABLE SAMPLES CULTIVATED IN ANDALUCÍA

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Background and objectives: The Mediterranean diet is characterised for a high consumption of fruits and vegetables. Specifically, in the region of Andalucía vegetable cultivation is particularly important. The intake of these vegetables supposes an important health-protecting factor because of their antioxidant activity, amongst other biological effects.Since the antioxidant activity of phytochemicals present in the diet has been of increasing interest in recent years, the whole aim of this work is to give a better understanding about the antioxidant activity of some typical Mediterranean vegetables cultivated in Andalucía.

Methods: The antioxidant activity of thirteen vegetable samples has been studied. These included different varieties of asparagus, tomato, onion, garlic, artichoke, carrot, lettuce, green bean, fava bean, pepper, eggplant, zucchini and potato. Three different assays were employed: Trolox Equivalent An-

tioxidant Capacity (TEAC), Ferric Ion Reducing Antioxidant Power (FRAP) and Oxygen Radical Absorbance Capacity (ORAC).

Results: According to ORAC assay, samples that showed the highest antioxidant capacity were red onion, asparagus and red garlic, in this order. Red onion showed also the highest results for TEAC and FRAPS assays. However, according to TEAC and FRAP assays, the second and third-highest results were achieved with tender onion and asparagus, in this order.

Conclusions: The antioxidant capacity of different typical Mediterranean vegetables cultivated in Andalucía was determined and related to their antioxidant content to render their antioxidant potential more comprehensive.

Key words: Mediterranean vegetables; antioxidant activity; ORAC; TEAC; FRAP.

PO2896

BIOACTIVE COMPOUNDS IN DEFATTED DABAI PERICARP FOR INHIBITION OF OXIDATIVE STRESS BIOMARKERS IN HYPERCHOLESTEROLEMIC RABBITS

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Background and objectives: Dabai fruit, scientifically known as Canarium odontophyllum is a potential source of nutraceutical. The antioxidant-rich purplish defatted dabai pericarp as waste of future dabai oil industry is potentially used as pharmaceutical ingredient for cardio-protection. This study aims to determine the effect of defatted dabai supplementation on oxidative stress biomarkers in high cholesterol-induced rabbits.

Methods: A total of 28 healthy rabbits were divided into four groups (n=7 in each group). A group of hypercholesterolemic rabbits were treated with 50 g defatted dabai pericarp per kg body weight daily for 8 weeks, while a statin group and two control groups (normal and hypercholesterolemic) were used for comparison. Plasma total antioxidant status (TAS), plasma malonaldehyde (MDA) and cellular antioxidant enzymes (SOD, GPx and catalase) of the rabbits were determined after 8 weeks of experiment.

Results: Results show that all groups showed significant reduction in plasma TAS and increment of plasma MDA except the group treated with defatted dabai pericarp that showed significant increment in plasma TAS and no significant increment in plasma MDA when compared to baseline. The normal rabbits had significant reduction in cellular SOD and GPx activities with no changes found for catalase activity. The group supplemented with defatted dabai pericarp showed significant up-regulations of SOD and catalase enzymes, but reduced GPx activity. Treatment with simvastatin was found to down-regulate the antioxidant enzymes except catalase, while treatment with defatted dabai pericarp (antioxidant-rich) showed further reduction in SOD activity in the group compared to non-treated hypercholesterolemic group.

Conclusions: Reduction in plasma MDA together with high increment in plasma TAS of the tested model indicates protective effect of the defatted dabai pericarp supplementation, thus offer beneficial cardio-protection.

Key words: antioxidant enzyme, dabai, hypercholesterolemic, malonaldehyde, oxidative stress

PO2897

ISOLATION AND CHARACTERIZATION OF EXOPOLYSACCHARIDE PRODUCED BY LACTOBACILLUS REUTERI FY-004

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Background and objectives: Probiotics, food-grade organisms, are capable of producing extracellular polysaccharide (Exopolysaccharide, EPS), which contribute to functions such as preventing dyspepsia, antitumor, antiallergy of human, and inhibition the growth of food-poisoning microbe.

Methods: We screened proper probiotics from infant's feces and fermented vegetable, and we used Bifidobacterium longum BCRC14634 from BCRC as a standard strain. After cell absorbing test, Gram stain, milk coagulating test, catalase test, acid and Bile salt tolerance test, we screened and purified effective organ. We also separated and purify EPS. As to EPS detection, we used phenol-sulfuric acid method to determine the quantity of EPS. We purified EPS by molecular sieving column and anion exchange chromatography, and determined its molecule weight by S-200 size-exclusion chromatography.

Results: The result of 16S rDNA sequence comparison results are showing with the same species, and the first one is Pediococcus pentosaceus FY-001, the second is Enterococcus faecalis Fy-002, the third is Lactobacillus fermentum Fy-003, the forth is Lactobacillus reuteri Fy-004We chose Lactobacillus reuteri Fy-004 to be our target species as to its high productivity and biological activity of EPS. The EPS fraction was composed of a single high-molecular-mass polymer of 4.6 x 10^5 Da containing glucose, fructose and rhamnose.

Conclusions: The results revealed beneficial physiological effects of exopolysaccharide from probiotics, such as antidiabetogenic, immunomodulative and anti-inflammatory properties.

Key words: Probiotics, Exopolysaccharide (EPS), Identification, Chromatography

PO2898

CLINICAL ANTI-OBESITY EFFECT BY ADMINISTRATION OFCARNITINE AND SYNEPHRINE CONTAINING DRINK

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Background and objectives: Obesity is a serious health problem in developed countries and the prevalence of obesity has been increasing dramatically for several decades. The Carnitine and Synephrine, have been a variety of studies which are decreased body fat. This study was to investigate the Carnitine and Synephrine containing drink regulation of body fat in BMI>27 or body fat>30% subjects.

Methods: This was a randomized, placebo controlled, double blind design. 35 subjects (20 to 65 years) were enrolled and randomly divided into two groups. The trial total was 8 weeks. Anthropometric measurements and blood collection were given at initial, 3rd, 6th, and 8th week, including weight, body fat, and blood lipid profile.

Results: The results revealed that weight and BMI were significantly reduced ($p<0.05$), and body fat was decreased 0.9% compared with placebo, and total cholesterol in plasma was greatly reduced 3.8% after administration of Carnitine and Synephrine containing drink.

Conclusions: These results suggested that the Carnitine and Synephrine containing drink could be down-regulation of weight and body fat.

Key words: Carnitine, Synephrine, body fat.

PO2899

COMPARATIVE STUDY OF RESVERATROL, POLYPHENOLIC CONTENT AND RELATIVE ANTIOXIDANT CAPACITY OF ROMANIAN RED WINES

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Background and objectives: Romanian viticulture is characterized by tradition, progress and quality. Romanian wines produced from foreign and domestic grapes were positively evaluated at various competitions in the field.Their quality is not only organoleptic but it also related to their composition giving the wines to potential to exert ahuman health benefits .

Methods: To prove this we have analyzed 65 samples of wine produced in different wine-growing regions of Romania, in which we determined the concentrations of trans- and cis-resveratrol, the total polyfenolic compounds and the antioxidant activity. We are using a sensitive, high throughput liquid chromatography coupled with mass spectrometry method (LC-MS/MS) for resveratrol determination. The total phenolic compounds (TPC) were determined using modified Folin-Ciocalteu method. The antioxidant capacity was tested by DPPH method, BHT was used as standard control and the capability of samples to scavenge DPPH was expressed as percentage values.

Results: The biggest average quantity of resveratrol was found in the wine obtained from the Pinot Noir variety: 0.893micrograms/ml, followed by Cabernet Sauvignon, Merlot and Feteasca Neagra varieties. All antioxidant activity values obtained were highly correlated with total polyphenol and resveratrol content.

Conclusions: It turned out that local varieties such as Feteasca Neagra si Babeasca neagra have a high content of polyphenols and antioxidant shows comparable with the other red wine varieties known in Europe.

Key words: red wine, resveratrol, polyphenol, antioxidant capacity

PO2900

LPS-BINDING CAPACITY OF FRUIT PROANTHOCYANIDINS.

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Background and objectives: The lipopolysaccharide (LPS) originated from gram-negative bacteria belonging to the intestinal microbiota has been recently proposed as a key factor in the development of metabolic endotoxemia and low grade inflammation, frequently associated with metabolic syndrome and its complication. Proanthocyanidins (PACs) are phenolic compounds abundant in fruits which display antioxidant activity and are involved in the protection against non-transmissible chronic diseases. In a first step to elucidate whether dietary PACs may interfere with intestinal absorption of LPS, the aim of the study was to determine the in vitro LPS-binding capacity of fractionated PACs obtained from cranberry and avocado (A-type PACs), and apple and grape (B-type PACs).

Methods: Fruit PACs were fractionated according to their molecular weight by adsorption chromatography on Sephadex LH-20 and semipreparative diol-phase HILIC-HPLC columns. Polymerization degrees and structure features were subsequently carried out by phloroglucinolysis and mass spectrometry, respectively. The LPS-binding capacity was evaluated by incubating LPS-FITC with polymyxin B conjugated to agarose beads, in the presence or absence of PACs fractions. Unbound LPS-FITC was removed and the remaining fluorescence determined in a Synergy HT Microplate Reader.

Results: The most efficient PAC fraction in inhibiting LPS binding to polymixin-agarose beads was the Low Molecular Weight Fraction and the crude extract from avocado (IC50=27.0µg/ml and 30.1µg/ml, respectively), followed by the High Molecular Weight Fractions from cranberry (IC50=40,5µg/mL), apple (IC50=86.1µg/ml) and avocado (IC50=97.6µg/ml).

Conclusions: Dietary PACs from avocado and cranberry seems to be particularly interesting in their ability to bind LPS, suggesting that these bioactive compounds may interfere with endotoxin absorption in the intestinal lumen, contributing to the protective effect of PACs against non-transmissible chronic diseases. Supported by Fondecyt 1120290.

Key words: Proanthocyanidins; lipopolysaccharide; non transmissible chronic diseases; metabolic endotoxemia

PO2901

ANTIOXIDANT AND PROOXIDANT ACTIVITY OF ESSENTIAL OIL OF GARLIC BY ELECTRON SPIN RESONANCE IN PORK PATTIES

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Background and objectives: The aim of this study was to study the antioxidant and prooxidant activity of the essential oil of garlic (AE) and the AE added at doses of 0.05 % (A1) and 0.4% (A2) in pork patties packaged in aerobic conditions and stored in refrigeration during 6 days.

Methods: For that, the antioxidant activity of the AE in a model system (Fenton reaction), and in burgers with ESR (electron spin resonance) by free radical formation during heating at 55 °C and its binding to PBN (p-fenil-N-tert-butilnitrona) on days 0, 3 and 6 of storage was studied.

Results: The results showed that AE showed prooxidat effect at phenol concentration ≥1.6 mg GAE/L. In patties A1, the radical formation after 3 hours of heating at 55° C was significantly lower (P <0.05%) than in control samples (C) and A2 throughout the storage. In contrast, burgers treated with 0.4% of AE showed that radical formation was higher (P <0.05%) than C and A1, therefore, the higher level of AE showed a prooxidant effect.

Conclusions: The results indicate that the use of 0.05% essential oil of garlic, as a natural antioxidant in pork burgers, being a good strategy of conservation.

Key words: Garlic; Essential oil; Patties; Antioxidant; Prooxidant.

PO2902

EFFECT OF THE ADMINISTRATION OF A MILK PRODUCT CONTAINING A HEAT-TREATED PROBIOTIC AND A PREBIOTIC IN PRESCHOOL CHILDREN

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Background and objectives: Some heat-treated probiotics, such as Lactobacillus johnsonii La1, retain immunomodulating capacity in vitro and in in vivo preclinical models. However overall data in humans are scarce. The aim of this study was to investigate the effect of a non-fermented milk product containing a heat-treated La1 (HTLa1) and a fructooligosaccharides prebiotic (FOS:Inulin) on immune functions and fecal microbiota of preschool children.

Methods: randomized, double-blind, multicentric, placebo-controlled clinical trial carried out in 282 children from 5 day-care centers. The test group received for two months 2x200ml/d of a product containing HTLa1 and FOS-inulin; the control group received the same product without prebiotics and HT probiotic. Acute respiratory infections and diarrhea were registered along the study. Salivary and stool samples were collected at baseline and at the end of treatment. Salivary SIgA and ß-defensin-1, and fecal SIgA and ß-defensin-2 were assessed by ELISA. Fecal concentrations of Bifidobacterium, Bacteroides and Lactobacillus were determined by qPCR.

Results: dropout rate was 25.9% (73/282). No significant adverse events were reported and no differences in the incidence of diarrhea were observed between the groups. The incidence of upper respiratory infections was slightly lower in the test group, 19.8% vs 26.2 % in the controls (not significant). Salivary and fecal concentrations of SIgA were not affected by HTLa1+FOS:inulin nor was that of β-defensin 2 in feces. Saliva β-defensin-1 concentrations decreased along time in both groups. However, this decrease was significantly less pronounced in the treated group. No differences in the fecal bacterial populations were observed.

Conclusions: These exploratory data suggest that the administration of a HTLa1+FOS:inulin does not significantly affect the salivary and fecal defense factors in children although a rather maintenance effect on salivary β-defensin-1 was observed. The clinical meaning of such effect deserves further investigation.

Key words: Heat-treated probiotic; children; ß-defensins; secretory IgA; microbiota.

PO2903

WATERMELON LYCOPENE AGAINST DIET INDUCED HYPERCHOLESTEROLEMIA

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Background and objectives: Contemporary dietary patterns have strengthened the notion of functional/nutraceutical foods to ameliorate various lifestyle related disorders. In developing economies like Pakistan, use of phytonutrients based designer foods is a pragmatic approach to support nutrition and ultimately health. In this relation, watermelon (Citrullus lanatus) is considered as one of the promising source of nutraceuticals especially lycopene. The current study was tailored to assess the therapeutic worth of watermelon lycopene to cope with diet induced hypercholesterolemia.

Methods: For the purpose, cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides (TG) were assessed in hypercholesterolemic and hyperglycemic states of body. Lycopene based functional/nutraceutical drinks T1 (whole watermelon juice), T2 (watermelon strawberry blend+lycopene), T3 (lycopene supplemented watermelon juice) & T0 (control) was given to experimental rats throughout the eight week study period. The efficacy assessment was conducted in Sprague Dawley rats as study I (normal rats), study II (hypercholesterolemic rats) and study III (hyperglycemic rats).

Results: The provision of lycopene based functional/nutraceutical drinks caused a significant reduction in serum cholesterol, LDL and triglycerides whilst, a noticeable rise was recorded for HDL. The highest decline in cholesterol was noticed as 5.99 to 6.74% (study I), 12.20 to 13.16% (study II) and 8.12 to 9.02% (study III) T3 followed by T2, T1 and T0. Likewise, a pronounced decrease in serum LDL and triglycerides was assessed in T3 groups. In contrary, the rise in HDL was observed in groups relied on therapeutic drinks.

Conclusions: In the nutshell, diet induced hypercholesterolemia and allied health claims can be prevented with oral provision of lycopene. Lycopene based watermelon juice proved effective to manage dyslipidemia. Further, lycopene based therapeutic food has ability to manage serum lipid within normal range by inhibiting the in vivo cholesterol synthesis.

Key words: Watermelon, Lycopene, Functional/Nutraceutical, Cholesterol, LDL

PO2904

CAROTENOID AND POLYPHENOL PROFILES OF CABBAGE AND PLUM VARIETIES AND THEIR CONTRIBUTION TO TOTAL ANTIOXIDANT CAPACITY

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Background and objectives: Diets rich in fruits and vegetables are recommended by health organizations such as the WHO. However, it is poorly understood which compounds in fruits/vegetables are the most bioactive with respect to beneficial health effects. Carotenoids and polyphenols constitute important classes of phytochemicals possessing both anti-oxidative properties and may further influence gene expression. A disturbance of the prooxidant-antioxidant-balance could lead to oxidative stress and inflammation, major factors associated with chronic diseases such as ulcerative colitis and diabetes. Objectives and

Methods: We investigated the contribution of two major groups of vegetables/fruits (cabbage, plums), to total dietary carotenoid and polyphenol intake. Plum (n=17) and 27 cabbage varieties from Luxembourg were investigated for their individual polyphenol and carotenoid profile(UPLC), vitamin C, micro-macronutrient content, and their association with markers of antioxidant capacity.Antioxidant capacity was determined via the FRAP and ABTS tests, vitamin C was measured via Tillmann's reaction.

Results: Total carotenoid and polyphenol content varied considerably between the different cabbage/plum varieties, with highest concentrations in Kale (13.3±0.58 mg/100g FW) and in Cherry plums (1.96±0.28 mg/100g) for carotenoids; and Kale (27.0±0.91 mg/100g) and Kirks plums (151±14 mg/100g) for polyphenols.In multiple linear regression models, flavonoids, neochlorogenic acid and vitamin C were the best predictors of antioxidant capacity as assessed by ABTS (beta= 0.582, 0.238 and 0.224, R2= 0.831) andflavonoids, anthocyanins, lutein and vitamin C as assessed by FRAP in cabbage (beta = 0.258, 0.580, 0.272 and 0.310, R2=0.832), while for plums these were selenium, total sugars, chlorogenic acid and vitamin Cfor ABTS (beta = 0.535, 0.405, 0.254 and 0.276, R2=0.853) and selenium, chlorogenic acid and flavonoids for FRAP (beta = 0.424, 0.384 and 0.386, R2=0.711).

Conclusions: Cabbage and plum antioxidant activity was best explained by several, not a single class of constituents, and the type of test used influenced results. It is estimated that cabbage and plums contribute to an antioxidant intake equivalent to 26.3 and 6 mg/ day of ascorbic acid equivalents, respectively.

Key words: antioxidant capacity, carotenoids, polyphenols

PO2905

SETTING UP MODELS FOR STUDYING THE EFFECT OF DIETARY MINERALS ON BIOAVAILABILITY ASPECTS OF CAROTENOIDS

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Background and objectives: While data on carotenoid intake is available, much less is known on factors impacting their bioavailability. Some dietary factors known to alter carotenoid uptake/absorption include dietary lipids and fibre. A factor that so far has received little attention is dietary minerals and trace elements. In our previous results, employing an in-vitro digestion system coupled with a Caco-2 cellular epithelial model, a negative impact of high concentrations of calcium, magnesium, iron and zinc on carotenoid micellarization and cellular uptake was found, with reductions on cellular uptake as high as 90%.

Objectives and methods: In this study we further investigate: a) physico-chemical characteristics of the digesta, e.g. micelle formation, by simulated gastro-intestinal digestion, using various emulsifying vehicles; b) the interaction between carotenoids and minerals at various concentrations, employing a Caco-2/HT-29 co-culture cell model; c) human postprandial absorption of carotenoids from kale in the presence of a high calcium supplement.

Results: Following in-vitro digestions of 60mg isolated beta-carotene, digesta particle size distribution in the aqueous phase, analysed by Nanoparticle Tracking Analysis using a NanoSight NS500 (Amesbury, UK), in combination with filtration trials at various cut-off sizes (20, 200nm) revealed incomplete embedding of beta-carotene into mixed micelle formation, with rather large particles being formed (90% around 50-200nm). Canola-oil appeared to be the best vehicle for carotenoid micellarization (51%), also showing the least losses of beta-carotene after filtration (micellarization 26%) when compared to milk (micellarization 4%), where losses after filtration reached >90%.

Conclusions: Optimization of digestion parameters to obtain physiological mixed micelles is paramount. As mixed micelles have a diameter of approximately 8nm, we suggest that in future digestion models, a 20nm filtration should be included after digestion, to prevent over-estimation of carotenoid micellarization and to remove particles that might be toxic for cellular cultures.

Key words: carotenoids; in-vitro digestion model; human trial; Caco-2/HT29

PO2906

PREBIOTIC EFFECT OF A FORMULA SUPPLEMENTED WITH GALACTO-OLIGOSACCHARIDES IN TERM INFANTS: A RANDOMIZED MULTICENTER TRIAL.

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Background and objectives: There is accumulating evidence that human milk oligosaccharides play a crucial role on the intestinal microbiota. The principal objective was to demonstrate in healthy term infants the effect of a Galacto-oligosaccharides (GOS) supplemented infant formula (0.4g/100mL)in stimulating prebiotic effect.

Methods: This was a randomized, double blind, controlled, clinical trial performed by 6 centers in Italy Three groups were considered: breast milk, GOS supplemented infant formula (study formula) and standard infant formula (control formula). Study and control formula were supplied by Heinz Italia S.p.A. (Latina, Italy). Anthropometric parameters were recorded at: baseline visit (B) within 15 days after birth, visit V1 (30 ± 10 days of life), visit V2 (60 ± 10 days of life), visit V3 (90 ± 10 days of life), visit V4 (120 ± 10 days of life) and final visit (Vf), before the introduction of complementary feeding. A fecal sample was collected at B, V1, V2 and Vf. Bifidobacteria, Lactobacilli, Clostridium, Escherichia coli were evaluated. Total bacterial DNA was extracted from faecal samples and subsequent qPCR analysis was performed.

Results: A total of 199 breast fed infants and 163 formula fed (80 in the control group and 83 in the study group) were recruited. All three groups showed appropriate physical development throughout the period. Study formula presented normal and soft tools in the majority of episodes (89%). Ratio between Clostridium count and Bifidobacteria and Lactobacilli count was significantly more favourable when considering the study formula group with respect to the control one during the entire follow up (P=0.02).

Conclusions: Our study showed that the GOS supplemented formula mimicked the effect of human milk in promoting Bifidobacteria and Lactobacilli growth as well as in inhibiting Clostridium.This trial is registered with ClinicalTrials.gov, numberNCT00486148.

Key words: GOS, formula, prebiotic, Clostridium, bifidogenic activity.

PO2907

DETERMINATION OF ANTI OXIDATIVE OF INDONESIAN FOOD (KEMOJO CAKE)

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Background and objectives: Kemojo cake could be additional food program for elementary school students. Unfortunately, kemojo cake have not analyzed of nutrient label yet .Pandan, corn and durian are good source of antioxidant. The content of antioxidant of pandan leaf powder is higher than fresh form. To inform nutrient of kemojo cake. It is a communication between producer and consumer. To analyze antioxidant of kemojo cake. To promote traditional food as additional food program for elementary school and at International.

Methods: The study analyze eight samples kemojo cake before and after cooking which was determined by H-ORAC acid B Method. The basic ingredients are egg, flour, sugar, and coconut milk. Samples are dried by freeze dry system. Scaling the samples are in order to compare the weight before and after freeze dry system. After that, samples should be milled and extracted.

Results : There were almost the same result between first and second extraction which spawned durian had the huge antioxidant (8.13 µmol TE/gr) and it was followed by pandan whichhad antioxidant 7.62 µmol TE/gr. The lowest of antioxidant was corn which had 4.14 µmol TE/gr in 1 gram.

Conclusions: antioxidant capacity of food increased after cooking process than before cooking. It is shown that thermal processing at high temperature for 25 min significantly elevated the total antioxidant activity

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Key words: kemojo cake, antioxidant, H-ORAC Method

PO2909

THE POSSIBILITY OF USING BIOLOGICAL ACTIVITY SUBSTANCES AND SWEETENERS IN COOKIES

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Background and objectives: In recent years consumer interest in biologically active substances, including dietary fiber and inulin has increased. These substances play an important role in the prevention of diet-related diseases. Sweeteners are another kind of functional substances, allowing for production of foods with reduced sugar content. The aim of this study was to assess the use of buckwheat hulls and buckwheat flour, inulin and sugar substitutes in pastry goods.

Methods: Buckwheat flour was used as a partial replacement for wheat flour at the level of 25% (oat cookies - CO), 60% (muffins - M) and 40% (sunflower cookies - CS). Inulin was used as a fat substitute at the level of 50%; aspartame and acesulfame K were used as a sugar substitute in M and CS cookies, but in oat cookies 50% of sugar was replaced by brown sugar. Buckwheat hulls, chokeberry and mulberry extracts were also used. The content of protein, lipids, carbohydrates, ash and total dietary fiber (TDF), soluble dietary fiber and insoluble dietary fiber was determined.

Results: Cookies with buckwheat hulls and flour contained much more protein (16% - CO, 45% - CS and 50% - M), ash (20% - CO, 11,5% - CS and 33% - M) and TDF (22% - CO, 78% CS and 550% M), but much less lipids (18% - CO, 17% - CS and 39% - M) in comparison with the control samples. The dominant fraction of TDF in all cookies was the insoluble fraction.

Conclusions: Substitution of flour by buckwheat flour and sugar by sweeteners in cookies' recipe is one of the possibilities to increase biological activity substances content in our diet and reduce of the caloric value of products.

Key words: cookies, buckwheat flour, sweeteners, dietary fiber

PO2910

GLYCOMACROPEPTIDE: A NEW DIETARY OPTION FOR IMPROVING PHENYLKETONURIA(PKU) DIET COMPLIANCE

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Background and objectives: Phenylketonuria (PKU) is a genetic metabolic disorder in which a defective liver enzyme cannot metabolize phenylalanine (Phe), an amino acid found in many foods. Elevated Phe levels affect the cognitive and psychological profiles of PKU patients.PKU can be treated with a life-long low-protein diet, but maintaining compliance to the diet is difficult. Several new options for the life-long nutritional management of PKU have been proposed in recent years. Glycomacropeptide (GMP) is a protein derived from cheese whey that is rich in specific essential amino acids, but in its purified form, is free of tyrosine, tryptophan and phenylalanine and could therefore provide an alternative protein source for PKU individuals. A variety of foods or beverages can be made with GMP.This review focus on recent advances and studies about GMP, its safety and its potential benefits to PKU patients.

Key words: Phenylketonuria,Glycomacropeptide, functional food

PO2911

GYNURA FORMOSANA EXTRACT DECREASES SERUM URIC ACID AND URINE ALBUMIN IN MICE FED WITH HIGH-FAT DIET

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Background and objectives: Gynura formosana is a folk medicine in Taiwan used as a hypoglycemic agent. Obesity is a risk factor for type 2 diabetes mellitus and also is linked with chronic kidney disease. This study is to examine whether Gynura formosana show protective effect on kidney in obese mice induced by high-fat diet.

Methods: Four groups of male C57BL/6j mice were fed for 10 weeks with a control diet (5% fat,C), a high fat diet (35% fat, HF), or a high fat diet with 0.1% (G1) or with 0.5% (G2) Gynura formosana extract. The body weight, adipose tissues mass, serum lipids, uric acid, adipomectin and urine albumin were measured.

Results: The body weight, adipose tissue mass and the levels of serum uric acid and urine albumin were significantly increased in HF compared to the control group. In G2 group, the body weight, the relative weight of epididymal fat (EP) and retroperitoneal fat (RE) were significantly reduced to be respectively 88%, 75% and 70% of HF group. However, the adiponectin levels in G2 group showed 1.2-fold higher than that in HF group. The plasma uric acid and urine albumin were significantly decreased by Gynura formosana extract both with 0.1% or 0.5% in diet.

Conclusions: We conclude that a high fat diet increased body weight, adipose tissue mass, and hyperuricemia in mice and these effects can be reduced by Gynura formosana extract. Gynura formosana extract might have the renal protective effect in obese mice induced by high fat diet.

Key words: Gynura formosana, adipose tissue, uric acid, albumin

PO2912

POLYPHENOLS PROFILE AND ANTIOXIDANT CAPACITY OF SELECTED MEDICINAL PLANTS OF BANGLADESH

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Background and objectives: Over the last few decades, medicinal plants with varying bioactive compounds of diverse health beneficial roles have been of major interest in the field of functional food science. The mostly pronounced bioactive compound from these plants has been polyphenols. This study aimed at assessing total phenolic content (TPC), polyphenols profile and antioxidant capacity (AC) of 15 comparatively under-utilized medicinal plants in Bangladesh.

Methods: Folin-Ciocalteau method and DPPH Inhibition, respectively, were employed for TPC and AC together with simultaneous determination of individual polyphenols through HPLC.

Results: TPC ranged from 276.85 (Moringa oleifera) to 15.45 (Zanthoxylum rhetsa) mg per 100g. The highest % DPPH inhibition in methanol extract was found for Zanthoxylum rhetsa (92.86) and in water extract for Moringa oleifera (91.87) those also showed the lowest IC50 in corresponding solvent systems. The lowest % DPPH inhibition in methanol extract was found for Spilanthes calva (24.49) and in water extract for Centella asiatica (4.88). Ten individual polyphenols including Chlorogenic acid, coumaric acid, caffeic acid, apigenin-7-o-neohesperidoside, apigenin, querectin-3-beta D-gluoside, querectin-3-o-glucopyranoside, kaemperfrol, isoramanetin and lutelion were assessed. Amaranthus viridis, Spilanthes calva, Oxalis corniculata, Piper retrofractum, Moringa oleifera contained highest amount of chlorogenic acid, coumaric acid, caffeic acid, apigenin-7-o-neohesperidoside, apigenin respectively. Senna tora contained highest amount of querectin-3-beta D-gluoside, kaemperfrol and isoramanetin respectively whereas querectin-3-o-glucopyranoside and lutelion were highest in Alternanthera sessilis.

Conclusions: Moringa oleifera, with the lowest IC50 and highest %DPPH inhibition and TPC, was found to be the most potent source of antioxidants for free radical scavenging capacity.The authors acknowledge the support provided by the National Institute of Nutrition, Hyderabad, India and the Center for Advanced Research in Sciences (CARS), University of Dhaka, Bangladesh.

Key words: Polyphenols, antioxidant capacity, medicinal plants, DPPH, IC50.

PO2913

MINERAL AVAILABILITY OF INFANT FORMULAS SUPPLEMENTED WITH LACTOFERRIN AND / OR GOS AFTER IN VITRO GASTROINTESTINAL DIGESTION

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Background and objectives: Infant formulas play pivotal role in the nutrition, especially 4-6 months after birth when nutritional requirements can no longer be met by breast-milk alone. Although human milk is the first choice for the newborn infants, infant formulas have been designed to provide with the required nutrients for optimal growth and development. Recently, the infant formulas are designed to contain the bioactive components present in human milk such as lactoferrin (Lf) and galactooligosaccarides (GOS) because of its functional roles. Lf improves the absorption of important minerals such as iron and calcium. In this study we determine the functionality of Lf and GOS added to infant formulas on mineral absorption using in vitro simulation of gastrointestinal digestion.

Methods: An in vitro solubility method was applied to infant formulas supplemented with Lf (0.1%, 0.15% and 0.2 %) and / or GOS (3.3%, 5% and 10%). The content of Ca, Fe, Mg, Zn, K, P and Mn of samples and soluble fractions were analyzed by using the inductively coupled plasma.

Results: The addition of Lf and GOS to formulas led to an increase on the mineral content in the soluble fractions. The presence of Lf and GOS in the same formulas had the best effect on Ca, P and Fe solubility (%). Meanwhile, no significant effect of Lf and GOS was observed in Mn, Zn and K solubility (%). Results indicate an increase on the bioaccesibility of essential minerals when infant formulas are supplemented with of Lf and GOS.

Conclusions: The addition of Lf and / or GOS has a beneficial effect on mineral bioaccesibility indicating a possible role of Lf and GOS in enhancing the mineral bioavailability. In vivo studies are needed to further evaluate Lf and GOS as supplementation of infant formulas.

Key words: Lactoferrin, GOS, formula, minerals, solubility.

PO2914

INULIN AND FOS INHIBIT E. COLI INVASION OF INTESTINAL EPITHELIAL CELLS VIA ACTIONS ON BOTH BACTERIA AND EUKARYOTIC CELLS

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Background and objectives: The non absorbable glucids inulin (INU) and fructooligosaccharides (FOS) are well known for their prebiotic properties, i.e. the capacity to favor the selective growth of host-friendly bacteria. Both FOS and INU have been ascribed therapeutic activities, including protection against intestinal inflammation and metabolic syndrome. In fact, these products are currently added to infant formulas to emulate human milk composition. In addition to their prebiotic qualities, oligosaccharides have direct effects on the intestinal mucosa. Here we describe the protection of model intestinal epithelia against bacterial invasion by FOS and INU.

Methods: In vitro invasion assays were carried out in IEC18 cell monolayers exposed to GFP-transformed Escherichia coli on the apical side at a 1:100 ratio for 4 hours. Bacteria were measured by flow cytometry analysis as GFP-positive events in the cell homogenate. Both enteroinvasive (LF82) and nonenteroinvasive (K12) strains were used. Two concentrations of each oligosaccharide (5 g/l and 10 g/l) were studied. In addition, E. coli biofilm formation assays were adapted from a microtiter plate protocol (Appl. Environ. Microb. 2002;68:6).

Results: FOS shows a 70% and 45% inhibition of LF82 invasion at 10 and 5 g/l, respectively ($p<0.001$) INU only achieved a 30% inhibition ($p<0,001$). By changing the experimental conditions (timing of oligosaccharides exposure and co-exposure to bacteria and oligosaccharides) it was estimated that almost 75% of the inhibitory effect was attributable to actions on bacteria, and the other 25% to enhancement of epithelial defense. There was no effect on bacterial growth. However, LF82 biofilm formation was inhibited by both products by 36% at 5 g/l and 50% at 10 g/l ($p<0.001$).

Conclusions: Both INU and especially FOS reduce epithelial invasion by enteroinvasive E. coli by actions that involve bacteria and epithelial cells.

Key words: AIEC, Prebiotic, epithelial invasion, IEC18 cells

PO2915

EFFECTS OF UNSAPONIFIABLE MATERIALS IN RICE BRAN OIL ON SERUMCHOLESTEROL LEVELS IN RATS

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Background and objectives: Rice bran oil (R) lowers plasma cholesterol levels more effectively than other commonly used vegetable oils.R is characterized by a relatively high content of unsaponifiable materials (USM) of non-fatty acid components such as sterols (S), ƒÁ-Oryzanol (O) and tocopherol families.The cholesterol lowering ability of R seems to be due to the contents of USM especially O.In this study, the effects of different contents of O and more additive of S on serum cholesterol levels were studied.

Methods: Male Sprague-Dawley rats were fed a hypercholesterolemic diet containing cholesterol and sodium cholate in the plural experiments of 3 or 4 weeks period.Dietary lipid sources were lard or soybean oil in the control group, in the experimental groups normal R, low or high level of O in R and commercial S added (1.0%, 2.0%) to R were used.

Results : There were no differences in the body weight of the rats between the control and the experimental groups in each experiments.In all experimental groups, serum TC level of R and added S, low or high O level groups were markedly decreased compared to each control group.Serum HDL cholesterol level significantly increased in the R and all experimental S or O group than the control group. Then we investigated whether the amount of S or O in R caused these effects.No differences in serum TC level according to the amount of S or O were found. From these results the correlation of serum TC level with all kinds of USM were examined.It was shown the lowering effect of TC correlate with tocotrienol content.

Conclusions: R is preferable for regulating lipid metabolism and is beneficial for promoting our health.

Key words: Rice bran oil, Serum Cholesterol, Unsaponifiable materials, Tocotrienol

PO2916

HYDROPHILIC ANTIOXIDANT CAPACITIES OF VEGETABLES AND FRUITS COMMONLY CONSUMED IN JAPAN AND ESTIMATION OF DAILY INTAKE

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Background and objectives: Dietary antioxidants are considered important elements for human body to prevent free-radical-related diseases and aging, but sum of antioxidants enough to maintain health is still unclear. As a first step to address this issue, hydrophilic antioxidant capacities of vegetables and fruits commonly consumed in Japan were measured and daily intakes were estimated in this study.

Methods: The hydrophilic antioxidant capacities of 23 vegetables and 13 fruits commonly consumed in Japan were evaluated by a modified hydrophilic-oxygen radical absorbance capacity (H-ORAC) method. The average daily intake was estimated from these H-ORAC values and food intake data of the National Health and Nutrition Survey in Japan for 2005-2009.

Results: The H-ORAC values for vegetables ranged from 1.63 to 66.07 (average 6.95) micromol Trolox equivalent (TE)/g and the H-ORAC values for fruits ranged from 1.58 to 33.47 (average 12.23) micromol TE/g. The daily intake of hydrophilic antioxidants from vegetables and fruits was estimated to be 4423 micromol TE/d (2967 micromol TE from vegetables and 1456 micromol TE from fruits). In addition, the comparison of the results of the H-ORAC assay with those of polyphenol content and 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay was also studied. The H-ORAC values had a strong positive correlation with polyphenol contents (r = 0.956), and were 1.0-18.2-times higher than the antioxidant capacities evaluated by the DPPH assay.

Conclusions: The daily intake of hydrophilic antioxidants from vegetables and fruits in Japanese was estimated to be 4423 micromol TE/d. However, the biological significance of this value has not yet been clarified. The H-ORAC values obtained here will provide a foundation for high-quality epidemiological studies aimed at elucidating the relationship between daily intake of antioxidants and health.

Key words: Antioxidant; Hydrophilic-oxygen radical absorbance capacity (H-ORAC) assay; Daily intake; Vegetables and fruits.

PO2917

INFLUENCE OF BIFIDOBACTERIUM LONGUM CECT 7347 IN LIVER IRON MOBILIZATION AND INFLAMMATORY BIOMARKERS PRODUCTION IN A GLUTEN-INDUCED ENTEROPATHY ANIMAL MODEL

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Objectives and study: To evaluate the influence of orally administered Bifidobacterium longum CECT 7347 on nutritional iron status of weanling animals with gliadin-induced enteropathy.

Methods: Weanling rats, sensitized with interferon (IFN)-γ, were fed gliadins alone or with B. longum CECT 7347. Hemoglobin (Hb) concentration (Drabkin's), liver transferrin receptor (TfR)-2, interleukin (IL)-6 and TNF-α expression (mRNA), active hepcidin peptide production (LC-Ms/Ms) and total liver iron content (Atomic Absorption Spectrometry) were determined.

Results: Gliadin feeding increased hepatic iron deposition and reduced serum Hb concentrations in comparison with control animals. These observations were accompanied by decreased TfR2 expression and increased IL-6 and TNF-α gene expression. However, B. longum CECT 7347 administration to this animal model increased circulating Hb concentration and reduced iron deposition in the liver. B. longum administration also increased TfR2, IL-6 and TNF-α gene expression in comparison with IFN-γ sensitized animals fed gliadins. A similar trend was observed in hepcidin peptide production.

Conclusions: Animal with gliadin-induced enteropathy had reduced serum Hb concentrations in comparison with controls, demonstrating the enteropathy-associated iron deficiency. However, administration of B. longum CECT 7347 increased the expression levels of TfR2, and contributing to restoring normal liver iron and serum Hb concentrations. Although both TfR2 and IL-6 are involved in hepcidin regulation, their action seems to be dependent on iron serum levels.

Key words: Celiac, bifidobacteria, gliadin, iron, enteropathy.

PO2918

DETERMINATION OF GLUTATHIONE AND ITS DERIVATIVES IN HUMAN BLOOD AFTER ORAL ADMINISTRATION

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Background and objectives: Glutathione (GSH) has long history as supplement and medicine to improve liver function and skin whitening. However, previous studies have not detected increase of GSH and its fragments in human blood after oral intake of GSH. The objective of the present study was to elucidate absorption and transportation of food-derived GSH.

Methods: Healthy human volunteers were ingested GSH prepared from torula yeast (KOHJIN, 50 mg/kg body weight). Blood was collected from vein into heparinized tube. Plasma was mixed with 3 volumes of ethanol. The supernatant and precipitate were extracted with 5% TCA-2% 2-mercaptoethnol to liberate GSH and fragment peptides from protein. For determination of GSH and fragment peptides, derivatization with 6-aminoquinolyl-N-hydroxy sccinimidil carbamate (AccQ) followed by LC-MS/MS was used.

Results: There was no significant increase GSH after ingestion of GSH in the deprotenized fraction. However, Cys-Gly significantly increased. Also, protein-bound forms of all compounds significantly increased after the ingestion. These facts indicate that GSH and its derivatives are absorbed into blood system and transported as conjugate of protein. Further studies on change of GSH after exercise in human blood, are now in progress.

Conclusions: Supplementation of GSH can impact on blood GSH and fragment peptides levels. Also, GSH and fragment peptides are transported as protein-bound form in human blood.

Key words: glutathione (GSH), *f*ÁGlu-Cys, Cys-Gly, oxidative stress, redox regulation

PO2919

IDENTIFICATION OF EPICATECHIN AS THE BIOACTIVE CONSTITUENT IN POLYPHENOL ENRICHTED EXTRACTS THAT DEMONSTRATE A BENEFICIAL EFFECT ON ALLERGIC SYMPTOMS

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Background and objectives: Polyphenols are naturally derived bioactive compounds found in abundance in a number of plant and food sources and have been attributed numerous beneficial health effects. We have previously characterized the anti-allergic effect of a polyphenol enriched apple extract in an OVA-induced murine model of food allergy. The objective of the current study was to better understand which major class of bioactive polyphenols is responsible in mediating the anti-allergic effect of the polyphenol enriched extracts.

Methods: Female BALB/c mice were sensitized orally to the allergen (OVA) given together with an adjuvant (cholera toxin). Polyphenol enriched fruit extracts or purified epicatechin polyphenol were administered in the diet of sensitized animals for 8 days following the last sensitization. Sensitized mice were challenged orally with ovalbumin following treatment, and allergic symptoms were compared between control and treated mice. OVA-specific serum immunoglobulins (IgE) and gene expression profiles in the intestine were measured together with a matrix analysis of the different polyphenol extracts.

Results: Polyphenol enriched apple extracts demonstrated a differentiating ability in vivo to modulate allergic symptoms. This beneficial immune-modulatory effect can be attributed to the epicatechin polyphenol, as oral administration of purified epicatechin in the diet of OVA-sensitized mice modulated allergic symptoms in a dose dependant manner. Epicatechin was enriched within the matrix of extracts that demonstrated a superior in vivo efficacy, but was not present in extracts that had no effect in the OVA-model.

Conclusions: Epicatechin class of polyphenols demonstrates anti-allergy properties.

Key words: anti-allergy, bioactive, immunomodulation, epicatechin, polyphenol

PO2920

FERMENTATION SUPERNATANTS OF KONJAC GLUCOMANNAN, INULIN AND CELLULOSE INHIBIT GROWTH BY APOPTOSIS AND CELL CYCLE ARREST IN HUMAN COLON CELLS

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Background and objectives: Dietary fibers are potentially protective against colon cancer by production of short chain fatty acids (SCFA) through fermentation by the microflora. This study investigated the effects of konjac glucomannan (KGM), inulin, and cellulose on cell growth and cell cycle using two different human colon cancer cell lines (WiDr and LS174T).

Methods: The fermentations of dietary fibers (10 g/L) were conducted in vitro for 48 h under anaerobic conditions with mice fecal slurries. A negative control containing only the fecal sample was prepared as a fecal blank. The resulting fermentation supernatants (FS) were analyzed for SCFA. WiDr and LS174T cells were treated for 24 h with the concentration range of 5-20% (v/v) FS and the effect on cell growth, apoptosis and cell cycle were determined.

Results: FS of KGM and inulin contained 3.4- and 1.8-fold higher concentration of butyrate than the fecal blank, respectively. The effects of FS on the growth inhibition were stronger and more sensitive to the apoptosis in the LS174T cells. However, a cell cycle arrest in G0/G1 phase was observed in the WiDr cells after incubation of FS of KGM for 24 h.

Conclusions: Fermentation of dietary fibers may affect colon cancer cell lines through different modulation, apoptosis and cell cycle arrest.

Key words: konjac glucomannan, inulin, cellulose, fermentation

PO2921

SATIETY CONTROL THROUGH FOOD STRUCTURES MADE BY NOVEL PROCESSING: THE SATIN - SATIETY INNOVATION PROJECT

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Background and objectives: SATIN is a five-year €6 Million EU funded project designed to develop foods that regulate appetite by reducing hunger, accelerating within meal satiation and enhancing between meal satiety. The project involves seven SMEs, four industry and seven academic partners and is led by the University of Liverpool (UK).

Methods: The SATIN project employs novel food processing methods to modify food structure to produce functional foods for weight management. This multidisciplinary collaboration will develop food products that help regulate food intake by accelerating satiation during a meal, enhancing satiety and/or reducing appetite through novel processing methods.

Results: The likely impact of these products will be assess using in vitro modelling of the gastrointestinal tract using dynamic gut models and automated screening assays comprising of GI chemosensory and hormone secretion pathways. This will then be validated in human trials by examining key biomarkers, nutrient availability and behaviour.

Conclusions: These studies will not only substantiate individual product health claims but also identify and characterise the consumer benefits of satiety beyond weight management. Using foods from these studies and other products taken from the market SATIN will examine if a large scale intervention using a satiety based approach is an effective weight management strategy. For further information: www.satin-satiety.eu.

Key words: Satiety, Satiation, Food Processing, Innovation, gut models

PO2922

DAIDZEIN ATTENUATES 17β-ESTRADIOL-REPRESSED MYOGENIC DIFFERENTIATION

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Background and objectives: The biological functions of 17β-estradiol (E2) are exerted through two isoforms of estrogen receptor (ER), ERα and ERβ, which regulate the transcriptions of target genes by binding to the estrogen-response elements (EREs). The two ER isoforms are expressed in the skeletal muscle. ERα represses myogenic differentiation by increasing the expression of ubiquitin-specific peptidase 19 (USP19), and ERβ inhibits ERβ-activated USP19 expression. Here, we investigated whether daidzein has an inhibitory effect on E2-repressed myogenic differentiation because the soy isoflavone daidzein increases the transcriptional activity of ERα rather than that of ERβ.

Methods: C2C12 myoblasts and mouse satellite cells were cultured in differentiation medium containing 1 μM daidzein in the presence or absence of 10 nM E2 for 8 days. Ovariectomized female ddY mice (8 weeks old) were fed diet containing 0.1% daidzein with or without E2 replacement.

Results: In both C2C12 cells and satellite cells, daidzein attenuated E2-decreased levels of structural muscle proteins (myosin heavy chain and tropomyosin) and E2-increased level of USP19. The knockdown of ERα abolished the inhibitory effects of daidzein on E2-increased USP19 level in C2C12 cells. Daidzein inhibited E2-activated binding of ERα to ERE in the intron 1 of USP19 gene and enhanced the binding of ERα to the ERE. In ovariectomized mice, dietary daidzein inhibited E2-induced decrease of muscle masses and attenuated E2-increased USP19 expression in skeletal muscles. Furthermore, daidzein decreased the binding of ERα to ERE of USP19 gene, and increased the binding of ERα to ERE.

Conclusions: Daidzein attenuated the E2-induced decrease of skeletal muscle masses, and down-regulated USP19 expression through the activation of ERα in vitro and in vivo. These results indicate that daidzein suppresses USP19 expression by activating ERα and consequently has beneficial effects on skeletal muscle mass in female mice.

Key words: daidzein, estrogen, skeletal muscle

PO2923

IN VITRO MODULATION OF GLP-1 ACTIVITY BY DIFFERENT AQUEOUS AND ORGANIC EXTRACTS OF EDIBLE SEAWEEDS

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Background and objectives: There have been some indications that seaweeds could be used anti-diabetic foods/ingredients but the mechanisms of action remain unclear. Glucagon-like-peptide (GLP-1) is an incretin hormone secreted by the small intestine in response to nutrient ingestion, regulates the insulin secretion by pancreatic b-cells. Long-term infusion of GLP-1 improves glucose tolerance and lowers fasting glucose and augments satiety. On the other hand administration of GLP-1 receptor antagonists impairs glucose tolerance in humans. Performing various chemical extractions on edible seaweeds will determine the types of seaweed components which stimulate GLP-1 secretion. Aims. To study the effects of water-, ethanol- and chloroform-extracts of Nori, Wakame and Sea spaghetti on the in vitro GLP-1 secretion.

Methods: STC-1 cells (2 x 106) were seeded into 6-well tissue culture plates and incubated overnight to allow attachment. Media was discarded, cells were washed with HEPES buffer and test incubations (n=8) containing the seaweed extract (50mg/ml) or vehicle control were added. After a 3h period, incubations were removed and stored at -20ºC prior to measurement by ELISA. GLP-1 was measured using a commercial kit obtained from Pheonix Pharmaceuticals (Arizona, USA).

Results: Clear differences between alga and extracts were observed on the GLP-1 activity. Among extracts, the highest secretagogue GLP-1 activity was observed for the three Nori extracts (4 to 8-times higher than control). Water-Nori and Ethanol-Nori extracts also increased GLP-1 secretion (2 and 4.5 times higher than control, respectively). In contrast water Sea spaghetti extracts decreased GLP-1 secretion (by about 70%). The type of compounds present in aqueous, chloroformic and ethanolic extracts, would suggest that pigments such as phycoerhytrine and fucoxanthin, and the amount and type of fibre could be responsible for stimulation GLP-1 secretion.

Conclusions: The chlororoformic extract of Nori induces the highest GLP-1 secretion but a number of other seaweed extracts are worthy of further study. Granted by AGL-2011-29644-C02-02, Consolider-Ingenio 2010 # CSD2007-00016 and predoctoral fellowship to Adriana Schultz-Moreira by Universidad Complutense, Madrid, Spain.

Key words: GLP-1, seaweeds, extracts, in vitro.

PO2924

NEUROPROTECTIVE EFFECTS FROM SALVIA MILTIORRHIZA BUNGE IN THE GERBIL HIPPOCAMPAL CA1 REGION AGAINST INDUCED TRANSIENT CEREBRAL ISCHEMIA DAMAGE

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Background and objectives: We observed neuroprotective effects of five major lipophilic diterpenes derived from Salvia miltiorrhizaBunge extract, such as cryptotanshinone (CTs), dihydrotanshinone I (DTsI), tanshinone I (TsI), tanshinone IIA (TsIIA) and tanshinone IIB (TsIIB), in the gerbil hippocampal CA1 region (CA1) against transient ischemic damage.

Methods: These diterpenes were administered 30 min before ischemia-reperfusion and the animals were sacrificed 4 days after ischemia-reperfusion.The neuroprotective effects of from Salvia miltiorrhizaBunge extract were examinedusing cresyl violet (CV) staining and neuronal nuclei (NeuN) immunohistochemistry.

Results: In the vehicle-treated-group, cresyl violet positive (CV+) cells and neuronal nuclei (NeuN)+ neurons were sig-

nificantly decreased in the CA1. CA1 pyramidal neurons were well protected from transient ischemic damage in the TsI-, and CTs-treated-ischemia groups compared with DTsI-, TsIIA- and TsIIB-treated ischemia-groups. In addition, the activations of astrocytes and microglia were examined by GFAP and IB4 immunohistochemistry. Reactive GFAP- and IB4-immunoreactive astrocytes were less observed in the TsI- and CTs-treated ischemia-groups than those in the other groups.

Conclusions: These results suggest that TsI and CTs among five major lipophilic diterpenes have strong potentials for neuroprotection against ischemic damage. Our present finding suggests that Salvia miltiorrhizaBunge extract may be useful in protecting neurons from some ischemic insults.

Key words: Salvia miltiorrhizaBunge, Transient cerebral ischemia, Hippocampla CA1 region, Neuroprotection

PO2925

DECREASE IN THE PRODUCTION OF BETA-AMYLOID BY ECKLONIA CAVA ACTIVATION OF THE ACTIVATION OF ALPHA-SECRETASE IN HEK293 CELLS

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Results: In the vehicle-treated-group, cresyl violet positive (CV+) cells and neuronal nuclei (NeuN)+ neurons were significantly decreased in the CA1. CA1 pyramidal neurons were well protected from transient ischemic damage in the TsI-, and CTs-treated-ischemia groups compared with DTsI-, TsIIA- and TsIIB-treated ischemia-groups. In addition, the activations of astrocytes and microglia were examined by GFAP and IB4 immunohistochemistry. Reactive GFAP- and IB4-immunoreactive astrocytes were less observed in the TsI- and CTs-treated ischemia-groups than those in the other groups.

Conclusions: These results suggest that TsI and CTs among five major lipophilic diterpenes have strong potentials for neuroprotection against ischemic damage. Our present finding suggests that Salvia miltiorrhizaBunge extract may be useful in protecting neurons from some ischemic insults.

Key words: Salvia miltiorrhizaBunge, Transient cerebral ischemia, Hippocampla CA1 region, Neuroprotection

PO2926

INHIBITORY EFFECTS OF LIGULARIA FISCHERI ON THE FORMATION OF ADVANCED GLYCATION ENDPRODUCTS AND RAT LENS ALDOSE REDUCTASE

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Background and objectives: The aim of this study was to evaluate the preventive and/or therapeutic potency for diabetic complications.

Methods: Ligulariafischeri(LF) was tested inhibitory effects against advanced glycationendproducts (AGEs) formation, rat lens aldose reductase (RLAR) and scavenging effect on 1, 1-diphenyl-2-picryl-hydrazil (DPPH) radical.

Results: Among several fractions from 70% ethanol extract of LF, the ethyl acetate fraction showed the highest DPPH radical scavenging activity of 53.92% at concentration of 3.3g/mL. Moreover, the ethyl acetate fraction exhibited the most potent AGEs formation inhibitory effect of 73.57% at concentration of 1.1g/mL. Also the ethyl acetate fraction showed the most potent RLAR inhibitory effect of 88.97% at concentration of 0.12g/mL. Therefore, the ethyl acetate fraction exhibited the most potent antioxidant and anti-diabetic complications. NMR was used to identify the bioacitve compound, which had been accomplished via bioactivity-guided fractionation from the ethyl acetate fraction of LF, as 3, 4-Dicaffeoylquinic acid.

Conclusions: These data suggest that this compound from LF might be effective as a potential source for prevention and treatment of diabetic complications.

Key words: Ligulariafischeri, 1, 1-diphenyl-2-picryl-hydrazil, advanced glycationendproducts, rat lens aldose reductase, diabetes complication.

PO2927

VISUALIZATION OF THE BIOLOGICAL EFFECTS OF FRUITFLOW® ON PLATELET ADHESION UNDER PHYSIOLOGICAL FLOW CONDITIONS

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Background and objectives: Epidemiological evidence indicates that the Mediterranean diet has cardio-protective effects. Thus, a high intake of e.g. tomato is purportedly linked with beneficial properties for the vascular system. Screening of libraries containing natural ingredients and nutrients let to the identification of tomato components that modified the function of blood platelets. A water soluble tomato extract (Fruitflow®) was found to inhibit platelet aggregation induced by ADP or collagen in human blood. Accordingly, Fruitflow® obtained a EFSA approved health claim for "maintaining normal platelet aggregation that contributes to healthy blood flow". The aim of this study was to use a technological platform to (a) visualize the adhesion of platelets, (b) evaluate the effect of Fruitflow® on the extent and kinetics of platelet adhesion, (c) validate this method by comparing the observations with those made in platelet aggregation assays.

Methods: We implemented the BioFlux 1000Z system (Fluxion, USA) to simulate physiological blood flow conditions at controlled shear flow in a microscopy system. Human whole blood was perfused at a shear rate of 1000/s in collagen I-coated channels of BioFlux plates for 10 min. The adhesion of platelets was observed in real-time, with images being taken every 15 sec with a CCD camera. The effect of Fruitflow® on platelet adhesion was then measured.

Results: The biological effect of Fruitflow® could be visualized using a microfluidic flow cells. FruitFlow ® dose-dependently reduces the collagen I-induced adhesion of platelets. These data corroborate and extent previous observations described for Fruitflow® on platelet aggregation.

Conclusions: Platelet adhesion can be measured in real-time and under physiological condition using the BioFlux system. The effects of Fruitflow® on platelet adhesion indicate that Fruitflow® may help to maintain a healthy blood flow by preventing the adherence of platelets to blood vessel walls.

Key words: platelet, aggregation, shear flow, tomato

PO2928

INTERACTION BETWEEN PHENOLIC COMPOUNDS OF VIRGIN OLIVE OIL WITH A SALIVARY PROTEIN (MUCIN): AN APPROACH TO BIOAVAILABILITY.

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Background and objectives: Virgin olive oil (VOO) is appreciated for its nutritional benefits. Phenolic compounds are related with them by their antioxidant capacity. The interaction between proteins and phenolic compounds is of great interest in nutrition since the proteins would bind the polyphenols present in the diet, forming insoluble complex and reducing their bioavailability and antioxidant capacity. The objective of this work was to evaluate the interaction between phenolic acids (cinnamic, p-coumaric, caffeic, vanillic and protocatecuic acids), tyrosol (p-hydroxyphenylacetic) hydroxityrosol (3,4-dihydroxyphenylacetic) and a extract phenolic from VOO with a salivary protein (mucin from porcine).

Methods: The interaction between polyphenol-protein was measured by the increasing turbidity of the reaction mixture and was expressed in nephelometric turbidity units (NTU). Polyphenols solutions (1% ethanol) at different concentration (80 to 1000 mg/L) were mixed with mucin solution (0,2% pH 3.5). Reaction mixtures were measured after 1, 30, 60, 90 and 180 min at 37°C.

Results: The results showed than the highest polyphenol-protein interaction were observed with VOO phenolic extract, cinnamic, p-coumaric and caffeic acids. The interaction polyphenol-protein increased with the concentrations of polyphenols. During the reactions, each compound had a different behavior but all produced turbidity immediately after 1min of the reaction. The maximum value of turbidity for the phenolic acids and hydroxityrosol was obtained to concentration more than 400 mg/L at 30 min of reaction time, while the VOO phenolic extract increase the turbidity during the reaction.

Conclusions: These results suggest that the polyphenols from VOO react with the salivary proteins forming an insoluble complex immediately. This interaction is related with the phenolic chemical structure and their concentrations.

Key words: virgin olive oil, polyphenols, bioavailability.

PO2929

OIL BULKING AGENTS AS FAT REPLACERS TO DEVELOP HEALTHIER MEAT PRODUCTS: A RAMAN SPECTROSCOPIC STUDY

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Background and objectives: In the development of healthier meat products, one of the most relevant aspect are related to reformulation processes based on replacement of the animal fat with another fat whose characteristics are more in line with health recommendations. Special interest should attach to the development strategies which not imply loss of quality in the new derivate. The aim of this work was to examine quality changes in terms of technological and structural properties (using Raman spectroscopy) in healthier meat batters formulated using olive oil bulking agents based on polysaccharide gels as animal fat replacers.

Methods: Meat batters were prepared with pork backfat (MB-PF) or with a combination of olive oil, sodium alginate and dextrin (MB-A/D) or inulin (MB-A/I) as fat replacer. Proximate composition, cooking loss and lipid structural changes were evaluated.

Results: Fat content ranged between 16.95% and 20.06%, with the highest ($P<0.05$) value in the MB-PF sample (all pork fat). In reformulated meat batters (MB-A/D and MB-A/I) fat content involved around 13.5 g of olive oil per 100 g of product. Besides, these samples showed optimal technological properties. It was also found increased disorder in the oil acyl chains, which implicates lipid–protein interactions, in both MB-A/D and MB-A/I.

Conclusions: Reformulation process based on the use of olive oil bulking agents as fat replacer could be used to improve fat content of meat products. The understanding of the relationship between technological and structural characteristics could be helpful in optimizing the development of healthier meat products.Acknowledgements: AGL2010-19515, AGL2011-29644-C02-01, and CARNISENUSA (CSD2007-00016).

Key words: Healthier meat products, fat replacer, oil bulking agent, technological properties, structure

PO2930

BIFIDOBACTERIUM CECT 7765 AMELIORATES INTESTINAL AND PERIPHERAL TISSUE INFLAMMATION ASSOCIATED WITH OBESITY IN HIGH-FAT DIET FED MICE

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Background and objectives: Obesity results from a long-term positive energy imbalance and is also associated with chronic, low-grade inflammation. Obesity has also been related to phylum and group-specific changes in the human intestinal microbiota in observational studies, suggesting a role for specific bacterial taxa in this disorder. However, direct evidence of the role specific bacteria paly in this disorder is limited. Here, the objective is to evaluate the effects of administration of Bifidobacterium pseudocatenulatum CECT 7765 on metabolic and immune alterations in high-fat diet (HFD) induced obesity in mice.

Methods: Adult male wild-type C57BL-6 mice were fed a standard diet or HFD, supplemented or not with B. pseudocatenulatum CECT 7765 for fourteen weeks. Several parameters related to glucose and lipid metabolism and to immunity and microbiota-related features were analysed.

Results: B. pseudocatenulatum CECT 7765 reduced serum cholesterol, triglyceride, glucose and leptin levels, and decreased insulin resistance and improved glucose tolerance in obese mice. This bacterial strain also reduced the concentration of inflammatory cytokines in small intestine, pancreas and adipose tissues. The strain administration also modified the composition of the intestinal microbiota in HFD-fed mice, increasing the numbers of Bifidobacterium spp., and Clostridium coccoides and Clostridium leptum groups.

Conclusion: The study provides direct evidence of the ability of B. pseudocatenulatum CECT 7765 to ameliorate inflammation associated with obesity in a HFD-induced obesity mouse model.

Key words: Bifidobacterium, obesity, chronic inflammation, immunity, high-fat diet.

PO2931

INFLUENCE ON HEALTH MARKERS OF THE REGULAR CONSUMPTION OF ANEW MEAT PRODUCT DESIGNED WITH AN OPTIMIZED NUTRITIONAL PROFILE

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Background and objectives: Health and nutrition are in straight relationship, being diet the most common approach to prevent the incidence of overweight/obesity and associated comorbidities. Furthermore, cardiovascular disease prevalence together with overweight and obesity rates are increasing worldwide. The role of diet in these conditions is essential. Research and food industry are looking for healthier offerings to the consumer, to improve nutritional quality of highly demanded products. This work aimed at assessing the effects of regular consumption in healthy adults of optimized nutritional profile (ONP) meat products on health status and weight management compared to a reference product.

Methods: The study was designed as a randomized, placebo controlled, double-blind, nutritional intervention, with three arms, in which two optimized products were compared to a reference product when consumed within a balanced isocaloric diet. A total of 60 subjects were invited to participate and 47 finished the trial. Anthropometry was monitored fortnightly, while DXA analysis and biochemical parameters were assessed at the beginning and the end of the study. Weight, body composition, and fasting levels of glucose, insulin, total-cholesterol, HDL-cholesterol and some antiinflammatory biomarkers were also analyzed.

Results: Body weight and fat mass were reduced in the three dietary groups after the intervention, although the participants consuming the product with high omega-3 PUFA and reduced fat content experienced a higher fat mass loss than the other two groups. Concerning glucose and lipid metabolism markers, levels were maintained in all the dietary groups during the study, without differences among them.Similarly, this trend also occurred with C-Reactive Protein levels or ICAM and VCAM values.

Conclusions: The regular consumption of new ONP meat products designed with a nutritional profile reduced in fat and improved lipid profile seems to be a feasible strategy for weight control and healthy status maintenance.

Key words: functional foods, obesity, cardiovascular risk.

PO2932

EFFECT OF METHYLATED CATECHINS ON PHYSIOLOGICAL ACTIVITIES IN RATS FED A HIGH-FAT DIET

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Background and objectives: "Yabukita" green tea, a popular tea cultivar in Japan lacks methylated catechins,but "benifuuki" green tea contains unique methylated catechins(MC) such as epigallocatechin-3-O-(3-O-methyl) gallate. It has already been reported that adipose tissue weight gain in high-fat diet-fed mice were suppressed by "benifuuki" green tea consumption. In the present study, we examined whether the anti-obese effects would be accepted by the obese rats who consumed "benifuuki" tea powder.

Methods: Male Wistar rats,12 wk olds,were divided into four groups that were assigned to a control diet(C group,a commercial chow), a 30% high-fat diet(HF group), or a 30% high-fat diet +200mg MC/kg diet (LMC group),or a 30% high-fat diet +600mg MC/kg diet (HMC group). "Benifuuki" tea leaf powder were used for as MC. The rats had free access to tap water and experimental diets for 6 wk. Food intake and body weight were determined tri-weekly. Energy expenditure were measured for 1d the 6th week. At the end of the experimental period, the rats were sacrificed by drawing blood from the inferior vena cava under pentobarbital anesthesia. Liver, pancreas, and abdominal adipose tissues (epididymis, perirenal, and mesenteric adipose) were immediately excised and weighed.

Results: The HMC rats showed a slightly decreases in body weight,adipose tissue weights and significant decrease in serum leptin concentration, compared with those fed a high-fat diet. The pancreas amylase activities of HF group showed the low value about 30% compared with C group. When MC was added, pancreatic amylase activities were recovered to the same extent as C group. The rats fed a high-fat diet with MC showeda significant increase in energy expenditure, compared with C group and HF group.

Conclusions: The results indicated that MC had a anti-obese effects. Furthermore, MC had improvement effects of energy expenditure and digestive enzyme activities.

Key words: methylated catechins, energy expenditure, anti-obese effects

PO2933

PREBIOTIC EFFECT OF NEW TYPE RESISTANT STARCH ON SERUM LIPIDS IN HUMAN

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Background and objectives: Resistant starch (RS) is defined as the sum of starch that is not absorbed in the small intestine as same with dietary fiber. A wide range of health benefits of RS have been suggested such as prebiotic effects. J-OIL MILLS Inc. develop new type of resistant starch, AmyloFiber, which is hydrolyzed of high-amylose cornstarch with 1.5% hydrochloric acid at 50°C for 16 h). RS content of AmyloFiber is about 70%, that is one of the highest RS in food materials. Our preliminary study might be suggested AmyloFiber is easily fermentable for bacteria in the intestine, and changes microflora, especially increases Bifidobacterium. These data make us expect AmyloFiber that would maintain proper level of serum lipid through the some mechanism of short-chain fatty acids by cecal fermentation. AmyloFiber is low peak molecular weight and high degree of crystallinity. Amylose of high-amylose cornstarch might be susceptible to acid hydrolysis, and form double helices may form crystals, which are resistant to enzymatic hydrolysis. AmyloFiber is heat stable, which means RS does not decrease after food processing. AmyloFiber could be added to foods such as pasta, cookie, bread without adversely affecting their organoleptic properties.

Methods: In this study, prebiotic effect of AmyloFiber on fecal characteristic and serum lipids were examined for healthy volunteers. They took a slice of AmyloFiber bread (6.9 g RS), two pieces of AmyloFiber cookie (6.0 g RS), and one dish of soup with AmyloFiber (3.1 g RS) at every breakfast for 30 days. Serum triglyceride, and total-, HDL-, and LDL-cholesterols were measured at day 1, and each 10 days during experimental period.

Results: Serum lipids were changed after experiment.

Conclusions: AmyloFiber is useful candidate for RS food source.1) Journal of Applied Glycoscience, 60(2), (2013)

Key words: resistant starch, high-amylose cornstarch, acid hydrolysis, human, lipid

PO2934

ENDOGENEOUS ANTIOXIDANT CAPACITY OF SCHIZANDRA CHINENSIS BAILLON AGAINST TERT-BUTYL HYDROPEROXIDE-INDUCED OXIDATIVE HEPATIC DAMAGE IN RATS

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Background and objectives: Antioxidants exert their protective effects not only by scavenging ROS, but also by inducing the expression of phase II detoxifying / antioxidant enzymes which are contribute to detoxification of xenobiotic and the inactivation of ROS. This study was carried out to evaluate endogeneous antioxidant capacity and hepatoprotective potential of SchizandrachinensisBaillon extract (SCE) against tert-butyl hydroperoxide (t-BHP) induced oxidative liver damage rats.

Methods: Sixty male Sprague-Dawley rats were randomized into six groups as follows; NC, Normal control; TC, t-BHP control; PC, positive control, 100mg/kg BW of Silymarin; SCE-L, 300mg/kg BW of SCE; SCE-M, 600mg/kg BW of SCE; SCE-H, 1,200mg/kg BW of SCE. SCE pretreatments were administered orally for 14 days prior to t-BHP injection. After 16 hours, rats were sacrificed. We examined the abilities of each to regulate phase II antioxidant enzyme and hepatoprotective potential in liver.

Results: SCE prevented decrease of superoxide dismutase (SOD) activity that was induced by t-BHP. Especially, SCE were alleviated hepatic damage in a dose-dependent manner by induction of phase II antioxidant enzymes expression such as glutathione S-transferase (GST), glutamate-cysteine ligase catalytic subunit (GCLC) in mRNA. GST, GCLC and GCLM mRNA expressions also showed dose-dependent increase in SCE pretreated groups. Furthermore, serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities tended to decrease in SCE-H. Hepatic TNF-alpha level was significantly reduced in SCE-L, SCE-M and SCE-H compared to TC. In histopathological analysis, SCE pretreatment reduced the incidence of the lesions such as neutrophil infiltration, swelling of liver cells and necrosis compared with TC.

Conclusion: These results suggest that SCE is capable of alleviating t-BHP-induced hepatic damage by regulating endogeneous antioxidant capacity by modulating phase II antioxidant enzymes expression in liver, thereby improving hepatic toxicity.

Key words: SchizandrachinensisBaillon, Tert-butylhydroperoxide, Antioxidant, Hepatotoxicity.

PO2935

IN VITRO ALPHA-GLUCOSIDASE INHIBITORY ACTIVITIY OF UNDARIA PINNATIFIDA, HIMANTHALIA ELONGATA AND PORPHYRA UMBILICALIS WATER AND ORGANIC EXTRACTS

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Background and objectives: Hypoglycemic properties of seaweeds have been related to modification on carbohydrate digestion and absorption and show interest as antidiabetic-food. Chloroform-, ethanol- and water-soluble extracts from, Himanthalia elongata (HE), Porphyra umbilicalis (PU), Undaria pinnatifida (UP) were used to test the in vitro inhibitory activity on α-glucosidase model. Principal component analysis (PCA) was conducted on water- and ethanol- extracts to identify patterns in data and relation between the soluble bioactive constituents and α-glucosidase activity inhibition in the seaweeds tested.

Methods: Degree of inhibitions was assayed measuring the production of glucose from maltose solution at 15, 30, 45, 60 and 75 min. PBS buffer was used as a control and acarbose, an α-glucosidase inhibitor, was used as positive control. PCA was carried out by selecting those Principal Components (PCs) with eigenvalues larger than 1.0. Then, the factors were rotated, using Varimax method, to obtain the expected weight for each extraction factor. The higher eigenvalue, the higher percentage of the total variance explained. Differences were considered significant at $p < 0.05$.

Results: Water- extracts from HE followed by PU or UP showed the highest α-glucosidase inhibitory activities. In the case of ethanolic and chloroformic extracts non significant differences were found. Water extract of HE with respect to control and to the other water extracts, possessed significant in vitro inhibitory effects after 30 min (62.0% vs. control, at final incubation time of 75 min.). Moreover, PCA clearly distinguished HE effects from those of the other algae, supporting that soluble fibre and polyphenols were involved.

Conclusions: Present results suggest clear differences between the chlorophormic, aqueous, and ethanolic extracts of the three algae. HE water extracts deserve future studies on humans and domestic animals in vivo experiments.Granted to project AGL2011-29644-C02-02.

Key words: Seaweeds, extracts, in vitro, carbohydrate digestion, α-glucosidase

PO2936

INFANT FORMULA WITH GALACTOOLIGOSACCHARIDES STIMULATES BIFIDOBACTERIUM POPULATION, WITHOUT REDUCTION OF INFECTIONS IN THE FIRST YEAR OF AGE ON HEALTHY INFANTS.

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Background and objectives: Currently, there is not enough scientific evidence on clinical effects of infant formulas supplemented with prebiotics. The aim was examine the effects of an infant formula supplemented with 0.44 g/dl and later a follow-on formula with 0.50 g/dl of galactooligosaccharides (GOS) on the intestinal microbiota and incidence of infections in infants during the first year of age.

Methods: A multicentre, randomized, double-blind, placebo-controlled study was carried out on 365 healthy infants up to two months of age, randomly assigned to either formula, 177 infants to formula without GOS and 188 to formula with GOS. 132 infants in each group successfully completed the study until 12 months of age. The prebiotic effect of GOS formula was studied in a subgroup of 81 subjects. Incidence of infections was the main outcome. A secondary outcome was to determine Bifidobacterium genera and species (B. longum, B. bifidum, B. adolescentis, B. breve, B. catenulatum and B. dentium) in faeces measured by RT-PCR.

Results: The number of infections (diarrhoea and upper respiratory tract infections) of both interventions group during the first year of life was similar (no statistical differences). Despite the infections were not reduced, a bifidogenic effect was obtained on faecal analysis, with a higher Bifidobacterium count (P=0.010) in GOS group, different profile in Bifidobacterium species and higher percentage of infants colonized by B. breve in GOS group (57.50 %) than in control group (41.38 %).

Conclusions: The intake of infant formula supplemented with GOS produces changes in growth and species characterization of the Bifidobacterium population, being B. breve highly

abundant, as it is in breastfed infants, without relation with a reduction of infections in the first year of life.

Key words: infant formula, galactooligosaccharides, microbiota, infections

PO2937

CAROTENOID AND FLAVONOID COMPOSITION OF A LOW ALCOHOLIC NOVEL ORANGE DRINK OBTAINED BY FERMENTATION AND PASTEURIZATION OF ORANGE JUICE.

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Background and objectives: It is accepted that the intake of fruits and vegetables, which contains antioxidant compounds such as flavonoids and carotenoids, intensify the protection against many diseases related to oxidative stress. Moreover, moderate alcohol consumption confers cardiovascular protection. Both effects could join in a novel drink created by alcoholic fermentation of orange juice. The aim was to analyze the carotenoid and flavonoid composition of orange juice after fermentation and pasteurization processes.

Methods: The new orange drink was produced from commercial orange juice by a controlled alcoholic fermentation process (20 ºC – 10 days) and subsequently pasteurization process (80 ºC – 30 seconds). Collection of samples was made at the beginning (OJ) and at the end of fermentation (F-OJ) and pasteurization (FP-OJ) processes. The identification and quantification of carotenoid pigments and flavonoid compounds were performed using LC-MS techniques.

Results: Twenty-one carotenoid pigments were identified in OJ, F-OJ and FP-OJ samples. Isomers of auroxanthin, β-Cryptoxanthin and β-Carotene were the most relevant pigments, outstanding the second one with its provitamin A activity. Regarding flavanones, a total of 9 phenolic compounds were identified, of which narirutin, hesperidin and didymin were the most relevant. The fermentation process caused a significant increase ($p < 0.01$) in total flavanones (32.2 %) and carotenoids (28.9 %). Subsequently, pasteurization led to decrease these bioactive compounds, compared to F-OJ (about 6.7 % and 42.7 % for flavanones and carotenoids, respectively), being a significant decrease ($p < 0.01$) only for carotenoids.

Conclusions: Alcoholic fermentation and pasteurization produces a novel orange drink with low alcoholic content, which contains higher content of flavanones ($p < 0.05$) and lower content of carotenoids ($p < 0.01$) that the original orange juice.

Key words: Orange juice, Fermentation, Pasteurization, Carotenoids, Flavonoids

PO2938

GLYCEMIC RESPONSE OF CEREAL PRODUCTS IS MAINLY EXPLAINED BY ITS SLOWLY DIGESTIBLE STARCH, FAT AND FIBRE CONTENT

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Background and objectives: Cereal products exhibit a wide range of glycemic and insulinemic responses. It is however still unclear which parameters among nutritional composition and starch digestibility influence the more glycemic and insulinemic responses. The aim of the present analysis was to determine which parameters within nutritional composition and starch digestibility can explain the most Glycemic Index (GI) of cereal food products.

Methods: An internal database including the nutritional composition, starch digestibility parameters and GI of 190 cereal products have been used for this analysis. Relationships between nutritional composition, starch digestibility of the products and GI and insulin index (II) were analysed by simple and multi regression models. Only models where Khi-2, tolerance and inflation values indicated that there was no colinearity were selected.

Results: The GI and II values obtained with the present cereal products were well correlated with a r of 0,62. Simple regression analysis of GI as principal variable and using a model including both starch digestibility and nutritional composition displayed a R^2 of 45%. In this model, Slowly Digestible Starch (SDS), fat and fibres were significantly associated to GI ($p < 0,01$) as well as resistant starch ($p < 0,05$). No valid model was found to explain II based on macronutrient and starch digestibility.

Conclusions: These analyses confirm on a wider range of products previous data showing that GI of the cereal products is mainly explained by SDS, fat and fiber content of these latter. Therefore, SDS appears as highly relevant parameter for selecting cereal products inducing low glycemic products which should contribute to some health benefits.

Key words: Glycemic Index, Insulinemic index, cereal foods, starch digestibility, nutritional composition

PO2939

BIOACCESSIBILITY OF BIOACTIVE COMPOUNDS (ACE INHIBITORS AND ANTIOXIDANTS) FROM EXTRUDED MAIZE PRODUCTS ADDED WITH PORPHYRA COLUMBINA RED SEAWEED

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Background and objectives: Red seaweed belongs to the genus Porphyra, traditionally known as nori in Japan, is a popular food. Red seaweed P. columbina is found on hard substratum in Patagonia Argentina coasts. Among red algae proteins, phycobiliproteins have drawn attention because of their immunomodulatory, ACE inhibition and antioxidant properties. Also, many researchers have attributed the antioxidant capacity mainly to phenolic compounds. On the other hand, extrusion cooking is one of the most important food processing technologies which have been used for the production of different cereal based foods. Nowadays, there is not information about addition of red seaweed and even less about this particular alga into extruded foods. Moreover, there is no information about the bioaccessibility of bioactive compounds from this kind product. The aims of this work were to develop extruded maize products added with red seaweed P. columbina as functional food and to evaluate the bioaccessibility of bioactive compounds.

Methods: Three extruded maize product with different P. columbina replacement levels (1.7%, 3.5% and 5.2%; w/w) were obtained. Physical characteristic, sensory analysis, ACE inhibition, DPPH inhibition, TEAC, reducing power, and color were studied. From sensory analysis 3.5% replacement level was selected as the most appropriate and acceptable for human consumption. Then, bioaccessibility of mineral and bioactive compounds of extruded maize product (M) and extruded maize product with 3.5% P. columbina was evaluated (MP).

Results: MP showed: magnesium (59.3%), ACE inhibitor compounds (41.0% ACE inhibition), phenolic compounds (0.83 mg gallic acid/ g dialysate) bioaccessibility higher than M. Also, antioxidant capacity (36.6% DPPH inhibition, 2.4 mM TEAC, power reduction and 99.4% copper-chelating activity) were higher in MP than M dialyzates.

Conclusions: Results about bioaccessibility of bioactive compounds provided by P. columbina may help food technologists to tailor new bio-functional foods, such as functional snacks.

Key words: accessibility, bio-functional foods, seaweeds.

PO2940

PROTEOMIC IDENTIFICATION OF SMALL ANTIOXIDANT PEPTIDES IN DRY-CURED HAM

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Background and objectives: The antioxidant activity of peptide fractions extracted from dry-cured ham was recently assayed. It was observed that several collected fractions exhibited DPPH (2,2-diphenyl-1-picrylhydrazylradical) radical-scavenging activity as well as superoxide ion extinguishing ability. One group of fractions containing peptides of low molecular mass exerted a strong DPPH radical-scavenging activity thus suggesting the presence of peptides with antioxidant activity that should be identified which is the goal of this communication.

Methods: Water-soluble peptides were extracted from dry-cured ham and separated through size-exclusion chromatography. Fractions at elution volumes from 200 mL to 275 mL with strong antioxidant activity as determined through the DPPH radical-scavenging activity assay, were collected and subjected to proteomic tools. Identification of sequences was carried out by Matrix-assisted laser desorption/ionization time-of-flight (MALDI-ToF) and nESI-ion trap mass spectrometry.

Results: The assayed fractions showed strong antioxidant activity (from 39% to 92%). The molecular masses of peptides in such antioxidant fractions were found between 400 and 2000 Da. A total of 93 peptides were sequenced. From them, 27, 23, 19 and 17 peptides were identified from relevant pork muscle proteins like actin, α-enolase, myosin heavy chain, and creatine kinase proteins, respectively and the remaining 27 peptides were from other pork muscle proteins.

Conclusions: Results from this study show that Spanish dry-cured ham may represent a source of natural peptides exhibiting antioxidant activity and thus with potential benefit for human cardiovascular health.Acknowledgements: HEFCE infrastructure funding is acknowledged for MS equipment to PDF. LM and PDF are grateful to the EU-FP7 Marie Curie IEF scheme (FOOSAF project) for financial resources. FPI Scholarship from MINECO to E.E. and grants Prometeo/2012/001 from Conselleria d´Educació (Generalitat Valenciana) and AGL2010-16305 from MINECO and FEDER funds and are fully acknowledged.

Key words: antioxidant peptides, proteomics, dry-cured ham.

PO2941

MODULATORY EFFECT OF FERULIC ACID ON LPS-INDUCED INDOLEAMINE 2, 3-DEOXYGENASE (IDO) EXPRESSION IN MICROGLIA

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Background and objectives: Indoleamine 2,3-deoxygenase (IDO) act as rate-limiting enzyme in inflammation of the central nerve system(CNS). Ferulic acid (FA) is a kind of polyphenol contained in rice bran, and is reported to have anti-inflammatory effect.In this research, weinvestigated the effect ofFA on lipopolysaccharide (LPS) inducedIDO in microglia.

Method: Microglia cell line MG6 treated with various concentration of FA and E.coli derived LPS,and was measured of IDO mRNA expression by real-time PCR, TNF-α and IL-6 production was also measured by ELISA. Furthermore, to reveal the mechanismof inhibitory effect of FA, we performed western blotting to measure some kinds of proteins involved in MAPK and NFκB signaling pathways using western blotting.

Result: FA supressed LPS-induced IDO mRNA expression, but not TNF-α and IL-6. LPS inducedI NFκB degradation was suppressedby FA in a dose dependent manner. However, phosphorylation of proteins involved in MAPK pathway weren't suppressed by FA.

Conclusion: These results suggested that inhibition of NFκB pathway involved in suppression of LPS induced IDO mRNA expression by FA.

Key words: tryptophan, IDO, ferulic acid, inflammation, microglia

PO2942

VITAMIN D STABILITY IN FORTIFIED FOOD EMULSIONS

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Background and objectives: Designing food products to control stability of lipophilic food compounds includes developing emulsions with specific structural characteristics. We focus on building interfacial layers from proteins and polysaccharides that surround lipid droplets and are resistant to degradation during technological process and digestion. The aim of this study was to analyse storage stability of vitamin D in fortified emulsions and find out whether it is possible to increase bioavailibility of vitamin D from these emulsions.

Methods: Objectives of our study were emulsions stabilized by whey proteins (WP) alone and together with carboxymethylcellulose (CMC) with addition of 0.5% vitamin D3Vitamin D content in emulsions was determined by RP-HPLC after cleaning by normal phase chromatography.Emulsions were fed to rats. Rats were divided into 3 groups: control (usual diet); usual diet + 2 g emulsion with WP (Diet 1); and usual diet + 2 g emulsion with WP and CMC (Diet 2). Rats were given free access to food and water, emulsions were given once a day for 2 weeks. Levels of serum 25-hydroxyvitamin D (25(OH)D) as an index of the nutritional vitamin D in the rats body were evaluated.

Results: Analysis of vitamin D3 retention in emulsions stabilised by WP alone and WP together with CMC showed no statistically significant differences in vitamin content. Quantitative analysis of vitamin D3 in all emulsions stored for 10 days in the dark at +4oC showed that vitamin content was stable and varied within standard deviation limits.Supplementation of rats diet by vitamin D3 for 1 week increased serum 25(OH)D level up to 151+/-31,5 nmol/L forDiet-1 and 169,7+/-10,17nmol/L forDiet-2, whereas for control group serum 25(OH)D concentration was 71+/-24,97 nmol/L (SD).

Conclusions: After 2 weeks in both groups receiving emulsions with vitamin D a plateau of 175,17nmol/L serum 25(OH) D was reached.

Key words: food emulsions, vitamin D

PO2943

BIOACCESSIBILITY ASSESSMENT OF CAROTENOIDS FROM COMERCIAL NUTRACEUTICAL PRODUCTS

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Background and objectives: Health-promoting products are getting popular among consumers and a large list of nutraceuticals containing phytochemicals from foods is available in the Brazilian market. Research on their bioavailability is essential to elucidate the potential health benefits of carotenoids formulations, since it depends on digestive stability, released

from the matrix (referred as bioaccessibility) and transepithelial passage efficiency. In vitro digestion models are being extensively used to predict carotenoids bioaccessibility in a rapid and cheaper way, besides not involve ethical aspects as in vivo assays.The aim of this study was to assess carotenoids bioaccessibility from five available capsule-formulations of nutraceuticals in the Brazilian market, claimed as carotenoid source and with several health benefits. The nutraceuticals products were purchased in local stores in Rio de Janeiro, Brazil.

Methods: An in vitro digestion model was applied by mimicking oral, gastric and intestinal physiological conditions. Five percent (w/w) of canola oil was added to the samples. Analyses involved enzymes as α-amylase, pepsin, bile, pancreatin, lipase and inorganic salts. Physiological variations were reproduced by the bath shaker with orbital gyros (37ºC) and ultracentrifugation (5000g, 45 min). Identification and quantification of carotenoids were performed by HPLC, using a 33ºC column oven, PDA detector, and a C30YCM Column. Carotenoids separation was obtained by a gradient elution of methanol and methyl tert-butyl ether, using a 0.8mL/min flow rate, injection volume of 15 µL and run time of 28min.

Results: Bioaccessibility of carotenoids was decreased after pass through the gastro-intestinal model and varied among the five formulations. A lycopene formulation presented greater bioaccessibility in the small intestine (48,02%) than other ones rich in β-carotene (0.96%, 31.29%, 34.45% and 36.22%) or one rich in lutein (0.86%).

Conclusions: These results showed that the available carotenoids amounts for absorption in these products are much lower than declared in the label.

Key words: In vitro digestion, β-carotene, lycopene, lutein, bioavailability

PO2944

PEANUT BUTTER FRUIT: A RICH SOURCE OF LYCOPENE

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Background and objectives: The interest in South American native plant species has been growing in recent years due to their health benefits. The species Bunchosiaarmeniaca(Cav.) DC.is a plant from Andes and the popular name is peanut butter fruit. In Brazil it is cultivatedfor a long time, but only in domestic orchards, known as caferana, cafezinho, ciruela, caramela, ameixa-do-pará or ameixabrava. Due to its orange to red color, typical of carotenoids, the aim of the present study was to quantify and determine the carotenoids profile in the edible parts of the fruits.

Methods: Peanut butter fruits were collected in January 2013 in the city of Rio de Janeiro, Brazil. Total carotenoid content were evaluated by spectrophotometric methodat 450nm and the carotenoids profileby High Performance Liquid Chromatography.

Results: The fruit pulp presented high levels of total carotenoids (40 mg/100 g wet basis), in which 89% was lycopene (36 mg/100 g), followed β-carotene (2.5 mg/100 g) and lutein (0.3 mg/100 g). Lycopene is the carotenoid with the highest antioxidant activity and is present in high concentrations in the prostate tissue, which may explain its role in reducing the risk of prostate cancer. In Brazil, prostate cancer is the second most common among men, behind skin cancer. It is the sixth most common cancer type in the world and the more prevalent in men, accounting for about 10% of all cancers. The tomato and its products are considered the main sources of lycopene in the Western diet.

Conclusions: The peanut butter fruits are a rich source of lycopene presenting 10 times more than the tomato fruit (3.5 mg/100 g). This biodiversity fruit has a great potential of use, once it has a good tasty to eat fresh and can also be used as an ingredient in preparations to increase the lycopene levels in food.

Key words: Bunchosiaarmeniaca,carotenoids, biodiversity fruits, bioactive compounds.

PO2945

EVALUATION OF ANTHOCYANIN PROFILE IN APPLE PEEL OF THREE CULTIVARS PRODUCED IN BRAZIL

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Background and objectives: The annual apple production in Brazil has remained around one million tonnes/year. In the processing industry of fruit juices, apple juice is considered one of the main products. This juice production generates 25 to 30% of waste (bagasse: peel, pulp and seed) which has aroused the interest of the scientific community, aiming its use for the

obtaining of new products from these residues. The peel is the part of the residue with the higher concentration of pectin and flavonoids, such as anthocyanin, being its antioxidant activity responsible for reducing the risk of cardiovascular diseases and chronic diseases such as cancer. The objective of this study was to compare the anthocyanin profile in apple peel of three cultivars produced in Brazil.

Methods: The cultivars Gala, Fuji and Red were obtained in local market in the municipality of Rio de Janeiro, Brazil. The apple peels anthocyanins were extracted with acidified methanol solution. Chromatography analysis was performed on a Waters® Alliance 2695 system, with a Waters® 2996 photodiode array detector, Thermo® Scientific C18 BDS (100mm x 4.6mm; 2.4µm) column and gradient elution method with acetonitrile and formic acid. It was observed the same anthocyanin profile among cultivars.

Results: The majoritary anthocyanin detect was cyanidin-3-galactoside (corresponding to 88% of total anthocyanin content in the evaluated matrix). This anthocyanin, compared to others present in food, has one of the highest antioxidant activity.

Conclusions: Therefore, the three apple cultivars can be considered a source of anthocyanin, being wasted each year by juice industry in large quantities, while could be used, for example, as a food ingredient with antioxidant properties. It could also allow the fruit sector to diversify its production and increase income.

Key words: antioxidant, flavonoids, residues

PO2946

EFFECT OF NON-ALCOHOLIC BEER IN THE SUBJECTIVE SLEEP QUALITY IN AN UNIVERSITY STUDENT POPULATION UNDER STRESS

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Background and objectives: Sleep deprivation affects the homeostasis of the physiological functions of organism. Beer is the only beverage that contains hops, a plant with sedative effect. Our objective is to determine the improvement of subjective sleep quality using the Quality Index Questionnaire Pittsburgh Sleep.

Methods: The assay was conducted in a population of 30 university student. The experimental period was 3 weeks, the first 7 days for the control, and following 14 days individuals ingested beer during dinner.

Results: The results revealed that one beer took during dinner improve the Subjective Quality of Sleep, because the Sleep Latency (time period measured from going to bed until the onset of sleep) decreases ($p<0.05$) respecting to control.

Conclusions: The overall rating Subjective Quality of Sleep also improved significantly ($p<0.05$). In conclusion, the consumption of non-alcoholic beer at dinner is recommended to improve the quality of sleep.

Key words: Sleep, Pittsburgh, hop, beer, stress.

PO2947

HYPOCHOLESTEROLEMIC EFFECT OF COWPEA VICILIN IN RATS FED A HIGH-CHOLESTEROL DIET

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Background and objectives: In this work was evaluated the hypolipidemic effects of cowpea vicilin (_-vignin) and a statin in rats.

Methods: Rats male (n=27) were divided into three groups that received a hypercholesterolemic diet (20% palm oil, 1% cholesterol and 0.5% cholic acid). Hypercholesterolemic group (HC diet) was treated with saline solution, while that HC+7SC (HC diet, plus cowpea _vignin), and HC+SVT (HC diet, plus drug simvastatin) have received daily doses of 300 and 50 mg/kg/day of protein and drug, respectively, by gavage during 4 wk.

Results: The HC+7SC group showed a decrease in the total serum cholesterol, non-HDL-C and the atherogenic index (32.5, 54.3 and 70.7%, respectively), and these values were higher than those treated with simvastatin.Serum HDL-cholesterol levels were increased (57.1%) in the HC+7S-C group and hepatic cholesterol and triglyceride contents were significantly lower than in the HC (13.7 and 17.1%, respectively). The lipoprotein lipase activity was higher in the HC+7S-C group than the others; however, there were no differences in glutamic pyruvic transaminase activities.Furthermore, the expression of low density lipoprotein receptors (LDLr) in the liver has presented an upregulation (more 119%), while others were downregulated:the sterol regulatory element-binding protein 2 (SREBP-2) minus 34%; the 3-hydroxy-3-methylglutaryl Coezima-reductase minus 52%; HMGCoA-syntetase minus 77%; and the fatty acid synthase minus 10%.

Conclusions: Based on these data, it can be suggested that the oral daily administration of isolated vicilin from cowpea can promote a hypolipidemic effects in rats fed hypercholesterolemic diets and these effects could involve the regulation of

the expression of some genes involved in lipid metabolism. Currently, others target genes are being studied in our lab to determine other possible elements involved.Acknowledgments: FAPESP, PADC/FCF/UNESP and FUNDUNESP.

Key words: cowpea vicilin; hypolipidemic; hypercholesterolemia.

PO2948

EFFECTS OF ADZUKI BEAN VICILIN IN RATS FED A HIGH-CHOLESTEROL DIET

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Background and objectives: The effect hypolipidemic, and body fat-lowering, of isolated vicilin (7S) from adzuki bean (AB) were studied.

Methods: Wistar rats were divided into four groups (n=9): standard diet (STD, casein), hypercholesterolemic (HC) diet (STD plus 20g/100g palm oil, 1g/100g cholesterol and 0.5g/100g cholic acid), HC diet+7S-A (HC plus 300mg of 7S/kg/body weight/day) and HC diet+SVT (HC plus 50mg of simvastatin/kg/body weight/day). The protein and the drug were administered by gavage for 28 days.

Results: Fecal excretion and feeding efficiency were similar among HC, HC+7S-A and HC+SVT. The HC+7S-A and HC+SVT groups have reduced body weight gain in 11.8 and 12%, respectively, compared to HC. Administration of vicilin (AB) caused significant decrease in serum levels cholesterol (-33.1%), triacilglycerides (-17.8%), and non-high-density lipoprotein (-53.4%), and increase of HDL-C (+52.9%), while those that received simvastatin had reduction of cholesterol in 20.4%, triacilglycerides in 6.9%, non-HDL-C in 30.7% and increase in HDL-C of 18.6%. The atherogenic indexes of HC+7S-A and HC+SVT groups were 67.1 and 31.7% lower than that of HC group, respectively. The liver of the animals of HC+7S-A group showed lower total lipids (-13.9%) and cholesterol (-9.2%) while HC+SVT a reduction of 8.8 and 11.3%, respectively, compared to animals fed HC diet. In liver tissue sections of animals that received HC diet were observed microvesicles fat accumulation within hepatocytes. This analysis characterizes hepatic steatosis and ballooning in liver tissue of animals fed HC diet. The lipoprotein lipase activity was significantly higher in all groups fed HC diet. The relative concentration of mRNA of the fatty acid synthase enzyme (FAS) and sterol regulatory-element binding protein-2 (SREBP-2) had a strong decrease in groups that received adzuki vicilin. Others target genes are being studied to determine other variants involved.

Key words: adzuki vicilin; hypolipidemic; cholesterol-lowering.

PO2949

PLASMA PHARMACOKINETICS FOLLOWING INTRAVENOUS ADMINISTRATION OF MASLINIC ACID, A PENTACYCLIC TRITERPENE FROM OLIVES

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Background and objectives: Maslinic acid is the main pentacyclic triterpene found in fruits and leaves of Olea europaea L. This component presents beneficial effects on health, including antiinflammatory, hypoglycemic, antiviral, antimicrobial and antitumor activities. The aim of the present study is to determine the pharmacokinetics parameters of maslinic acid in rats.

Methods: Maslinic acid was dissolved in hydroxypropyl-α-ciclodextrin and administered by a single intravenous dose of 1 mg/kg to 6-hour fasted male Sprague-Dawley rats. Blood samples were withdrawn from the saphenous vein at different times (2, 5, 10, 15, 30, 40, 50, 60, 70, 100 and 130 min). Plasma samples were processed by liquid-liquid extraction with ethyl acetate before LC-APCI-MS analysis. The plasma concentration-time data was analyzed by WinNonlin software to calculate the pharmacokinetic parameters.

Results: Non-compartmental and compartmental analyses were performed and intravenous data were best described by a two compartment model. After intravenous administration, maslinic acid showed a rapid distribution to an extravascular compartment, with half-life (t1/2) of 8.86 min, followed by an elimination phase with t1/2; of 48.0 min. The apparent volume of distribution in the steady state (Vss) was 0.135 L/kg. Maslinic acid showed a maximum plasma concentration (Cmax) of 18.32 μmol/L, body clearance (CL) of 8.65 mL/min/kg and area under the plasma concentration time-course (AUC) of 244.3 μmol•min/L.

Conclusions: The pharmacokinetic model adequately described the plasmatic concentration of maslinic acid, suggesting that this pentacyclic triterpene rapidly leaves the bloodstream, with a low distribution to the peripheral compartment and fast elimination from the organism.Supported by grants AGL2009-12866 from MCT Spain and 2009-SGR-00471 from the Generalitat de Catalunya.

Key words: Maslinic acid, Rat plasma, Olives, LC-MS

PO2950

METABOLITE PROFILE IN PLASMA OF MASLINIC ACID, A BIOACTIVE COMPOUND FROM OLEA EUROPAEA L.

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Background and objectives: Maslinic acid, the main pentacyclic triterpene of olives, exerts antioxidant, cardioprotective and antitumor activities. Despite its beneficial effects on health, there is a lack of knowledge on the metabolism of this compound. Therefore, the present study aims to identify and quantify maslinic acid and its metabolites in plasma.

Methods: Sprague-Dawley rats were orally administered with 50 mg/kg of maslinic acid and blood was collected after 30 min. Plasma samples were treated by liquid-liquid extraction with ethyl acetate prior to analysis by LC-APCI-MS. The triterpene was separated on a C18 column using a gradient elution of water and acetonitrile at a flow rate of 0.8 mL/min. The metabolites of maslinic acid were identified by LC-APCI-LTQ-Orbitrap-MS with a mass accuracy < 1 mDA.

Results: Maslinic acid was found in plasma with m/z 471.3480 and retention time (t) of 11.1 min at a concentration of 5.47 ± 0.70 μM. The screening of plasma samples revealed the formation of derivatives with mass shifts of +14, +16 and +30 in comparison to maslinic acid. Two monohydroxylated and dehydrogenated metabolites (m/z 485.3272) were quantified at 16.0 ± 3.5 nM (t = 8.19 min) and 508.1 ± 75.1 nM (t = 9.63 min), respectively. Three monohydroxylated derivatives (m/z 487.3418) were found at concentrations of 155.2 ± 23.0 nM (t = 6.70 min), 56.5 ± 10.5 nM (t = 7.33 min) and 45.6 ± 11.3 nM (t = 9.03 min), respectively. Finally, a dihydroxylated and dehydrogenated metabolite (m/z 501.3211) was detected with values of 14.3 ± 3.5 nM (t = 6.16 min).

Conclusions: After oral administration, maslinic acid is the main compound in plasma, along with 6 metabolites resulting from hydroxylation and dehydrogenation reactions.Supported by grants AGL2009-12866 from MCT Spain and 2009-SGR-00471 from the Generalitat de Catalunya.

Key words: Maslinic acid, Rat plasma, LC-MS

PO2951

DIETARY N-METHYLSEROTONIN REGULATES SKIN TEMPERATURE IN A FEMALE RAT MODEL OF MENOPAUSE-RELATED HOT FLASH.

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Background and objectives: Clinical evidence suggests that supplementation with black cohosh (Cimicifuga racemosa) relieves symptoms of menopause, but the data are mixed. N-methylserotonin (NMS) is a minor component of black cohosh and is a selective agonist of a serotonin (5-HT) receptor subtype that is involved in thermoregulation (5-HT7).NMS also has inhibitory activity at the serotonin reuptake transporter [Powell et al. (2008) J Agric Food Chem 56:11718-26]. These findings implicate NMS as an active component of black cohosh that may relieve hot flash and mood-related symptoms of menopause, but the in vivo effects and effective dose(s) of NMS are currently unknown. In this study we sought to determine the effects of dietary supplementation with NMS on induced hot flash and mood in female rats.

Methods: Ovariectomized (OVX) female rats were fed diets that contained different levels of NMS (0-18.5 ug/kg/d) or were given estradiol implants. The animals were then tested for locomotor activity in the open field, anxiety-like behaviors on the elevated plus maze, and depression-like behaviors with the forced swim test. Hot flashes were subsequently induced with intravenous calcitonin gene-related peptide, and skin temperature was monitored with thermocouple probes.

Results: Dietary NMS did not affect OVX-induced weight gain, uterine growth, or mood-related behaviors. However, one-way ANOVA detected that dietary NMS significantly lowered baseline skin temperature [$F(3,12)= 13.422$, $p< 0.001$, Power= 0.997] and blunted the hot flash response [$F(3,10)= 5.268$, $p= 0.018$, Power= 0.796] in a manner similar to that observed in animals with estradiol implants.

Conclusions: These in vivo findings support NMS as an active component of black cohosh that could decrease menopausal hot flashes without the potential risks associated with hormone replacement therapy or phytoestrogen use.

Key words: black cohosh, serotonin, thermoregulation, menopause

PO2952

THE EFFECT OF IN VITRO SIMULATED DIGESTION ON THE BIOACTIVITY OF FREE AND COMPLEXED RESVERATROL IN ORANGE JUICE AND MILK

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Background and objectives: Resveratrol, has been reported to exert many different health-promoting effects. The dietary intake can be increased through resveratrol-enriched functional foods. The high hydrophobicity of resveratrol and oxidative enzymes may constitute a serious problem for its bioavailability, formulation in the elaboration of functional foods. In order to avoid this limitation, inclusion of resveratrol in cyclodextrins (CDs). In this work, we investigated the effects of an in vitro gastric and pancreatic digestion on the stability, composition and absorption of the 0.8 mM resveratrol in orange juice and milk, in the absence and presence of 13 mM of α-CDs.

Methods: Digestion was carried out with a mixture of pepsin-HCl for 2 h, followed by 2 h incubation with pancreatin and bile salts at 37ºC with shaking, in the absence of light. After digestion, the samples were acidified, filtered and analysed by HPLC-DAD to determine the content of total soluble recovered.

Results: When the dialyzed samples were analyzed by HPLC, it was found that resveratrol was not attacked by digestive enzymes. When the absorption values of resveratrol were compared both in the presence and absence of α-CDs in orange juice and milk, it was observed that resveratrol complexed in α-CDs in orange juice and milk was absorbed mainly (0.72 mM and 0.69 mM respectively) whereas the resveratrol in absence of α-CDs in juice and milk was absorbed only 0.1 mM in both case. This indicated that resveratrol absorption is highest when it was complexed, because it is totally dissolved and α-CDs acts as a reservoir, releasing resveratrol according to their solubility limit allowing greater absorption.

Conclusions: This complexation phenomenon increased the absortion of the resveratrol in orange juice and milk, so the CDs act as controlled release reservoir.

Key words: Resveratrol, cyclodextrins, absortion, in vitro digestion.

PO2953

ANTI-INFLAMMATORY EFFECTS OF LACTOBACILLUS ACIDOPHILUS AND BIFIDOBACTERIUM LACTIS IN AN INFLAMMATORY MODEL OF HT-29 CELLS

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Background and objectives: Recent evidences suggest that pathogenesis of inflammatory bowel disease (IBD) may be due to imbalance of the intestinal microflora. Probiotics such as Lactobacilli and Bifidobacteria have been shown to exhibit a beneficial effect on treatment of IBD. Previous studies have showed the treatment of Lactobacillus acidophilus and Bifidobacterium lactis can improve the inflammatory symptom of rat colitis model. The present study examined the anti-inflammatory effects of L. acidophilus and B. lactis in an inflammatory model of human colorectal cancer cells.

Methods: HT-29 human colorectal cancer cells were treated with tumor necrosis factor-α (TNF-α) and lipopolysaccharide (LPS) for 24 hours as an inflammatory group. L. acidophilus and B. lactis were added at designated multiplicity of infection (MOI, 0.1, 1 and 10) with TNF-α and LPS as treatment groups. Interleukin-8 (IL-8) concentration in cultured medium was analyzed by enzyme-liked immunosorbent assay (ELISA). Protein expressions of phosphorylated nuclear factor kappa B (p-NFκB), vascular cell adhesion molecule-1 (VCAM-1) and intercellular adhesion molecule-1 (ICAM-1) were analyzed by Western blotting.

Results: L. acidophilus at MOIs of 1 and 10 showed low IL-8 secretion as compared with inflammatory group. L. acidophilus at MOIs of 0.1, 1 and 10 showed low expressions of p-NFκB and VCAM-1 as compared with inflammatory group. The expression of ICAM-1 was not affected by L. acidophilus. B. lactis at MOI of 10 showed low IL-8 secretion as compared with inflammatory group. B. lactis at MOIs of 1 and 10 showed low expressions of p-NFκB and VCAM-1 as compared with inflammatory group. In addition, B. lactis down-regulated ICAM-1 expression in a dose dependency.

Conclusions: The results suggest that L. acidophilus and B. lactis may inhibit inflammation through different pathways.

Key words: Inflammatory bowel disease, Lactobacillus acidophilus, Bifidobacterium lactis

PO2954

ISOTHIOCYANATES PROTECT AGAINST OXIDIZED LDL-INDUCED ENOS REDUCTION AND ANGIOGENESIS VIA FOXO1-DEPENDENT REGULATION

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Background and objectives: Oxidized low-density lipoprotein (oxLDL) is a key contributor of atherogenesis through multiple mechanisms. OxLDL inhibits endothelial nitric oxide synthase (eNOS) activity and nitric oxide (NO) production, leading to interruption of NO-mediated responses in endothelial cells has been demonstrated to be involved in the pathogenesis of several cardiovascular disorders.

Methods: In this study, we investigated the protection effects of three structurally related isothiocyanates (ITCs), i.e., sulforaphane (SFN), benzyl isothiocyanate (BITC), and phenethyl isothiocyanate (PEITC), against oxLDL-induced eNOS reduction, cell migration and tube formation and the mechanism involved.

Results: Western blot and EMSA analyses reveal that oxLDL increases reactive oxygen species (ROS) production through activating NADPH oxidase complex, results in Akt and FOXO1 dephosphorylation, FOXO1 nuclear location and bound to the eNOS promoter in human umbilical vein endothelial cells (HUVECs). The correlation between oxLDL-induced FOXO1 activity and the expression of angiogenesis-related molecules, including hypoxia inducible factor-1£\ (HIF-1£\), vessel endothelial growth factor (VEGF) and Angiopoietin-2 (ANG-2) also increased. In the presence of oxLDL, SFN, BITC, and PEITC (0-10 £gM) pretreatment dose-dependently reversed membrane activation of NOX and ROS production. The ITCs also prevent oxLDL-induced FOXO1 activity and eNOS reduction, cell migration and tube formation.

Conclusions: In conclusion, our results provide a new protective mechanism involving FOXO1 as a critical role in regulating angiogenesis in HUVECs and suggest a novel capacity for SFN, BITC, and PEITC in protect against oxLDL-induced endothelial destruction which may be potential compounds for the prevent from oxidative stress-related cardiovascular diseases.

Key words: isothiocyanates, oxLDL, HUVECs, eNOS, FOXO1.

PO2955

EXTRACT OF A JAPANESE PICKLING MELON PREVENTS ETHANOL-INDUCED LIVER INJURY IN RATS

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Background and objectives: The development of alcoholic liver disease is a complex process that involves both the parenchymal and non-parenchymal cells of the liver. Tamatsukurikuromon-sirouri (TS), a Japanese pickling melon (Cucumis Melo var. Conomon), is a special vegetable in Osaka, Japan and its extract has a strong antioxidant activity. Here we examined the effect of an extract of TS (ETS) on ethanol-induced liver injury.

Methods: 1) In vitro experiments: Isolated hepatocytes or hepatic stellate cells (HSCs) were cultured with or without 100 mM ethanol. ETS (0~100 ƒÊg/ml) was added to culture medium with ethanol simultaneously. The cells were harvested after 0~24 hrs. 2) In vivo experiments: Male Wistar rats were fed a diet with or without 0.3 or 0.5% ETS. Animals were given drinking water containing ethanol 5% (v/v) together with two doses of CCl4 (0.1 ml/kg BW, i.p.) weekly for 3 weeks.

Results: In cultured hepatocytes, the treatment of ETS suppressed ethanol-induced increase in cell death via inhibiting CYP2E1 activity. ETS treatment maintained intracellular ROS levels in 100 mM ethanol-treated cells to the levels of the control cells. In HSC which is a key player in hepatic fibrosis, the treatment with ETS also suppressed ethanol-induced increase in expression of type I collagen and ƒ-SMA, makers of HSC activation. Furthermore, we examined the effect of ETS on AST and ALT activities and liver fibrosis in rats treated with ethanol plus CCl4The treatment of ETS suppressed the leakage of AST and ALT in the ethanol plus CCl4 treated rats. Furthermore, ETS treatment totally protected against ethanol plus CCl4 induced liver fibrosis and necrosis.

Conclusions: These results suggest that ETS may be a candidate for preventing ethanol-induced liver injury.

Key words: Ethanol-induced liver injury, Hepatocytes, Fibrosis, Japanese pickling melon

PO2956

INFLUENCE OF VITAMINS FOR DIFFERENTIATION OF MONOCYTE, THP-1, TO MACROPHAGE

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Background and objectives: THP-1, a human monocytic cell line could be polarized into M1 / M2 macrophages. It is suggested that M1 macrophages play a key role in the defense against bacterial and viral infection. In contrast M2 macrophages play a role in parasite infection, tissue modeling, and angiogenesis. M1 produce inflammatory cytokines, such as IL-1, IL-12, TNF- and nitric oxide (NO) and, M2 produce anti-inflammatory cytokine IL-10. In this study, it was investigated for influence of micronutrients such as vitamins in differentiation to M1 and M2 macrophages.

Methods: THP-1 was treated for 48h with phorbol 12-myristate 13-acetate. Then, differentiated adherent cells were stimulated LPS and IFN, and, the vitamin was added to the differentiate cells. And we investigated for polarization on THP-1 macrophages towards either the M1 or M2A volume of cytokines and NO from differentiated THP-1 were examined. The expression of cytokines mRNAs was determined by qPCR. NO was determined by using griess reagent, and an expression of iNOS mRNA, related to produce NO, was analyzed by qPCR.

Results: Inflammatory cytokine, and nitric oxide productions were activated by LPS and IFN . It was suggested that M1 marker genes was induced by LPS and IFN . IL-12 was down-regulated, but M2 marker gene, IL-10 was up-regulated by only PMA-stimulated THP-1 macrophages. Nitric oxide production induced by LPS and IFNstimulation was slightly inhibited by addition with vitamin D3Therefore, vitamin D3 induces macrophages into M2Also, vitamin D3 induces into more M2 macrophages than M1in macrophages differentiation.

Conclusions: Our study was suggested that vitamin D3 induce to differentiate macrophages into M2 was dominant. Vitamin D3 increase to in expression IL-10 mRNA more than IL-12Therefore, vitamin D3 is good for the health against in parasite infection.

Key words: macrophage, monocyte, M1/M2, vitamin

PO2957

INFLUENCE OF FOODS ON DIFFERENTIATION OF MONOCYTE, THP-1, TO OSTEOCLAST

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Background and objectives: Bone remodeling is maintained by the balance of osteoclasts which perform bone resorption and osteoblast which perform bone formation. But, when this balance breaks down, it has bad influence on normal bone turnover. An influence of micronutrient in foods, such as calcium and vitamin D, on the bone metabolism was been investigated well. It would be also important to investigate influence of actual food intake on the bone metabolism.

Methods: In the present study, using human monocytic cell THP-1 differentiated into osteoclasts by phorbol 12-myristate 13-acetate(PMA), macrophage colony stimulating factor(M-CSF), and receptor activator of NF-kB ligand(RANKL), or influence of food extracts on differentiation to osteoclast was examined. Osteoclasts are large, multinucleated cells, which originate from the fusion of macrophages. Tartrate-resistant acid phosphatase(TRAP) is a well-known marker of osteoclasts differentiation. Differentiation of osteoclast was confirmed by morphological analysis using TRAP staining, determination of TRAP activity and detection of receptor activator of NF-kB(RANK) protein.

Results: TRAP staining and activity in THP-1 stimulated with PMA for 24hr were increased by M-CSF and RANKL treatment, compared with control cells without M-CSF and RANKL. When the influence of some food extract stimulation on the osteoclast differentiation was investigated, it was shown that hot water extract of an edible mushroom increased significantly TRAP activity. In bone metabolism, it is also important that the osteoclast differentiation would be promoted, in order to transpose old bone to a new one.

Conclusions: In our work, it was suggested that an edible mushroom might influence osteoclast action.

Key words: osteoclast, THP-1, edible mushroom

PO2958

A CO-ADMINISTRATION OF FLAVONOIDS TO INCREASE THEIR BIOAVAILABILITY IN RAT

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Background and objectives: Functional food factors such as flavonoids undergo conjugations with UDP-glucuronosyltransferases and/or phenol sulfotransferases at the intestinal absorption process and excreted to lumen side. Therefore, the dietary functional factors are usually low in the bioavailability. However, the conjugation reaction may be confused when plural kinds of flavonoids are simultaneously absorbed in the intestinal epithelial cells, and hereby a flavonoid may escape from the conjugation and be incorporated into blood circulation in the free aglycone form.

Methods: In the present study, we administrated rat with plural flavonoids and compared the levels of aglycone and conjugated forms in blood. First, a combination of flavonoid, quercetin and luteolin or quercetin and galangin, were dosed orally to rats and determined in the levels of aglycone and conjugated forms in blood.

Results: The plasma aglycone level of luteolin significantly increased by the co-administration with equal amount of quercetin, but did not by the co-administration with galangin. Then, a combination of flavonoid and glycosides, quercetin and apigetrin (apigenin 7-O-glucoside) or quercetin and vitexin (apigenin 8-C-glucoside), were dosed orally to rats. The plasma level of conjugated quercetin significantly increased by the co-administration with apigetrin, but did not with vitexin.

Conclusions: As a result, an O-glycoside flavonoid can enhance the incorporation of co-administrated flavonoid, may be because the O-glycosides undergo hydrolysis during the absorption process and thus the overall concentration of flavonoid can be high in intestinal epithelial cells. The idea of co-administration of flavonoids will be a strategy to enhance the bioavailability of biofunctional flavonoids and prevent degenerative diseases.

Key words: quercetin, bioavailability,

PO2959

STRUCTURALLY DIFFERENT GALACTO-OLIGOSACCHARIDES HAVE DIFFERENT DIGESTIBILITY PATTERNS AND BIFIDOGENIC PROPERTIES IN RATS

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Background and objectives: Galacto-oligosaccharides (GOS) have demonstrated to increase the bifidobacterial population of fecal microbiota in healthy human´s volunteers; however, such effect was not observed in other related studies. These dissimilarities can be attributed to several factors including the type, purity and composition of the GOS used. The relationship between bifidogenic properties and structural features of GOS in vivo has been investigated.

Methods: A comparative study regarding the resistance to gut digestion, fermentability and selective growth of beneficial bacteria in the large intestine of rats fed novel GOS derived from lactulose (GOS-Lu) or commercially available derived from lactose (GOS-La) was carried out. Animals were fed either a control diet or diets containing 1% (w/w) of GOS-Lu or GOS-La for 14 d; Cr2O3 was included in diets as an indigestible marker.

Results: Quantitative analysis of carbohydrates from dietary and ileal samples demonstrated that the trisaccharide fraction of GOS-Lu was significantly more resistant to gut digestion than that from GOS-La, according to their ileal digestibility rates (12.5 and 52.9%, respectively), whilst the disaccharide fraction of GOS-Lu was fully resistant. The low ileal digestibility of GOS-Lu was attributed to the great resistance of galactosyl-fructoses to mammalian digestive enzymes, highlighting the key role played by monomer composition and linkage type involved in the oligosaccharide chain. The absence of GOS-La and GOS-Lu digestion-resistant oligosaccharides in fecal samples indicated that they were readily fermented within the large intestine, enabling both GOS to have a potential prebiotic function. The novel GOS-Lu exerted a stronger bifidogenic effect on gut microbiota than GOS-La, having the former a selective and significant increase of Bifidobacterium animalis.

Conclusions: A direct relationship between patterns of resistance to digestion and bifidogenic properties of galacto-oligosaccharides is revealed.

Key words: bifidobacteria, galacto-oligosaccharides, prebiotics

PO2960

NEW SPL OF PHYTONUTRIENTS FOR ESSENTIAL LIFESPAN

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Background and objectives: There is increasing knowledge concerning phyto-chemicalspotential for health maintenance or disease risk reduction throughout adulthood and during aging. This means that they are essential individual lifespan. The purpose of this paper is to describe the specific proposed level (SPL) and the tolerable upper intake level levels (UL) established by Chinise Nutrition Society are based on evaluations of functionality and possible adverse health effects.

Methods: Identification of possible indicators by Systematic Evidence-Based Reviews ; Evaluating approaches for integrating evidence into processes for derivingSPL and UL¡£ SEBR is essentially an approach to identifying, tabulating and grading the quality of available data.

Results: Both positive or adverse effectsdetectedand indentifiedat the quality of available data were evaluated by DRI experts committee.12 phyto-chemistry SPL and10UL are established in the general population. including Carotenoid, Quercetin. Lutin, Glucosamine Sulfate so on.

Conclusions: These results show first the recommendation SPL and UL on non-essential nutrients substance by Chinese Nutrition Society.As a starting point,the result provide a guidance for professionals and industries.

Key words:phytochemicals, Evaluating approaches, specific proposed level, UL

PO2961

TEXTURE AND COLOR OF BREAD: INFLUENCE OF β-GLUCANS ADDITION

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Background and objectives: β-glucans are soluble and fermentable fibers that, once in the intestine can compose solutions presenting benefits for health. The amount of yeast β-glucans in foods must range between 50 and 200 mg per serving (EFSA). However, the influence of β-glucans addition on bread sensory characteristics was not understood. Quality control of bread was based on texture and color, since both parameters affect consumer preference. The objective was study the effect of adding different levels of β-glucans extracted from yeast cell wall to improve the bread´s characteristics.

Methods: Breads were made from 500 g of flour mixture for bread and variable amounts of β-glucans (0; 0.5; 1; 1.5 and 2 g). Volume was evaluated. For texture assay a TA-XT-2iHR Texture Analyser. Regarding color, lightness (L*), redness (a*) and yellowness (b*) were determined using a Minolta CR-300 colorimeter.

Results: The bread displaying the largest volume was that with a dose of 1.5 g . For Hardness, the highest value corresponded to the 0 g dose and the lowest to the 1.5 g one; whereas for Elasticity, the highest was for 1.5 g and the lowest for 0g and 0.5 g; the highest value for Masticability corresponded to 0.5 g and the lowest one to 1.5 g. In respect to color, L* was the highest for the 1.5 g; a* was the highest for 0 g and the lowest for 1.5 g; b* was the highest for 0 g and the lowest for 1.5 g.

Conclusions: More studies are needed to confirm the influence of β-glucans addition to bread using different baking conditions.

Key words: bread, β-glucans, texture, color.

PO2962

BIOACTIVE ANDCLAIMS : REGULATORYSYSYTEM IN CHINA

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Background and objectives: Chinese have a long tradition and strong passing for using heber and specific foods to be as a tonics and to regulate body functions.In the present, regulation system defines health foods as foods with specific health functions.

Methods: RegulationOverview and Comparativeanalysis.

Results: The paper Introduce the regulation system on function claim and nutrition claim in China, and compare with EU and US to Ingredient and claim on science approach and management. There are a rule for function food and novel Ingredients; convention food which makes nutrition and function claims of nutritional benefits on its label or packaging (nutrition Labeling, GB28050).

Conclusions: There are novel ingredient approvalregulation, 27 claims that are allowed, more than 10 thousand products in the marketing . The approach procedure is difference with other countries.

Key words: Novel ingredient, Function claims;label

PO2963

MICROENCAPSULATED GREEN TEA EXTRACT SUPPLEMENTATION AMELIORATED DYSLIPIDEMIA AND FAT ACCUMULATION IN A FRUCTOSE FED RAT MODEL

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Background and objectives: The effectiveness of polyphenols depends on preserving the stability, bioactive and bioavailability of the active ingredients. To protect polyphenolic green tea extract from adverse environmental conditions, it was microencapsulatedwith mean diameters of 3.4 ìm using maltodextrin (1:4, v/v) as a carrier and coating agents by hydroshear homogenization at 8,000rpm for 30 min.This study was initiated to compare the effects of microencapsulated green tea extract (MGTE) and non capsulated green tea extract (GTE) on hypertriglyceridemia induced by feeding a high fructose diet in wistar rats.

Methods: 8 week old rats were fed either AIN 93 diet (normal control, NC, n=10), or modified AIN-93 diet in which cornstarch was substituted with 63% fructose to induce hypertriglyceridemia for 8 weeks. The hypertriglyceridemic rats were treated with daily oral dosed of 0 mg (hypergriglyceridemic control, HC, n=10),GTE(n=10) or MGET(n=10) with dose of 50mg•kg bw-1d-1 for 4 weeks. Serum lipid profiles, visceral fat accumulation and antioxidative enzymes were analyzed.

Results: The serum triglycerides (TG), total cholesterol, HDL-cholesterol and uric acid (UA) were significantly increased by feeding a fructose diet. The treatment of GTE decreased serum TG and FFA levels compared with those of HC group. The supplementation ofMGTE caused more decrease inserum TG, FFA, and UA than GTE did. The supplementation of GTE or MGTE in hypertriglyceridemic rats decreased the amount of epididymal fat and visceral fat significantly compared to those in HC group.

Conclusions: Our results indicated that the utilization of microencapsulated green tea extract, instead of free compounds, can effectively alleviate the dyslipidemia and fat accumulation induced by high fructose diet.This research was supported by joint research project (#PJ9071222012) from Rural Development Administration, Republic of Korea.

Key words: Microencapsulation, green tea extract, hypertriglyceridemia.

PO2965

ANALYSES OF A POLYPHENOL AGLYCONE PROFILE IN FRUIT AND VEGETABLES BY LC-MS QTOF

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Background and objectives: Epidemiological data indicates that increased intake of fruit and vegetables (FV) is associated with decreased incidence of chronic diseases. FV contain potentially protective components which may account for health benefits associated with increased intakes, including polyphenols. However, to determine polyphenol intake from FV it is important to assess content.

Methods: Data, collected within our centre, identified commonly consumed FV in Northern Ireland. One aim of our work was to measure polyphenol content of these FV. Samples (n 2) of each were lyophilised, milled and 0.05g was hydrolysed with enzymes. A profile of 14 polyphenol aglycones (flavonoids and phenolic acids) were analysed by LC-MS QToF, within a single run.

Results: Data are presented as mg/100gfw ± SD. Content for raw and cooked cauliflower, respectively, were: chlorogenic acid (chl), 0.06 ± 0.00 v. 0.16 ± 0.00; caffeic acid, 0.26 ± 0.04 v. 0.11 ± 0.01; para-coumaric acid (p-cou), 0.14 ± 0.00 v. 0.03 ± 0.01 and quercetin, 0.02 ± 0.00 v. 0.00 ± 0.00. Chl content for raw and cooked parsnip was 0.24 ± 0.05 v. 0.18 ± 0.02Chl content for gem and ice-berg lettuce was 1.00 ± 0.11 v. 0.57 ± 0.06p-cou content for raw and cooked cabbage was 0.07 ± 0.01 v. 0.03 ± 0.00. Although un-ripe, ripe and over-ripe bananas were analysed, and epicatechin was present, amounts were <LOD.

Conclusions: Our results indicate that polyphenols are present in FV and therefore may play a role in beneficial effects associated with increased consumption. However, before we can fully establish impact on human health, further research is required, measuring polyphenol content in other FV, and examining the effect of ripeness, cultivar and domestic cooking. This research is on-going within our centre.Acknowledgements: Work is funded by the MRC.

Key words: fruit, vegetables, polyphenols

PO2966

EFFECT OF DAIRY CALCIUM FROM CHEESE AND MILK ON BLOOD LIPIDS IN HEALTHY YOUNG MEN

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Background and objectives: Calcium from different dairy sources might affect blood lipids differently due to differences in food matrix and nutritional composition of the individual dairy products.The aim of this study was to investigate the effect of high dairy calcium intake in the matrix of cheese or milk on blood lipid profile.

Methods: Fifteen healthy young men participated in a randomized cross-over study with three isocaloric 14-days intervention diets: i) high intake of semi skimmed milk (1200 mg dairy calcium/day and ~500 mg non-dairy calcium/day); ii) high intake of semi hard cows cheese (1200 mg dairy calcium/day and ~500 mg calcium from non-dairy sources) or iii) non-dairy calcium control diet (~500 mg non-dairy calcium/day). All diets were similar in macro¬nutrients, dietary fiber and fatty acid composition. Fasting blood samples were taken before and after each diet period.

Results: Compared to non-dairy calcium, cheese consumption attenuated the increase in both total and LDL cholesterol (-0.48 ± 0.14 and -0.37 ± 0.12 mmol/L, respectively; Pdiff. < 0.01). Likewise, milk consumption attenuated the increase in total and LDL cholesterol (-0.32 ± 0.14 and -0.31 ± 0.12 mmol/L; Pdiff. < 0.05); however the magnitude of effect was slightly smaller than for cheese and no difference was found between the cheese and the milk diet (Pdiff. > 0.24). There was no effect of diet on changes in HDL cholesterol, triglycerides or lipid ratios.

Conclusions: Dairy calcium from milk and cheese attenuated fat-induced increases in total and LDL cholesterol. No difference between dairy calcium sources were found, thus these results do not confirm the hypothesis that the blood lipid response by dairy calcium depends on the dairy product type.

Key words: Dairy, calcium, blood lipids, milk, cheese

PO2967

INTESTINAL INFLAMMATION IN CYSTIC FIBROSIS: LACK OF EFFECTIVENESS AFTER TREATMENT WITH MESALAMINE AND PROBIOTICS

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Background and objectives: There is some evidence of intestinal inflammation in patients with Cystic Fibrosis (CF) but little is known about the pathophysiology. The objective was to assess the incidence of intestinal inflammation measuring faecal calprotectin (FC) and intestinal permeability (IP) in children with CF and to investigate whether mesalamine or probiotics could modify the inflammation.

Methods: FC (µg/g) and IP were assessed in CF patients before and after one-month treatment with mesalamine and VSL#3. IP was measured by dual test with lactulose (L) and mannitol (M). Fecal nitrogen and fat were obtained by Fenir (g/day).

Results:

Mesalamine treated patients (n= 25)	Basal	After treatment
FC (µg/g)	275 ± 233	218 ± 218
Fat (g/24h)	6.7 ± 5.9	6.28 ± 5.9
Nitrogen (g/24h)	2.3 ± 1.9	2.11 ± 1.31
%Lactulose (L)	1.59 ± 1.2	1.77 ± 1.42
%Mannitol (M)	49.85 ± 50.35	35.73 ± 22.14
% L/M	0.047 ± 0.042	0.059 ± 0.044
L/M	0.238 ± 0.212	0.29 ± 0.22

VSL#3 treated patients (n=17)	Basal	After treatment
FC (µg/g)	221 ± 273	256 ± 298
Fat (g/24h)	6.09 ± 5.69	5.56 ± 4.11
Nitrogen (g/24h)	1.9 ± 1.5	1.83 ± 1.18
%Lactulose (L)	1.97 ± 2.33	2.13 ± 1.7
%Mannitol (M)	18.60 ± 11.01	26.83 ± 15.4
% L/M	0.12 ± 0.13	0.079 ± 0.04
L/M	0.6 ± 0.67	0.39 ± 0.20

No statistically significant difference was found after treatment in both groups of treatment

Conclusions: Children with CF have increase of intestinal inflammation.The treatment with mesalamine and VSL#3 did not reduce the intestinal inflammatory state. This lack of improvement expresses a complex mechanism, which should be investigated in further studies.

Key words: Cystic fibrosis, intestinal permeability, mesalamine, probiotics, fecal calprotectin

PO2968

EFFECT OF PREBIOTIC SUPPLEMENT TO ENTERAL FEEDINGS IN PREMATURE INFANTS: A CASE CONTROL STUDY

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Background and objectives: Preterm infants are in critical need for a balanced intestinal microflora that may protect them against infection. The study of a potential role of prebiotic products in the care of premature infants remains in a very early stage. We aimed to assess the prebiotic effect of inulin supplement to NICU preterm infants.

Methods: An ongoing prospective, unblinded case control study in premature infants; GA < 34 weeks with a birth weight > 1000 gram. The study group receives inulin as a prebiotic mixed with the feeds twice daily, and control infants receive only the plain feeds (prebiotic and probiotic free formula) for a period of 42 days. Stools have been collected on the 7th, 21st and 42nd days of feed commencement and are subjected to Lactobacilli and Bifidobacteria enrichment cultures. Small part of the stools is stored at -70 degrees Centigrade for future assessment by real time qualitative PCR for Lactobacilli and Bifidobacteria presence. Weight, length and OFC measurements are assessed on weekly bases, Other investigated parameters are; gestational age at home discharge, antibiotics used and their duration during the NICU admission, routine labs, calcium and albumin.

Results: Thirty infants have been enrolled till now (15 inulin, 15 control). The supplement appeared to be safe and did not cause any adverse effects. Preliminary results showed that Premature infants on inlulin had more Lactobacilli- and Bifidobacteria-positive stool cultures that appeared earlier with larger number of colonies. Furthermore they tended to have less intolerance to enteral feedings, to reach full oral feeds sooner, and to be discharged home earlier.

Conclusions: The preliminary results support the safety and benefit of supplementing preterm infants' feeds with inulin waiting for the final outcome and the qualitative PCR results for confirmation.

Key words: premature, prebiotic, lactobacilli, bifidobacteria, PCR

PO2969

INHIBITORY EFFECTS OF SALVIA HISPANICA L. SEED EXTRACTS ON ANGIOTENSIN I-CONVERTING ENZYME IN VITRO

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Background and objectives: Currently, foods with functional compounds, which have the capability to act in a manner similar to drugs in certain pathological conditions but do not possess their side effects, have stimulated interest. It has been reported that Salvia hispanica L. seeds exert a hypotensive effect; however, the mechanism by which this effect is generated and which compounds are responsible for this effect are unknown. The inhibitory effects of angiotensin I-converting enzyme (ACE I) has not been previously described for this seed; such a mechanism was proposed based on the presence of certain compounds found in the chia seed, which showed an ACE-inhibiting effect in other foods. The purpose of the current study was to evaluate the potential of chia seed extracts on the inhibitory activity of ACE I in vitro, as well as to analyze the bioactive components in the extracts generating this effect.

Methods: Various extracts were studied (e.g., aqueous, methanol, acetone, and hexane). A phytochemical study of compounds present in chia extracts was performed using standard methods.

Results: The compounds present in the aqueous extract were only sugars; in the case of hexane and acetone extracts, unsaturated fatty acids and terpenoids were found, whereas in the methanol extract, phenolic oxides, glycosides, steroids, coumarins, unsaturated lipids, and carbonyl groups were found. IC50 values of the extracts on ACE I were 318±4.2 μg/mL, 218±5.6 μg/mL, and 63±3.7 μg/mL for hexane, acetone, and methanol extracts, respectively.

Conclusions: Results of this study show that active compounds exist, primarily in the methanol extract, which possess an ACE I-inhibiting effect that, in turn, could be responsible for the hypotensive effect already reported. These compounds could have biotechnological potential for the treatment of this hypertension.

Key words: chia, ACE, hypertension

PO2970

PREBIOTIC EFFECT OF INULIN TYPE FRUCTANS: A FOCUS ON BIFIDOBACTERIUM POPULATIONS AND MICROBIAL RELATED METABOLITES IN OBESE INDIVIDUALS

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Background and objectives: Inulin type fructans (ITF) are non digestible carbohydrates that counteract the high-fat (HF) diet induced metabolic disorders in mice. Moreover it is well established that ITF promote the growth of Bifidobacterium genus. The aim of the work is to check the possible influence of ITF in the composition of Bifidobacterium species and related microbial metabolites in obese individuals.

Methods: For humans, samples were taken from a randomized, double blind study performed in overweight women treated with ITF prebiotics (Synergy 1) or placebo (maltodextrin) during 3 months (16 g/day) (Dewulf et al; 2012).For animals, male C57B16/J mice were divided into 3 groups treated for 4 weeks such as: CT group fed a control diet, HF group fed a HF diet, HF-ITF group fed a HF diet supplemented with ITF (0.2 g/day/mouse). The qualitative and quantitative analysis of the gut microbiota was analyzed by PCR-DGGE and q-PCR and SCFA by GC-MS. Correlation analysis between species of Bifidobacterium and some biological parameters were also performed in the human clinical trial.

Results: Bifidobacterium-DGGE profiles in the mice study showed different clustering groups and only 2 Bifidobacterium species were detected: B. animalis and B. pseudolongum. DGGE and q-PCR analysis of Bifidobacterium species in the clinical study have shown that B. longum, B. pseudocatenulatum and B. adolescentis were the predominant species and those that significantly increased at the end of the treatment in the group of women receiving ITF prebiotics. B. longum was also negatively correlated with metabolic endotoxaemia. After the treatment, caproate was significantly higher in feces of the placebo group.

Conclusions: ITF prebiotics selectively changed bifidobacterial population patterns in obese women and diet induced obese mice, opening the possibility to supplement diet with ITF to improve the intestinal microbial profile of obese individuals.

Key words: prebiotics, Bifidobacterium, gut microbiota, obesity

PO2971

ENCAPSULATION METHOD TO PROTECT UNSATURATED FATTY ACIDS FROM RUMEN BIOHYDROGENATION IN VITRO

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Background and objectives: Enrichment of ruminants' products with polyunsaturated fatty acids (PUFA) is one of the possibilities to introduce these fatty acids into the human diet. However, the rumen unsaturated fatty acids biohydrogenation limits their quantity and thus bioavailability in the rumen, as well as in animal products. The alginate/carrageenan calcium beads of linseed oil were evaluated in vitro to verify the ability of these products to protect PUFA from biohydrogenation by ruminal microbes.

Methods: The treatments were: control (C) without supplements, LB1 (control + 4% of linseed beads containing 15% oil), LB2 (control + 4% of linseed beads containing 20% oil), LO (control + 4% of linseed oil). Each product was supplemented (4% dry matter) to the substrate that comprises of a mixture of meadow hay and barley meal in the ratio of 60:40 and incubated using batch culture technique (BC) for 48 h. All samples (feeds and rumen fluid after incubation) were analyzed for fatty acids profile. Encapsulation efficiency was evaluated by measuring the changes in fatty acids profile in linseed oil before and in linseed beads after encapsulation process.

Results: The results indicated that the encapsulation process have no a significant effect on PUFA fraction ($P>0.01$). After incubation in BC system, linseed beads decreased ($P<0.01$) total rumen saturated and monounsaturated fatty acids content. Omega 3 and omega 6 fatty acids contents increased statistically ($P<0.01$) by LB1 and LB2The omega 3 values were 2.5, 17.9, 18.5 and 9.7 mg/100 mg FAME (fatty acid methyl esters), and omega 6 values were 8.7, 25.2, 26.9 and 17.6 mg/100 mg FAME, respectively for control, LB1, LB2 and LO treatments.

Conclusions: In conclusion, new encapsulation method has the potential to protect linseed oil from rumen biohydrogenation in vitro, however further in vivo experiments are required.

Key words: PUFA, rumen, biohydrogenation, encapsulation, in vitro

PO2972

PROTECTIVE EFFECT OF PROBIOTIC TREATMENT ON INTESTINAL MICROBIOTA AND POTENTIAL RISKS

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Background and objectives: Probiotics and phytochemicals are functional foods that possess health benefits. Probiotics have profound effects against pathogenic bacteria and are known to improve intestinal health. In this work, we studied the potential benefit of selected probiotics (Lactobacillus acidophilus and Bifidobacterium bifidum) and functional food ingredients (methanol extract of chamomile) in prevention of intestinal microbiota perturbation following antibiotic treatment, their rolein improving colonic microbiota in healthy rats and the possible risk of translocation in immunosuppressed rat model.

Methods: The study was conducted on white male albino rats where different groups received either: ampicillin, probiotic mixture (1x10(8) Lactobacillus acidophilus and 1x10(9) Bifidobacterium bifidum), chamomile extract or combinations of the three categories. Indicator pathogenic and beneficial bacteria were enumerated in rat feces. The effect of probiotics and functional food ingredients on nutritional parameters and growth was assessed. The immunosuppressed model was constructed by induction of immunosuppression in female white albino rats using dexamethasone as 0.5 mg/kg IM injection for 1 week followed by probiotic mixture daily oral dose for another week. Blood samples were inoculated on MRS agar.

Results: Antibiotic treatment produced microbiota perturbation. Administration of probiotic mixture alone or mixed with chamomile extract simultaneously with ampicillin significantly restored the normal level of microbiota ($P < 0.05$). Ingestion of probiotic mixture alone or with chamomile extract in healthy rats produced significant increase in colon beneficial bacteria together with significant reduction of pathogenic bacteria compared to control rats. Blood infection with Lactobacillus acidophilus and Bifidobacterium bifidum was noticed in 5 out of 8 immunosuppressed rats.

Conclusions: Probiotics may prevent the imbalance in intestinal microbiota resulting from antibiotic treatment and may improve the intestinal ecology in favor of the beneficial bacteria. Probiotic treatment might have some risks in immunosuppressed cases; further investigation is needed in this respect.

Key words: Probiotics, antibiotic, microbiota.

PO2973

EFFECT OF TEMPERATURE AND DAY LENGTH ON OMEGA-3, 6 FATTY ACIDS AND OXALIC ACID LEVELS IN PORTULACA OLERACEA

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Background and objectives: Portulaca oleracea (PO) is known to be a nutritious plant with appreciable levels of plant omega (w-3) fatty acids. The purpose of this study was to access the effect of varying temperature and day length conditions on the levels of the fatty acids and oxalic acids in the leaves of three species of the PO.

Methods: Three Portulaca oleracea microspecies, P. sativa(POS) P. nitida(PON) and P. papillato-stellulata(POP) were analyzed for their fatty acid and oxalic acid profile under day and night temperatures of 34/28(A), 28/22(B), 22/16(C), 16/10(D) degree celcius and long(16hrs) and short(9hrs) day conditions. Leaves were harvest at 8-true-leave-stage for the chemical analysis.Gas chromatography (GC) was used to analyze the fatty acids while HPLC was used for the oxalic acid.

Results: Mean levels of w-6 was 11.0±5.7ug/100g, w-3 was 50.7±23.7 ug/100g dry-weight and oxalic acid 147.6±6.6ug/g fresh-weight.There was significant difference in the microspecies levels of w-6 and oxalic acid only, $p<0.05$W-6 was higher in the POS(13.8±6.10) and low inPOP(8.6±4.4). Oxalic acid was high in POP(149.2±6.2) and low in PON(145.4±7.1) Temperature significantly influenced the levels of the acids with higher temperature producing the highest acid contents ($p<0.05$). The w-6 ranged from (C=12.97±4.3 to D=7.90±8.8).W-3 from (B=62.03±7.6 to D=26.15±29.17) and oxalic acid, (D=152.27±6.6 to A=146.23±7.3). W-6 to w-3 ratio ranged from (C=0.22±0.15 to D=0.13±1.67). Only oxalic acid content showed significant differences between long day and short day ($p<0.05$). The values were LD(148.89±7.5)and SD(146.29±5.3).

Conclusions: The microspecies differed in their fatty acid (w-6) and oxalic acid contents. Temperature and day length had significant effect on these. There was significant interaction between day length, temperature and microspecies on the oxalic acid levels.The authors are grateful to Pears Foundation of England for financial support.

Key words: Portulaca oleracea; w-3, w-6 fatty acid, oxalic acid.

PO2974

ROLE OF BIO- ACTIVE YOGHURT AND FERMENTED SOBYA ON THE RESTORATION OF THE GUT BARRIER FUNCTION AND COLONIC METABOLIC ACTIVITY

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Background and objectives: Traditional fermented food commodities exert beneficial effects on public nutrition. The present study examines the effectiveness offermented sobya supplementson colonic metabolic activities.

Methods:A human trial consisting of32healthy male adolescents was designed . The subjects were divided into four groups of equal number; (1) served as control and received fermented rice milk porridge. (2), (3)(4) received daily 190 grams portion ofa fermented supplementSobya, commercially available fermentedrice based semi solid puree providing5.9 x 109and1.8 x 108;conventional yoghurtprovidingBifidobacteria andLactobacillusat3.8 x 109and6.46 x 109cfu, respectivelyorbio-active yoghurt lactel to provide respective bacterialcounts of2.8 x 108and9.7x109.Before the intervention and at the terminationof the trial, the urinary lactulose and mannitol dual test was assessedas indicator ofthe integrity ofintestinal permeability. Bacterial counts, pHvalues,hydrolytic enzyme activities and short chain fatty acidswere measured in the fecal samples.

Results: Fecal lactobacillus and Bifidobacterial counts increased significantly following the 3 week nutritional intervention with all fermented supplements.The mean fecal pH values decreased also significantly amongsubjects consuming the fermented products.The mean activities of fecal β-galactosidase, β-glucosidase and β-glucuronidasesincreased among the groupsconsuming sobya and bioactive yoghurt with variable degrees of magnitude. Fecal β-glucuronidase enzymes correlate directly with microbiome richnessand the diet composition partially explains the induction of genes expressing these enzymes.

Conclusions: Traditional fermented sobyaaffects the intestinal microbiota, These shifts had been linked to improving thecolonic barrier function. Development of traditional fermented products should be encouraged forpromoting the public nutrition of vulnerable groups.

Key words: Sobya, Feeding, Microflora, Permeability, Enzymes

PO2976

CIRSIUM SETIDENS EXTRACTS INDUCES FATTY ACID OXIDATION AND DECREASES FAT ACCUMULATION IN THE LIVER OF A HIGH-FAT DIET FED MICE

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Background and objectives: Cirsium setidens is a perennial medicinal herb that is rich in flavonoids, mostly pectolinarin. In this study, we investigated the effect of C. setidens ethanol extracts (CSE) against the development of non-alcoholic fatty liver in mice fed a high-fat diet.

Methods: C57BL/6J mice were fed either a control diet (CON) or a high-fat diet (HF) for 8 weeks, and then fed CON, HF, or HF with 100mg/kg BW CSE (HF+CSE) for additional 7 weeks.

Results: Body weight gain and adipose tissue weight of mice fed HF with CSE were significantly decreased compared to the HF group. Moreover, CSE administration markedly attenuated the lipid droplets in liver tissue and significantly decreased hepatic TG concentrations, indicating a protective effect against HF-induced fatty liver. CSE administration strongly induced the hepatic mRNA levels of carnitine palmitoyl transferase 1and medium-chain acyl dehydrogenase (MCAD), fatty acid oxidation enzymes, compared to HF group. Similar induction of MCAD mRNA by CSE was also observed in epididymal adipose tissue. Hepatic protein levels of phosphorylated-AMPK were higher in the HF+CSF group than in the HF group.

Conclusions: These results suggest that CSE decreases body weight gain and hepatic fat accumulation by up-regulating the gene expression of fatty acid oxidation enzymes.

Key words: Cirsium setidens, non-alcoholic fatty liver, fatty acid oxidation, mice

PO2977

ENHANCED WATER DISPERSIBILITY OF POORLY WATER-SOLUBLE POLYPHENOLS BY COMPLEXATION WITH CASEIN AND CASEIN HYDROLYSATE

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Background and objectives: The polyphenols curcumin and quercetin are potential chemotherapeutic agent. Curcumin and quercetin are practically insoluble in aqueous media

and poorly absorbed from the gastrointestinal tract, which results in insufficient bioavailability. The present study describes the complexation between poorly water-soluble polyphenols and casein as well as the mixture of peptides (Pep) prepared as casein hydrolysate, for enhancing the water dispersibility.

Methods: The complex was prepared by mixing an aqueous solution of containing casein or Pep with an organic solution of a polyphenol (curcumin and quercetin), followed by removal of organic solvent in vacuo and lyophilization to obtain the complex as a powder.

Results: The complexes were much more water-dispersible than polyohenol alone. The water dispersibility increased as the quantity of casein or peptide in the complex increased. The particle size of the complex in aqueous media was around 150–350 nm, which suggests that the complex is a hydrocolloidal material in aqueous media. Characterization of the complex by scanning electron microscopy, differential scanning calorimetry, and zeta potential measurement showed polyphenols were incorporated in the hydrocolloid in an amorphous state.

Conclusions: The water dispersibility of poorly water-soluble polyphenols curcumin and quercetin was improved by the complexation with casein and casein Hydrolysate. The complex between polyphenols and casein or casein hydrolysate was confirmed to be present as a hydrocolloidal material in aqueous media.

Key words:polyphenol; curcumin; quercetin; solubility; peptide

PO2978

STUDY OF ENZYMATIC HYDROLYSIS OF MICROALGAE PROTEIN ISOLATE

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Background and objectives: Recently, bioactive peptides from enzymatic hydrolysis of various food proteins have been reported; however there are few publications related to peptides from microalgae residual cake. Until now the applications of microalgae are as nutritional supplements, natural dyes, and skin care products, but there is no study reporting derived peptides of Nanochloropsis gaditana residual cake with antioxidant activity. In this work, the objective was study the Nanochloropsis gaditana protein hydrolysis as source of antioxidant peptides.

Methods: Preliminarily the influence of the various proteolytic proteases on the hydrolysis of protein isolate was evaluated using proteinase K, trypsin and papain. In this case, papain was used for the optimization study as it showed the highest hydrolysis degree and antioxidant activity in the preliminary screening. Afterwards, the enzymatic hydrolysis using papain, was optimized by factorial design, considered factors were enzyme/substrate ratio, time and temperature of hydrolysis.

Results: The F-test and p-value indicated that the effect of temperature was the most significant on the hydrolysis degree, followed by time. Besides, Pareto chart demonstrated that these factors were the only statistically significant (p-value < 0.05). Finally optimal conditions for the bioactive peptides production were found at 47.5 ºC, 90 min and enzyme/substrate ratio of 0.08 Hub/mg, under which degree of hydrolysis was 65%. Finally, these results demonstrated that Nanochloropsis gaditana protein isolate was effectively hydrolyzed by papain to produce hydrolysates with a high degree of hydrolysis, and antioxidant activity.

Conclusions: These results show that microalga protein hydrolysate could be a promising source of antioxidant peptides. Author acknowledges the financial support given by Conicyt through Conicyt scholarship Nº 21070302 and Nº 24110191, Consortium Desert Bioenergy S.A. for research and development of biofuel industry from microalgae, INNOVA Chile-CORFO 09CTEI-6860, Program "Microalgae biomass for production of bio-compounds", Dirección de Investigación at Universidad de La Frontera and DI10-2016.

Key words: microalga, protein, hydrolysis.

PO2979

IDENTIFICATION OF FRUCTANASES WITH POTENTIAL APPLICATION IN THE FRUCTOOLIGOSACCHARIDES PRODUCTION.

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Background and objectives:b2-1 fructooligosaccharides (FOS) are complex sugars and their prebiotic properties has been widely reported. b2-1 FOS may be directly synthesized from sucrose using fungal fructosyltransferases or by partial enzymatic hydrolysis from plant inulin through enzymatic hydrolysis using microbial endoinulinases.Another sources to produce FOS are the branched inulins and levans containing different proportions of b2-1 and b2-6 linkages in their structures. These are available in plants and microorganisms.Due to their complex structures, the identification and characterization of novel fructanases (endoinulinases and endolevanases)

which can perform an efficient partial hydrolysis is required. In this work, the identification of some potential fructanases from the sequences reported in database using bioinformatic tools is described.

Methods:A preselection of 200 sequences was performed from the sequences reported in GenBank with hypothetical inulinase, levanase, and hydrolase activity. In a second step, a multiple sequence analysis was developed in CLUSTALX. Sequences clustered in different clades were analyzed and their characteristics compared with the sequences whose biochemical characterization has been reported.

Results: According to their primary structure, selected sequences belong to the Glycoside Hydrolase family 32Five mayor clades were identified in the phylogenetic tree constructed from the CLUSTALX alignment. Three enzymes with proven fructanase activity (endolevanase and levanbiohydrolase) were identified in 3 different clades. So, it is possible that sequences located at each clades encode for enzymes with the same kind of activity. In a more detailed analysis of the alignments some local differences probably involved in the specificity of the enzyme were identified. Based on the differences 6 sequences were selected from the database to be tested experimentally.

Conclusions: Six hypothetical fructanases were identified from database using bioinformatic tools,which were essentials to refine the search.This work was supported by PFICA-UJAT-2012- C01.

Key words: Fructanase, prebiotics, FOS, inulinase, endolevanase.

PO2980

EFFECT OF PUERARIN ON THE INSULIN SIGNALING PATHWAY IN TYPE 2 DIABETIC RAT MODEL

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Background and objectives: £ºPuerarin, a major active isoflavone extracted from the traditional Chinese medicine Radix Puerariae, has been studied for its comprehensive biological actions. However, its effect on insulin signal transduction in diatetic rats has not been well investigated. In the present study, we explored the effect of puerarin on insulin receptor (IR), insulin receptor substrate-1 (IRS-1), Peroxisome proliferator-activated receptor-α (PPAR-α), and Nuclear factor-kB (NF-κB) in Type 2 diabetic rat model.

Methods: 48 rats with type 2 diabetes were selected and then randomly assigned to low dose of puerarin (50mg/kg), middle dose of puerarin (100mg/kg), high dose of puerarin (200mg/kg), or distilled water. Each group continued on their original diets for 5 weeks. Five weeks later, the body weight and Blood biochemical indices were carried out. The pancreatic, kidney, liver and heart tissues were stained with hemotoxylin and erosin. The expressions of InsR, IRS, PPAR-α, and NF-κB were examined by Western blot method.

Results: Compared with the diabetic control group, puerarin could reduce the levels of FBG and PBG in diabetic rats, improve the ISI, improve liver and kidney function, and had dose-response relationship ($p < 0.05$). Puerarin inhibited the expression of NF-κB in peripheral tissue (liver, muscle) and increased the expressions of IRS-2 and PPAR-α.

Conclusions: Puerarin could improve insulin signal transduction, its hypoglycemic effect might be related to raising the level of antioxidant, as well as inhibition the expression of NF-κB in inflammatory signaling pathway.

Key words: puerarin; type 2 diabetes-insulin signal transduction.

PO2981

SUPPRESSIVE EFFECT OF HYDROLYZED RICE BRAN (HRB) ON D-GALACTOSAMINE/LPS INDUCED IL-18 AND HEPATITIS BY INHIBITION OF NF-κB PATHWAY IN MICE

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Background and objectives: Hepatitis is a serious health problem worldwide associated with significant morbidity. D-Galactosamine (GalN) /LPS induces acute hepatitis in mice. Hydrolyzed rice bran (HRB) is a modified water soluble arabinoxylan from rice bran that can be obtained by partial hydrolysis with carbohydrate-hydrolyzing enzymes from shiitake mushrooms. However, the effects of HRB on GalN/LPS induced hepatitis have not yet been clarified. In this study, we investigated the effect of HRB on GalN/LPS-induced hepatitis in mice.

Methods: Male ddY mice (6-wl-old) were fed a diet containing 0, 6 or 60 mg% HRB for 1 week. On the last day, the mice were treated with GalN/LPS and 6 h later the mice were killed. The serum transaminase activities were determined by a Transaminase C-test Wako kit. Serum IL-18 concentration and hepatic IL-18 mRNA expression were analyzed by ELISA kit and real-time PCR, respectively. To determine whether the inhibitory action of HRB was due to its effect on IkBa degradation, the cytoplasmic levels of IkBa protein were measured by western blot analysis.

Results: The dose of 6 mg% HRB was found to significantly alleviate the increase of serum AST activity and IL-18 concentration in GalN/LPS-intoxicated mice. The significant increase of AST activity was found to be accompanied with the elevation of hepatic IL-18 mRNA expression and serum IL-18 concentration. Furthermore, HRB abrogated IkBa degradation induced by GalN/LPS, and this was associated with the inhibition of NF-kB activation.

Conclusions: These results showed that HRB could provide a significant protection against GalN/LPS induced hepatitis, and IL-18 and inhibition of NF-kB pathway might be involved in the protective influence of HRB.

Key words: Rice bran, Hepatitis, IL-18, Arabinoxylan, Cytokine

PO2982

DIETARY POLYPHENOLS INDUCE A SECRETION OF GUT HORMONES FROM CACO-2 CELLS

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Background and objectives: Gut hormones are produced at epithelia of intestine in the response of a food intake. These hormones control the body in several levels by regulating appetite at brain, gut motility, and also insulin secretion. Some dietary polyphenols in plants are noticed by their functionality to improve diabetes through amelioration of blood glucose level. To investigate a link between polyphenols and gut hormones secretion, we performed in vitro analysis using human epithelial intestinal cell line (Caco-2).

Methods: First, Caco-2 cells were supplemented with eight kinds of catechins and compared the secretion of gut hormones; glucagon-like peptide-1 (GLP-1), peptide YY (PYY) and cholecystokinin (CCK).

Results: Catechins constituted with gallate ester induced secretions of gut hormones, whereas simple catechins didn't. Among them, epigallocatechin gallate and gallocatechin gallate were effective to induce secretion of all the three hormones. Epicatechin gallate and catechin gallate induced secretion of CCK, but not GLP-1 nor PYY. Then we measured also the secretion of GLP-1 with the addition of cyanidin, delphinidin, kaemferol, miricetin and naringenin. Though weaker than gallocatechin gallate, delphinidin, cyanidin and kaemferol induced GLP-1 secretion by this order. Myricetin and naringenin didn't show any inducible effect on GLP-1 secretion.

Conclusions: These results suggest that flavonoids of non-planar conformation and saturated bond at 2, 3 position can induce peptide hormone secretions, thus may modify the blood glucose level.

Key words: flavonoid, gut hormone, Caco-2

PO2983

BIO-ACTIVE COMPOUNDS OF FAGONIA ARABICA IN RELATION TO THEIR PHYSIOLOGICAL FUNCTIONS

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Background and objectives: The aim of the present study was to quantify phenolic acids and flavonoids from Fagonia arabica (FA) extracts and to evaluate its antioxidant potential.

Methods: Aerial parts of FA were powdered and extracted with hexane and ethanol. Reverse phase high performance liquid chromatography method was developed and validated for the simultaneous quantification of phenolic acids and flavonoids from different FA extracts. The antioxidant activity of FA extracts was investigated by measuring total phenolics, total flavonoids contents, DPPH radical scavenging activity, inhibition of linoleic acid peroxidation and reducing power. The potent fraction of extracts was fed to Wistar Kyoto (WKY) rats, followed by carbon tetrachloride (CCl4), and the levels of superoxide dismutase (SOD), nitric oxide (NO), reduced glutathione (GSH), lipid peroxidation and total antioxidant capacity (T-AOC) were studied.

Results: The RP-HPLC analysis of FA extracts revealed the presence of ferulic acid, vanillic acid, p-coumeric acid, gallic acid, p-hydroxy benzoic acid and chlorogenic acid being the major phenolic acids and quercetin, myricetin and catechin being the most prominent flavonoids compounds. The amounts of TP (0.43-6.39 mg/g of dry plant material, measured as gallic acid equivalent) and TF (0.39-2.36 mg/g of dry plant material, measured as catechin equivalent) were higher in ethanol fraction. Ethanol fractions of FA also exhibited the highest antioxidant and DPPH radical scavenging activities. CCl4 decreased levels of GSH, SOD, NO and increased the formation of malondialdehyde (MDA) in untreated positive control animals. FA extracts increased the levels of GSH, SOD and decreased lipid peroxidation.

Conclusions: These results showed that the antioxidant and radical scavenging activities of FA may be responsible for its therapeutic effect. Owing to this property, the FA can be further extended to exploit, its application for various health benefits as nutraceutical and food additive.

Key words: Quercetin, Free radical scavenging, Functional food

PO2984

ENHANCED PRODUCTION OF TESTOSTERONE BY GERANYLGERANIOL IN MOUSE TESTIS DERIVED TUMOR CELLS

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Background and objectives: Geranylgeraniol (GGOH) is a natural isoprenoid occurring virtually in all dietary sources which possess the mevalonate pathway, including rice. However, rich sources of GGOH include Bixa orellana commonly known for its annatto food colorant which has been used abundantly in many forms of food for daily consumption. GGOH is known to show diverse effects; induction of apoptosis in tumor cells and differentiation of osteoblast cells. We previously observed that dietary supplementation of GGOH suppresses lipopolysaccharide-induced inflammation in rats (1). In this study, we examined the supplementation of GGOH on steroidogenesis in testis Leydig cell-like tumor cells.

Methods: Mouse testis-derived tumor cells, I-10, were treated with GGOH, and the levels of testosterone and progesterone in cultured medium were measured by ELISA at several time points. Protein levels of steroidogenic factors, PKA, CREB, StAR, and CYP11a, were measured by western blot. And the effect of inhibitors for PKA (H89) and adenylate cyclase (MDL12,330A) on steroidogenesis stimulation by GGOH were analyzed.

Results: GGOH treatment significantly enhanced testosterone levels in cultured medium in dose-dependent manner at 0 to 30 microM. Progesterone levels in cultured medium were also increased by GGOH treatment. Western blot analysis revealed that GGOH enhanced the level of phosphorylated PKA. The treatment of H89 abolished stimulation of steroidogenesis by GGOH.

Conclusions: These results indicated that GGOH enhances testosterone production in I-10 cells via PKA activation.(1) Giriwono PE., et al., Eur. J. Nutr., in press.

Key words: geranylgeraniol, testosterone, steroidogenesis, protein kinase A

PO2985

MECHANISTIC STUDIES OF ADVANCED GLYCATION ENDPRODUCTS INHIBITION BY DIETARY SPICY INGREDIENT CAPSAICIN

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Background and objectives: Diabetes is a life-long disease marked by elevated blood sugar levels.A significant factor associated with hyperglycemia is the resultant nonenzymatic glycation of biological proteins, with the irreversible formation of advanced glycation endproducts (AGEs).The current study was aim to evaluate the effects of capsacin, an active component of chili peppers, on AGEs formation.

Methods: Individual stage of protein glycation were evaluated using the model systems of £-gluconolactone assay (early stage), BSA-methylglyoxal assay (middle stage), and BSA-glucose assay (last stage), and G.K. peptide-ribose assay (protein crosslinking).In addition, phenyl-tert-butyl-nitron served as a spin-trapping agent, and electron spin resonance (ESR) was used to explore the possible mechanism of the inhibitory effect of capsaicin on glycation.The in vivo verification of antiglycation, antioxidant and anti-inflammatory capacities was examined by 12-weeks of capsaicin administration in streptozotocin-diabetic rats.

Results: In vitro glycation assays demonstrated that capsaicin exerted inhibitory effects on the glycation reaction and its subsequent crosslinking.Dual action mechanisms, namely antioxidant and reactive carbonyl trapping activities, may contribute to its antiglycation effect.In vivo, capsaicin reduced tissue AGEs accumulation, tail collagen crosslinking and concentrations of plasma glycated albumin.Levels of oxidative and inflammatory biomarkers were also significantly decreased in capsaicin-treated groups when compared with the diabetic group.

Conclusions: These data suggest that capsaicin supplementation may reduce the burden of AGEs in diabetics and may prevent resulting complications.

PO2986

OCCURRENCE OF FOOD-DERIVED PEPTIDES IN HUMAN PERIPHERAL BLOOD IN MICRO M LEVELS FOR FEW HOURS

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Background and objectives: It has been demonstrated that ingestion of food proteins and their enzymatic hydrolysates show beneficial effects beyond the established nutritional value. Many active peptides have been apparently identified by activity-guided fractionation. However, recent LC-MS/MS analyses have revealed very low levels of the active peptide in human blood (pM-nM). Then doubt has been casted to the suggested efficacy of food peptides. However, most of the active peptides have been identified by in vitro assays without considering bioavailability. Some peptides, which are not active in food, might be converted to active form during digestion and absorption process. Although these peptides could be absorbed into circulation system and exert biological activity in body, they have been overlooked. The objective of the present study was to identify and quantify food-derived peptides in human blood.

Methods: Peptides in human plasma were extracted with 75% ethanol and fractionated by size exclusion chromatography (SEC). The peptides in SEC fractions were derivatized with AccQ or PITC and the resultant derivatives were resolved by reversed-phase HPLC. The primary structure of the derivatives was determined by ESI-MS/MS or Edman degradation methods, respectively.

Results: Specific peptides such as Pro-Hyp, Pro-Gly, and Glu-Leu were detected in human blood 30–120 min after ingestion of enzymatic hydrolysates of collagen, elastin, and soy protein isolate, respectively. While the contents of these peptides depended on structure, they reached to micro M levels.

Conclusions: After ingestion of enzymatic hydrolysates of food proteins, some specific food-derived peptides are circulating in human peripheral blood, of which contents are extensively higher than the previous data on the "active peptides" identified by in vitro assays. The present study suggests that the food-derived peptides in human blood in higher content might be responsible for the biological activity.

Key words: peptide, bioavailability, blood.

PO2987

BIOAVAILABILITY AND METABOLISM OF (POLY) PHENOLS AFTER ACUTE CONSUMPTION OF A NOVEL ORANGE DRINK IN RATS

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Background and objectives: Phenolic compounds are secondary plant metabolites and their dietary intake is believed to be associated with beneficial health effects. A novel beverage based on fermented and pasteurized orange juice (FP-OJ) has been developed and the bioavailability and metabolism of its polyphenolic fraction has been investigated in a rat animal model.

Methods: Twenty-one Male Wistar rats were fed a single dose of 2 mL FP-OJ. Blood samples were taken at 0, 2, 6, 10, 24, 36, and 48 h and urinary samples were collected, at adequate intervals, up to 48 hours after FP-OJ ingestion. Biological samples were analyzed by means of UHPLC-MSn and all relevant metabolites have been identified and quantified.

Results: Eighteen phenolic compounds were identified in the beverage, of which 8 have been quantified. Among the 2.3 μmol of phenolics in the fed dose, the most relevant were hesperidin and ferulic acid hexoside. Five flavanone metabolites were identified in rat urine. In detail, naringenin and hesperetin metabolites in urine represented about 4.6 % and 0.5% of the total intake of naringenin and hesperetin, respectively. These metabolites reached the excretion peak within 6h after ingestion, with a complete clearance at 24h. Additionally, urinary dihydro-ferulic acid-sulfate and -glucuronide were identified for the first time, after consumption of a citrus-derived product. For these metabolites, the maximum urinary excretion was at 24h, in keeping with their generation in the colon by the resident microbiota. The calculated absorption (based on ferulic acid and hesperetin as putative precursors) was 26%. Only glucuronidated flavanones were identified in plasma samples, peaking -2h and returning to baseline levels after 24h.

Conclusions:FP-OJ flavonoids are bioavailable in rats, giving rise to a variety of metabolites that may circulate through the body for several hours after intake.

Key words: orange juice, flavonoids, bioavailability, colon microbiota, urinary excretion

PO2988

CHIA (SALVIA HISPANICA L.) FLOUR AS AN ALTERNATIVE INGREDIENT TO DEVELOP GLUTEN-FREE POTATO BREAD

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Background and objectives: Chia seed has been used as an alternative ingredient in many products, i.e., gluten-free products. Furthermore chia has high nutritional and functional value due its composition in polyunsaturated fatty acids, protein, fiber, minerals and polyphenol coumponds. This study aimed to improve the nutritional properties of potato bread stuffed with ricotta and leek by adding chia flour.

Methods: A starchy base standard formulation (SF) was prepared as a control. Two experimental formulations were developed: gluten-free potato bread with 25% of chia flour (GFP25) and gluten-free potato bread with 50% of chia flour (GFP50). All formulations was analyzed in physical-chemical, microbiological and sensory aspects. Data was analyzed by Anova and Tukey test was performed ($p < 0.05$).

Results: Both control and experimental formulations met the microbiological standards of current legislation. We observed an increase in moisture content (SF: 48.61%; GFP25: 50.27% and GFP50: 50.47%), ash (SF: 1.66%; GFP25: 2.20% and GFP50: 2.56%) and lipids (SF: 7.50%; GFP25: 9.38% and GFP50: 10.41%) as the increase in the percentage of chia flour. The sensory analysis data indicate that the products were well accepted: GFP25 formulation presented the higher acceptability index (89%) compared to SF.

Conclusions: We concluded that our potato bread with chia flour could be an option of gluten-free products, constituting an alternative food for people who need a gluten-free diet, particularly, people with celiac disease.

Key words: functional food; chia; gluten-free products; sensory acceptance.

PO2989

LINGONBERRIES RETAIN BIOACTIVITY FOLLOWING SIMULATED GASTROINTESTINAL DIGESTION AND COLONIC FERMENTATION

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Background and objectives: Lingonberry (VacciniumvitisidaeaL) is a popular edible berry in Scandinavian countries and is increasing in popularity across Europe. Lingonberry possesses a complex polyphenolic profile consisting of a mixture of anthocyanins, phenolic acids, flavonols and proanthocyanidins which is of interest due to their putative anticancer activity.After consumption, phenolic compounds are subject to digestive conditions within the gastrointestinal tract which alter theirstructures and potentially their bioactivity. Given limited bioavailability in the small intestine, a substantial portion of berry phenolic compounds are likely to pass into the colon where they are degraded by the colonic microbiota. Therefore, it is reasonable to infer that the colonic epithelium is exposed to both the parent phenolic compounds and their degradation productsAimTo evaluate the impact of digestion and colonic fermentation on phenolic components and bioactivity of a lingonberry extract (LE).

Methods: LEs were produced by in vitro digestionand subsequent faecal fermentation and characterised by LC-MS and GC-MS. Bioactivity was tested using a physiologically relevant dose range (0-50 μg/ml phenols) with a 24 hour exposure inin vitro models representing key stages in colon carcinogenesis namely initiation (comet assay, HT29, mutagenicity assayHT-29G17neo) and invasion (Matrigel invasion assay, HT115).

Results: LC-MS and GC-MS analysis confirmed digestive and fermentation processes altered the polyphenol composition relative to the original LE with the levels of simple aromatic components increased in the fermented extract.Digested and fermented LEexhibited significant anti-genotoxic ($p< 0.05$), anti-mutagenic ($p< 0.05$) andanti-invasive ($p< 0.05$), effectscompared tothe appropriate controls (ANOVA, Post Hoc Dunnett T test)in all in vitro models.

Conclusions: This studyindicates that despite extensive structural modification following digestion and fermentation,lingonberry extracts retain their ability to modulate cellular processes associated with colon cancer.

Key words: Lingonberry, phenolics, fermentation, anticancer

PO2990

APPLICATION OF THE SOLVENT EXTRACTION TECHNIQUE TO INVESTIGATION OF ANTI-INFLAMMATORY ACTIVITY OF ADLAY BRAN

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Methods: In the present study, adlay bran (AB) was extracted with ethanol (ABE) or ethyl acetate (ABEa) and the anti-inflammatory effects were monitored using a system of lipopolysaccharide-stimulated RAW 264.7 macrophages. The extracts of ABE and ABEa were further separated into four fractions, respectively.

Results: The inhibitory effect of the ethyl acetate fraction of ABE (ABE-Ea) and ABEa (ABEa-Ea) on nitric oxide (NO) production were higher than those of other fractions, and their yields were 0.91% and 1.16% (wet weight based), respectively. Then, the ABE-Ea and ABEa-Ea were sub-fractionated into 30% Ea/n-hexane, 80% Ea/n-hexane, 100% Ea, and 95% ethanol by column chromatography. With the exception of the ABE-Ea-30% Ea/n-hexane sub-fraction, other sub-fractions expressed different inhibitory effects on NO production, the expression of inducible NO synthase and cyclooxygenase-2 protein, and the secretion of interleukin-6 and tumor necrosis factor-£\.

Conclusions: In conclusion, ABE-Ea and ABEa-Ea express anti-inflammatory properties, and the yield of ABEa-Ea was higher than that of ABE-Ea.

PO2991

AN IN VITRO INVESTIGATION INTO THE POTENTIAL PREBIOTIC ACTIVITY OF PSYLLIUM HUSKS

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Background and objectives: Psyllium husks are derived from a plant known as Plantago ovata. Consumption of psyllium husks was shown to exhibit health benefits which include lowering plasma cholesterol levels and possible potential as a prebiotic ingredient. This project aimed to investigate the potential of psyllium husks as a prebiotic.

Methods: Single colony of Lactobacillus Casei and Escherichia Coli was inoculated into different nutrient mixture made up of 0.1% peptone water containing 0%, 0.10%, 0.50%, and 1.00% psyllium husks (w/v). Samples were incubated anaerobically at 37oC for 0, 2, and 5 days before plating on nutrient agars, supplemented with 1% lactose (w/v) in triplicates to observe changes in the number of colonies. A pH meter is used to measure the change in pH of the samples.

Results: Although colony counts of both Lactobacillus casei and Escherichia coli showed an increasing trend at higher concentrations of psyllium husks with longer incubation period, the increase in the number of colonies of Lactobacillus casei and Escherichia coli between day 0 and day 5 of incubation were insignificant ($p > 0.05$).

Conclusions: Our data suggested that although psyllium husks was not effective in stimulating the growth of probiotic bacteria such as Lactobacillus casei, the growth of non-probiotic bacteria such as Escherichia coli were augmented, albeit insignificantly. Therefore, psyllium husks' potential as a prebiotic ingredient could be further investigated.

Key words: Psyllium; Probiotic; Prebiotic

PO2992

EFFECT OF GARLIC ESSENTIAL OIL ON PROTEIN OXIDATION IN CHILL STORED PORK PATTIES

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Background and objectives: Taking into accounts that meat products, such as burger patties, are very susceptible to oxidation as mincing, cooking, and addition of salt promotes the formation of Reactive oxygen species (ROS), the addition of natural antioxidants as essential oil on these meat products could be an interesting strategy to improve their quality. The aim of this study was to determine the effect of garlic (G) essential oil (EO) on protein oxidation in pork burgers manufactured without synthetic additives and stored under retail display conditions.

Methods: For that purpose 3 batches of pork burgers (minced to 5 mm and 2 % salt) were prepared: the control group C; G1 (Level 1: 0.05% EO); and G2 (Level 2: 0.4% EO). The patties were packed with modified atmosphere (70%O2: 20%CO2: 10% N2) (MAP), stored for up to 9 days at 4ºC. The oxidative stability was evaluated by the formation of myosin cross-links as analysed by SDS-PAGE, and protein thiol loss as analyzed spectrophotometrically after derivatisation with DTNB.

Results: Results showed that protein thiols were lost to yield myosin cross-links in the pork patties during storage. Garlic was found to promote protein oxidation, as seen by an extreme loss in thiol groups and highly elevated myosin cross-link formation, indicating that G interacts with the thiol groups of the myofibrillar proteins, and thus increases the cross-link formation in pork patties stored in oxygen containing packages.

Conclusions: This study shows that essential oils of garlic should be tested for prooxidant activity before to be used.

Key words: protein oxidation, map, garlic, patties, meat

PO2993

UNCOMPETITIVE INHIBITION OF D-PSICOSE ON SMALL INTESTINAL SUCRASE ACTIVITY IN THE RATS

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Background and objectives: Many sugar substitutes and a-glycosidase-inhibitors are developed as new type sweeteners for the lower increases in plasma glucose after consumption of sucrose or starch. D-psicose (a C-3 epimer of D-fructose) is a rare sugar present in small quantities in commercial mixtures of D-glucose and D-fructose obtained from the hydrolysis of sucrose or isomerization of D-glucose. It has been reported that D-psicose inhibits the small intestinal sucrase and maltase activities. However, the manner of inhibition on disaccharidases is not known clearly. The studies were conducted to assess kinetically the inhibitory effects of D-psicose on intestinal hydrolases using the brush border membranes from rat small intestine.

Methods: Male Wistar adult rats were used for the experiment. The brush border membranes were prepared from the upper and middle jejunum according to the method of Kessler et al. and stored at -20 °C until assay. The assay of disaccharidase activity was carried out according to the method of Dahlqvist et al. D-psicose was added to the assay system after addition of enzyme solution, to observe the inhibitory effects on disaccharidases.

Results: In the case of sucrase activity, the reaction velocity (V) plotted against substrate concentrations showed classic Michaelis-Menten kinetics and significant inhibition with increasing amounts of D-psicose. The identification of uncompetitive inhibition was based on Lineweaver- Burk analyses, which showed parallel lines for the different inhibitor concentrations. Maximum V (Vmax) decreased to 1/2(with 10mmol/L D-psicose) and 1/3(with 20mmol/L D-psicose). The apparent Ki was calculated to about 11 mmol/L from the Lineweaver-Burke plots. In the case of isomaltase, the reaction velocity (V) showed also classic Michaelis-Menten kinetics and significant inhibition with increasing amounts of D-psicose. The apparent Ki was calculated to about 23 mmol/L.

Conclusions: These results suggest that D-psicose inhibits intestinal sucrase activity in the uncompetitive manner and also inhibits isomaltase activity.

Key words: D-psicose, sucrase, isomaltase, small intestine

PO2994

ANTIOXIDANT AND HYPOLIPIDEMIC PROPERTIES OF GREEN TEA AND EGCG IN DYSLIPIDEMIC RAT

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Background and objectives: Green tea which contain the major ofEGCGhavehigh antioxidant activity. Here, the objective is to investigate whether green tea extract and EGCG can protect from oxidative stress and have hypolipidemic activity in dyslipidemic rat.

Methods: The antioxidant activity was determined by using Superoxide Dismutase activity (SOD) and lipid peroxidation product of whole blood and lipid profile included cholesterol total, Low Density Lipoprotein (LDL), triglyceride, High Density Lipoprotein (HDL) of serum from dyslipidemic rat. Rats were given high cholesterol feedand cholic acid during ten weeks until rats suffer dyslipidemic. After rats suffered dyslipidemic, the high cholesterol feed and cholic acid were stopped and given green tean extract 450; 300; 150 mg/kg body weight daily, EGCG 15; 10; 5 mg/kg body weight daily, compared to rats were given vitamin E 60 mg/kg/BW; simvastatin2.7 mg/kg BW,probucol 30 mg/kg BW daily for 21 days (first treatment) and 42 days (second treatment), control (normal feed), positive control (dyslipidemic rat).

Results: Green tea extract and EGCG could lower cholesterol total, triglyceride, LDL MDA and increase HDL, SODwere comparable with simvastatin, probucol both for 21 days and 42 days treatment

Conclusions: Green tea extract and EGCG had antioxidant and hypolipidemic potency by in vivo assay on dyslipidemic rat.

Key words: dyslipidemic, hypolipidemic,green tea, EGCG, antioxidant,lipid profile

PO2995

MODULATING ROLE OF MORUS ALBA LEAVES ON THE GLYCEMIC INDEX AND GLYCEMIC LOAD OF SELECTED FOOD PRODUCTS - BIOACTIVE FOOD PROJECT

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Background and objectives: Morus alba L. has been used for a long time in traditional medicine in the treatments of diabetes mellitusand bacterial infection. Moreover, found in the plant the polyphenolic compounds have proven anti-radical properties, which play an essential role in preventing many civilization diseases. In the studies the glycemic index and glycemic laod of the selected bioactive food products designed in the Project and enriched with Morus alba L. was assessed.

Methods: The glycemic index (GI) is a measure of the effect of carbohydrates on blood sugar levels. The GI ofa selected food was calculated using the area under2-hours blood glucose response curse obtained after the intake food portion with 50g of carbohydrates. In the study 15 healthy volunteers with BMI < 25 kg/m2 were participated.

Results: Most of the products enriched in Morus alba L. was characterized by significantly lower GI and glycemic load (GL) in comparison to their placebo correspondents. Simultaneously, both: bioactive and placebo products can be classified as high and medium- GI and GL products.

Conclusions: The results support the correctness of bioactive component choice and its appropriate dose in the products. Disconcerting seems to be the generally high IG and GL of studied products. It seems, decision about weekly portion of bioactive food products for further controlled clinical trial has to be well thought out.Financialy supported by the UE Project nr PO IG 01.01.02.00-061/09.

Key words: Morus alba Leaves, glycemic index, glycemic load, bioactive food

PO2996

THE ESTIMATION OF ANTIOXIDANT CAPACITY IN DAILY DIETARY INTAKE OF THE PATIENTS WITH 2 TYPE DIABETES MELLITUS-PILOT STUDY

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Background and objectives: The oxidative stress in diabetes is induced by intensified glycooxidation processes, oxidant-antioxidant imbalance, and coexisting inflammation. The antioxidant food compounds, (flavonoids, polyphenols, carotenoids, anthocyans) have an impact on diabetes prevention, course of this disease and complications development mainly by capturing free radicals, prooxydation inhibition and cells protection from free radicals. The objective of this study was to assess the daily antioxidant capacity of the diet by calculating Oxygen Radical Absorbance Capacity (ORAC) in patients with 2 type of diabetes.

Methods: The study included 38 patients with diagnosed 2-type of diabetes. The ORAC of daily dietary intake was estimated using validated food frequency questionnaire (FFQ) with diversification for seasons. Dietary intake was assessed through a face-to-face interview. ORAC was calculated basing on available international databases.

Results: The average antioxidant capacity of the diet in patients with 2 type diabtes was 27605 umolTE/day. It was noticed that the antioxidant potential was significant higher in summer than in other seasons which is linked to wide availability of vegetables and fruits in seasons. Moreover percentile distribution of consumption, revealed that nearly one third of respondents characterized by a very low diet antioxidant capacity.

Conclusions: Intake of dietary antioxidants in patients with type 2 diabetes were found to be very diverse and demanding more extensive studies. Furthermore, it is suggested to increase intake of foods rich in antioxidant compounds, characterized by the low energy density.Financialy supported by the UE Project nr PO IG 01.01.02.00-061/09.

Key words: diabetes, antioxidant diet capacity, ORAC

PO2997

DIETARY SOY ISOFLAVONE DAIDZEIN LOWERED THE FOOD INTAKE, BODY WEIGHT AND BODY FAT IN FEMALE RAT WITH AND WITHOUT OVARIECTOMY

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Background and objectives: Estrogens down-regulate eating behavior. Soy isoflavones are known to be estrogenic agents. We examined the effect of dietary administration of soy isoflavones daidzein and genistein on food intake, body weight gain and body fat in male, female and ovariectomized rats.

Methods: Male, female and OVX rats were given free access to either the control dietbased on AIN-76 or diets containing 150 mg per kg diet of daidzein, genistein or both of themfor 4 weeks.

Results: Dietary daidzein, but not genistein decreased food intake, body weight and body fat of female rats with or without ovariectomy. Estradiol administration decreased these parameters of male and ovariectomized rats. Dietary isoflavone did not affect uterine and didymus weight in spite that estradiol administration improve atrophy of uterine in ovariectomized rats and decreased didymus weight of male rats.

Conclusions: We appeared daidzein has female specific food intake decreasing effect. However, contrary to the hypothesis, the food intake decreasing effect of daidzein may not be a simple estrogenic effect because the effect of daidzein on food intake and the reproductive organs differed to the effect estrogen had on these factors.

Key words: Eating behavior; isoflavone; rat; estrogenic; sex specificity

PO3000

COGNITIVE AND MOOD EFFECTS OF ACUTE SUPPLEMENTATION WITH CONCORD PURPLE GRAPEJUICE IN HEALTHY ADULTS

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Background and objectives: Flavonoids found in berry fruits have been linked with a number of health benefits.Previous studies of purple grape juice have demonstrated improvement to memory in age-associated mild cognitive impairment following at least 12 weeks supplementation, as well as increased brain activation following 16 weeks intervention. Anthocyanin-rich berry extracts have also been observed to improve sustained attention when measured acutely but no studies to date have demonstrated acute cognitive effects of grape juice specifically.

Methods: This randomised, placebo-controlled, double-blind, balanced-crossover study,assessed the effects of 200ml concord purple grape juice in 20 healthy young adults. Computerised measures of cognitionand mood were completed at baseline and following a 20-min absorption period, chosen due to a peak in native anthocyanins at ~30 minutes post-ingestion.

Results:A significant increase in calm ratings and an improvement in speed of attentionwereobserved following concord purple grape juice. There were no effects on memory.

Conclusions: This finding demonstrates that a single serve of purple grape juice is able to significantly improve speed of attention and increase calmness when measured 20 minutes following consumption. This supports a previous demonstration of improved sustained attention following berry fruit, possibly implicating this as an anthocyanin effect, which account for 46% of the polyphenolic content of the grape juice administered. However, the phenolic acids, flavanols and flavonols also present are liable to play a role in any neurocognitive effects. These improvements observed in a small sample of healthy young adults suggest thatthe behavioural effects of concord grape juice warrant further investigation to ascertain peak dose and time effects as well as exploring the active compound(s) responsible for such effects.

PO3001

CONTROLLED RELEASE OF 5-METHYLTETRAHYDROFOLATE ENCAPSULATED IN MESOPORUS SILICA SUPPORTS CAPPED WITH "SACCHARIDES" UNDER GASTROINTESTINAL STIMULUS

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Background and objectives: The purpose of this poster is to describe the development and testing of a theory-based, tailored web-delivered intervention for prevention of excessive weight gain in young adults using a community-based participatory research (CBPR) model.

Methods: Investigators from 14 universities in different states of the USA employed the PRECEDE-PROCEED process of CBPR process to identify and prioritize quality-of-life behavioral and environmental factors that influence weight gain in young adults (YA).These factors were assessed for the YEAH (Young adults Eating and Active for Health) intervention via focus groups, key informant interviews, quantitative surveys, and environmental audits, and results were used to guide the development of the intervention. YEAH was developed as a 10-week, web-based intervention with 19 interactive modules and nudges (stage-tailored messages) addressing issues highest-rated by YA:managing stress (time and sleep management,balancing relationships, and control of alcohol), improving eating behaviors (eating enjoyment, skills for choosing and assembling meals), incorporating physical activity, and managing weight with a non-diet approach.Nudges were developed to reinforce module content, cognitively tested, and sent 3 times/weekvia email.Participants were encouraged to set goals and track progress via YEAH's website. Anthropometric measurements, fruit and vegetable intake, physical activity, stress management, and sleep duration assessments occurred at baseline, post-intervention (10-weeks), and 15 months. Data were analyzed using PROC MIX, SAS.

Results:YA (n=1639, age=19.3±0.03 years,BMI=24.1±0.1, 66% female), who were non-nutrition/non-exercise science majors, were recruited and randomized, stratified by institution and gender into intervention (n=824) and control (n=815) with 58% retention through 15 months. Intervention participants had significant increases in vegetable intake, intentions for meal behaviors and decreases in percentage of energy from fat at 10-weeks.

Conclusions: Community involvement in the development and implementation of YEAH enhanced theintervention and increased the likelihood of a sustainable weight management program.This project was supported by National Research Initiative Grant 2009-55215-05460 from the USDA National Institute for Food and Agriculture.

Key words: young adult, obesity prevention

PO3002

BEHAVIOR OF ASCORBIC ACID IN OLD RATS SUPPLEMENTED WITH ASCORBIC ACID

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Background and objectives: Antioxidants are more needed to inhibit the effects of oxidative stress. L-Ascorbic Acid (AsA) known as vitamin C is a water-soluble biologically active antioxidant.AsA plays important roles as an oxidant.

Methods: Wistar male rats 10 weeks and 80 weeks old were used.Rats were intravenously given AsA (4mg/kg body weight) and blood and urine were collected over time. After 7 days of AsA supplementation, animals were dissected.

Results: The content of AsA in plasma, liver and kidneys of the 80 weeks old rats showed lower levels than that of the 10 weeks old rats. The content of Glutathione (GSH) in liver of the 80 weeks old rats showed lower levels than that of the 10 weeks old rats.At the AsA supplementation test, the concentration of AsA in plasma of the 80 weeks old rats showed lower levels than that of the 10 weeks old rats.The concentration of lipid peroxide level in the plasma of the 80 weeks old rats was higher than that of the 10 weeks old rats.L-gulono-ƒÁ-lactone oxidase (GLO) mRNA expression in the liver of the 80 weeks old rats was lower than that of the 10 weeks old rats.The level of Sodium dependent Vitamin C transporter1/2 (SVCT1/2), Glucose transporter 1 (GLUT1) mRNA expression in Liver and kidneys of the 80 weeks old rats was lower than that of the 10 weeks old rats.

Conclusions: From the results,it was suggested that the 80 weeks old rats were more susceptible to oxidative stress than the 10 weeks old. It was concluded that increasing age have effects on AsA metabolism of rats.

Key words:aging, L-Ascorbic Acid, vitamin C, supplementation

PO3003

AN INVESTIGATION INTO THE IMPACT OF PALMARIA PALMATA CONSUMPTION ON MARKERS OF INFLAMMATORY AND ANTIOXIDANT STATUS IN HEALTHY ADULTS.

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Background and objectives: A vast quantity of in vitro research proposes beneficial antioxidant, anti-inflammatory and anti-hypertensive activities of seaweed, albeit few studies have investigated these in humans. Palmaria palmata is a popular seaweed snack in Northern Europe and Canada with putative health benefits being predominately based on anecdotal and in vitro evidence. This study aimed to investigate the effect of consuming Palmaria palmata on biomarkers of human health.

Methods: A four week randomised parallel placebo controlled human intervention trial was undertaken to investigate the influence of consuming Palmaria palmata (5 g/day) enriched bread (220g/d) on markers of inflammation (C-reactive protein – immunoturbidimetric assay) and antioxidant status (using the ferric reducing antioxidant power (FRAP) assay). Selected toxicological markers were also investigated (liver, kidney and thyroid function tests). Analysis of covariance (ANCOVA) (with baseline values as co-variates) was used to assess between group differences over time (time x treatment interaction effects) with controlling for age, sex, BMI and smoking status.

Results: The consumption of Palmaria palmata enriched bread (n 16) was shown to significantly increase mean (±SD) serum CRP (P=0.007) concentration (μg/dL) relative to placebo, with a change from 207.94 (± 306.89) at baseline to 241.3 (± 196.2) post-intervention. Palmaria palmata consumption (n 16) was also shown to increase mean (±SD) serum thyroid stimulating hormone (TSH) concentration (mIU) relative to the placebo group, with a change from 2.50 (± 0.82) at baseline to 2.93 (± 1.32) post-intervention. No significant changes were noted in liver and kidney function tests or antioxidant status in either placebo or treatment.

Conclusions: The results from thid human trial showed a pro-inflammatory effect of Palmaria palmata alongside altered thyroid function with significantly elevated TSH relative to control. More research is needed to elucidate the underlying mechanisms responsible for the changes apparent in this study, their potential long-term impact on health.

PO3004

EVALUATION OF COMPOSITION CHEMICAL, CAROTENOIDS AND BETA-GLUCAN CONTENT OF JATOBA-DO-CERRADO (HYMENAEA STIGNOCARPA MART.) OF THE BRAZILIAN SAVANNA.

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Background and objectives: There are few studies about the nutritional value of the species of the savanna, considered one of the most interesting ecosystems in Brazil due to its extensive biodiversity, which leads to its underutilization. However, jatoba-do-cerrado, an abundant legume of the Brazilian savanna, may be a functional food due to its fiber content and low glycemic index. Therefore, jatoba-do-cerrado can be used to supplement foods, playing an important role in preventing chronic diseases such as diabetes. Besides that jatoba-do-cerrado stands out for serving for reforestation.The main objective of this study was to characterize this variety with a view to introducing it as a commercial raw material.

Methods: It was determined the proximate composition, amino acid profile, fatty acid profile, mineral, carotenoid antioxidants and beta-glucans content according to AOAC.

Results: The jatoba contains (g.100 g-1): moisture 12.8, proteins 7.0, lipids 1.2, insoluble fiber and soluble fiber 41.7 and 11.2, respectively, carbohydrates 23.0, ash 3.0 presenting as major minerals (mg.100 g-1): calcium 145, potassium 1352, phosphorus 107, manganese 16.78, magnesium 125, zinc 1.11 and iron 0.74The fatty acids profile showed 75.8 % of unsaturated and 24.2 % of saturated fatty acids. The amino acid profile presented some limiting amino acids, suggesting the need to combine this legume with other foods. Relative to carotenoid antioxidants, it has been found (ìg.100 g-1): lutein 279.78 and beta-carotene 16.90. And found a low content of beta-glucans (g.100 g-1) from 1.0.

Conclusions: The results point out that the jatoba has high levels of fibers, among these, however at low concentration, beta-glucans which are being studied, and important minerals, leading to a potential use in developing new products with features and benefits that promote health.

Key words: jatoba-do-cerrado, Brazilian savanna, proximate composition.

PO3005

PHYTOCHEMICAL CONTENTS, ANTIOXIDANT AND ACETYLCHOLINESTERASE INHIBITORY ACTIVITY OF PIDADA (SONNERATIA CASEOLARIS) FRUIT EXTRACT, AN EDIBLE MANGROVE FRUIT SPECIES

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Background and objectives: Plant of Sonneratia caseolaris also known locally as 'Pidada' 'Berembang', 'Perepat' or 'Mangrove Apple' among Malaysian, produced an edible mangrove fruit species which can be found on tidal mud in mangroves area. This small 'green-apple-like-shape' fruit has a sour taste and usually eaten raw or added in cooking. This study was conducted to investigate the phytochemicals content (total phenolic, total flavonoid, total athocyanins and total carotenoid content), antioxidant activity and acetylcholinesterase inhibitory activity of unripe and ripe fruit of S. caseolaris.

Methods: Different parts of S. caseolari fruit (flesh and stem cap) were extracted using 80% methanol. Phytochemical contents were determined using standard spectrophotometric analysis. Meanwhile, antioxidant activity was determined using FRAP (ferric reducing antioxidant power), DPPH free radical scavenging assays and ABTS decolourization assays.

The acetylcholinesterase inhibitory activity was determined by enzyme inhibition method.

Results: The results showed that the total phenolics, total flavonoids and total carotenoid contents were higher in the flesh part of unripe fruit of S. caseolaris as compared to the others with the values of 67.67 ± 0.10 mg (gallic acid equivalent /g), 37.06 ± 0.30 mg (rutin equivalent /g) and 5.41± 0.10 mg (beta-carotene equivalent/100 g); respectively. No anthocyanins content was detected in both unripe and ripe of S. caseolaris (stemcap and flesh).The antioxidant and acetylcholinesterase inhibitory activity of S. Caseolaris were found higher in the flesh of unripe S. caseolaris as compared to other parts.

Conclusions: S. caseolaris fruit contained an acceptable amount of phytochemicals, antioxidants and acetylcholinesterase inhibition properties. Therefore, utilization and commercialization of this fruit as natural antioxidant and acetylcholinesterase inhibition sources could offer diverse opportunity for for pharmaceutical and nutraceutical applications.

Key words: Phytochemical, antioxidant, acetylcholinesterase inhibitor, pidada

PO3006

OPTIMIZATION OF MIX CONDITION WITH PUMPKIN, CORN SILK, AND ADZUKI BEAN FOR INHIBITION OF ADIPOCYTE DIFFERENIATION IN 3T3-L1 CELL

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Background and objectives: Obesity is important public concerns and there is increasing demand for effective therapeutic strategies. Pumpkin, corn silk, and adzuki bean have been used as traditional remediesagainst obesity in Korea. Therefore, the purpose of this study was to develop functional beverage using pumpkin (P), corn silk (C), and adzuki bean (A) with anti-obesity effect.

Method: The optimum formulation for mixing ingredients was achieved using response surface methodology (RSM), using a central composite design (CCD). A CCD was applied to investigate the mixing effects of independent variables, which included the P, C, and A, on dependent variables of glycerol and Oil Red O staining. The latter variables are biomarker for predicting inhibitory effect on 3T3-L1 adipogenesis.

Results: These data obtained from the assays fitted well in the each model as the lack-of-fit statistic was non-significant ($p>0.05$). The minimum lipid droplet formation (79.9%) by Oil Red O staining was found under the following experimental conditions: P = 100.8 μg/mL, C = 4.7 μg/mL, and A = 89.2 μg/mL, respectively. The maximum glycerol content (0.18 mM) was found under the conditions: P = 82.2 μg/mL, C = 5.9 μg/mL, and A = 58.4 μg/mL. To validate the optimized formula, the activities were compared with the experimental values. The optimal formula on lipid droplet formation was lower formation thanindividually treated P (100 μg/mL), C (10 μg/mL), and A (100 μg/mL). The optimal formula on released glycerol was higher release than individually treated samples.

Conclusion: Our data demonstrate that the developed two formulas strongly inhibit the adipocyte differentiation. Furthermore, these beverages might be used as a potential complementary treatment for the obese patients.

Key words: 3T3-L1 preadipocyte, adipocyte differentiation, response surface methodology, functional beverage

PO3007

THE IMPACT OF THE NATURAL PHYTOESTROGENIC DIETOTHERAPYON SEX HORMONE METABOLISM IN MENOPAUSAL WOMEN AND RISK OF BREAST CANCER

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Background and objectives: Phytoestrogens arenon-steroidal plant-derived compoundswith strong antioxidant properties.Phytoestrogensthrough binding to estrogen receptors can induce significant estrogenic properties and play a role in alleviating thesymptoms of menopause and prevention of hormone-dependentcancers. The objective of this study was to investigate whether a diet rich in antioxidants would affect sex hormone metabolism and reduce the risk of breast cancer.

Methods: The study was conducted among 80 women in the perimenopausal period, who were characterized by an increased risk of hormone - dependent cancer. The nutritionalintervention with phytoestrogens enrichedproducts took 9 weeks. The energy, nutritive value and level of antioxidants indaily food rations were analyzed using the Wikt Pro computer program. Estrogen metabolites (2 OHE, 16-OHE1) were determined from 24-urine samples by ELISA method. The EMR index was calculated. Thetotal antioxidant capacity was measured.

Results: The nutritional intervention based on products enriched in phytoestrogens increases antioxidant capacity in human plasma (TAC). Moreover, the significant decrease of estrogen promoting the cancer (16-OHE1) and increase of the metabolite inhibiting carcinogenesis (2-OHE) were observed.

Simultaneously the studyalso indicated a significant increase of estrogen index (EMR).

Conclusions: It was concluded that the higher consumption of antioxidants, especially phytoestrogens, was correlated with higher total antioxidant capacity and a significant increase of the estrogen index which means reduction of the risk ofbreast cancer.

Key words:antioxidant capacity, phytoestrogens, hormone-dependent cancer, menopausal women

PO3383

BERRIES POLYPHENOLS: A MULTIAPPROACH TO DISCLOSE HUMAN HEALTH BENEFITS

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Berries are well recognized as polyphenols rich fruits, whose consumption bring benefits to human health. However, the significance of its dietary intake is not well known in particular in countries that doesn't have tradition of harvesting/consuming those fruits. In Portugal, a food frequency questionnaire highlighted that berries only represent 9% of fruit daily intake of Portuguese population, although assigning 17% of polyphenols daily ingested. Although being a considerable quantity of ingested polyphenols, for compounds to be effective they must be bioaccessible. Polyphenols after ingestion are extensively altered and their bioaccessible quantities limited. Then, studies that intend to clarify the beneficial effects of berry polyphenols should access those alterations and/or take them into consideration. An in vitro digestion model has been used to mimic gastrointestinal digestion, prior to test berries digested metabolites in in vitro cell models (from simple yeast to human cells). Berries tested in yeast strains ameliorate wild type response to oxidative stress and strawberry tree fruits, in particular, have the ability to rescue an oxidative-sensitive strain phenotype. A modulation of cellular defences, such as the glutathione balance, rather than a direct reactive oxygen species scavenging was verified. Similar protective mechanisms are mediated by blackberries digested metabolites in human cells submitted to oxidative stress. Those metabolites seem to exert a cytoprotective effect through the activation of preconditioning mechanisms, rather than direct antioxidant capacity. Finally, human interventions studies have also been conducted in order to determine the bioavailable metabolites from berries juice, their kinetics and range of physiological concentrations in human serum. Then, in future works bioavailable metabolites could be tested in cell models to study their mechanism of action on human body.

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Key words: berries polyphenols, in vitro digestion model, cell models, preconditioning mechanism, human intervention study.

PO3384

DEVELOPMENT OF A SWEET AND ENERGETIC BAR USING SESAME

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Background and objectives: In Mexico, the sesame production is 1.3% and is used for preparing sweets, biscuits and confectionery in general. The aim of this work was to elaborate confectionery products whose main ingredient was the sesame.

Methods: The products were: hard candy added sesame and sesame energetic bar. The materials used were sesame, sucrose, citric acid, corn syrup, glucose, gelatin, water, and additives. The sesame evaluation was made based on the norm: NMX-FF-071-1994-SCFI. Non-industrialized products for human: use, oil, and sesame (Sesamum indicum l.). The chemical composition of sesame was 16.69 g/100 g protein, 50.90 g/100 g fat, crude fiber 15.70 g/100 g, 5.01 g/100 g ash, 12.76 g/100 g carbohydrates. The evaluation was conducted sesame toasting time, effect of temperature, the effect of added water, sugar substitute, effect of citric acid, in the crystalline state.

Results: Final formulation in 100 g solid: 23.67 g water; 35.51 g sucrose; 23.67 g glucose; 20 g roasted sesame, 0.47 g citric acid. The best sesame seed was stripped of its bark, the addition of glucose to the formulation was essential and established for the production of hard candy; citric acid was added to sesame hard candy, which was added at the end and in the crystalline state. In order to develop sesame energetic bar was

recommended the presence of amaranth. In addition required the presence of a mold release agent (wax paper thin), a bonding agent (starch gels in cold) a baking process to achieve a desirable texture. The effect of the size of final products is a feature to provide single servings. Of manufactured products found greater acceptance sesame bar.

Key words: Hard candy; energetic bar; sesame; citric acid; glucose.

PO3385

EFFECT OF FEEDING OMANI HALWA ON THE GROWTH PERFORMANCE, BLOOD GLUCOSE AND PLASMA LIPID PROFILE OF SPRAGUE-DAWLEY RATS

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Background and objectives: Omani halwa is a traditional sweet delicacy. We evaluated effect of feeding different levels of Omani halwa on growth performance, blood glucose, glycated hemoglobin (HbA1c) and plasma lipid profile of Sprague-dawley (SD) rats.

Methods: Forty-two male SD-rats of 4 weeks old were randomly divided into 7 groups containing 6 rats in each. Six experimental diets (in which normal rat chow was replaced with either white or black Omani halwa at 10, 15, and 20% level) were prepared and fed for 10 weeks. The group fed on rat chow acted as control. At the end rats were euthanized by cervical dislocation and blood (plasma) collected was analyzed for various biochemical parameters. Results: No significant ($P < 0.05$) differences were observed in feed consumption and growth rate of rats fed different levels and types of halwa as compared to control. The blood glucose level in rats fed different experimental diets did not vary ($P < 0.05$) as compared to control. The HbA1c values however differed significantly ($P < 0.05$) and the rats fed diets containing 20% of halwa showed significantly ($P < 0.05$) higher HbA1c values as compared to control group. Similarly rats fed diets containing 20% of halwa showed significantly ($P < 0.05$) higher TC and HDL-C values as compared to control. No significant ($P < 0.05$) differences were however observed in TG, LDL-C, and TC/HDL-C ratio of rats fed various experimental diets. The plasma creatinine levels differed significantly ($P < 0.05$) whereas plasma albumin levels did not differ ($P > 0.05$) in rats fed various experimental diets.

Conclusion: Feeding Omani halwa at 15% level did not affect the growth, blood glucose, HbA1c levels and lipid profile of rats.

Acknowledgement: Financial assistance was provided by SQU (IG/AGR/FOOD/01/11).

Key words: Omani halwa, feeding rats, blood glucose, HbA1c, lipid profile.

PO3386

MUSHROOM PROTEIN CONCENTRATES AS A PROTEIN SOURCE OF HIGH NUTRITIONAL VALUE

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Background and objectives: Nowadays is well accepted that a diet based in vegetable proteins is healthier than one based in animal proteins. Usually industrial protein concentrates are obtained by a wet procedure, i.e, protein extraction in alkaline solution and precipitation at its pI. This procedure implies a denaturalization of protein and loss of functional properties, and the reduction of other important functional products (polyphenols, vitamins, etc.). However, obtaining of protein concentrates by dry procedures (selective screening and elutration) allows obtaining products with 40-50% native proteins retaining main of the others functional compounds. In this work we present the characterization of mushroom protein concentrates obtained from industrial mushroom (Agaricus bisporus) by-products, by a dry procedure.

Methods: Mushroom were made into flour and fractionated by a dry procedure attaining four fractions: F-I, F-II, F-III and F-IV, which were analysed (humidity, ashes, proteins, carbohydrates, lipids, aminogram, solubility, water and oil retention.

Results: Mushroom flour (18.9%) has been concentrated by a dry procedure. Fractions F-III and F-IV present a protein concentration of 45.1% and 56.7%, respectively. F-IV amino acidic composition is well equilibrated (46.36 mg AEE/100 mg protein). This product can be used for the preparation of food product or formulas. The content in AEE covers the FAO and OMS recommendations for infants (45.6 mg AEE/ 100 mg protein), pre-schoolers (32.0 mg AEE/ 100 mg protein) and adults (11.1 mg /100mg protein).

Conclusion: The main advantage of this product is that the proteins conserve their native conformations retaining, practically, all its functional properties, and it conserves other functional products (polyphenol, vitamins, fibre…) constituting a good sources for the preparation of food products or formulas for young and old peoples.

Acknowledgements: This work was supported by funds from the Spanish Ministerio de Ciencia e Innovación and EU funds (FEDER) (Project: IPT-2011-1418-060000).

Key words: Mushroom, protein, high nutritional value.

PO3387

OLIVE LEAF BIOACTIVES: EXTRACT COMPOSITION, ABSORPTION AND METABOLIC EFFECTS IN HUMANS

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Bacground and objectives: Studies of the metabolic benefits of bioactives in olive leaf (from Olea europaea L.) are confounded by research using virgin olive oil owing to the differing phenolic composition of the two sources. Objectives of the current study were: 1. To profile the bioactives in Olive Leaf Extract (OLE); 2. To examine the bioavailability of key bioactives in OLE and; 3. To determine effects of OLE on insulin-sensitivity (IS) in a population at risk of developing type two diabetes.

Methods and results: 1. Analysis of OLE phenolics revealed OL and hydroxytyrosol (HT) to be the major constituents (83.7% w/w and 12.4% w/w abundance respectively). 2.Volunteers received either encapsulated or liquid OLE as acute oral doses and plasma and urine samples collected. Conjugated metabolites of HT (sulphated and glucuronidated) were the major forms identified in plasma and urine. Peak OL concentrations were 15 – 20 fold lower than HT metabolites in plasma and greater following liquid than capsules (p=0.004). Similarly the time-to-peak conjugated HT concentration in plasma was shorter for liquid than capsules (93 vs 64 minutes; p=0.031). Conjugated HT species were the major forms identified in urine with >80% being cleared within 8hours. The data shows that OLE effectively delivers oleuropein and hydroxytyrosol metabolites to plasma in humans. 3. Effect of OLE on IS was determined using encapsulated OLE (51.1 mg oleuropein, 9.7 mg hydroxytyrosol per day) in middle-aged, overweight males using a 'gold-standard' trial design. Participants (n = 46) received capsules containing OLE or placebo for 12 weeks before washing out and crossing over to the other treatment. OLE supplementation was found to improve IS by 15% (p=0.024) and pancreatic β -cell responsiveness by 28% (p=0.013).

Conclusion: We conclude supplementation with OLE is a useful preventative treatment for those at risk of developing type 2 diabetes.

Key words: Olive leaf, oleuropein, hydroxytyrosol, insulin-sensitivity.

PO3388

TREATMENT WITH A SYNBIOTIC CONCEPT REDUCES ASTHMA-LIKE SYMPTOMS AND INDUCES REGULATORY RESPONSES IN A MURINE MODEL OF CHRONIC ALLERGIC ASTHMA

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Background and objectives: Asthma is a chronic inflammatory disease affecting over 300 million people worldwide. Despite the effectiveness of the current treatments, over 50% of asthmatics are poorly controlled. This study explores the therapeutic effects of long-term treatment with a specific combination of Bifidobacterium breve M-16V and non-digestible oligosaccharides on asthma-like symptoms in a chronic allergic asthma model. Methods: Animals were sensitized (intraperitoneally) and challenged with ovalbumin (aerosol). After the first tree aerosol challenges, mice received saline or a synbiotic concept of Bifidobacterium breve M-16V, short- and long-chain fructo-oligosaccharides and pectin-derived acidic oligosaccharides by oral gavage and were challenged with ovalbumin tree times a week for one month. Pulmonary airway inflammation, Th-specific cytokines and transcription factors in lung tissue, mast cell degranulation, airway remodeling and other parameters were examined.

Results: B. breve M-16V and non-digestible oligosaccharides suppressed the influx of pulmonary eosinophils, but not macrophages, lymphocytes and neutrophils. Reduced levels of serum mouse mast cell protease-1 indicates a reduction in mucosal mast cell. The expression ratios of T cell transcription factors in lung tissue suggest that active treatment stimulates a regulatory T-cell phenotype, which is supported by the cytokine expression profile. In addition, the Foxp3 mean fluorescence intensity in blood CD4+ T cells was increased.

Conclusion: B. breve M-16V with non-digestible oligosaccharides, administered in a therapeutic way, has strong anti-inflammatory properties and induces regulatory responses in a chronic allergic asthma model. Interestingly, oral gavage with the concept leads to modulation of immune responses in the lungs, showing immunomodulatory effects that are not limited to the gastro-intestinal tract. This concept may be beneficial in the treatment of chronic asthma and/or allergic conditions.

Key words: B. breve M-16V, non-digestible oligosaccharides, allergy, therapy, immune response asthma and/or allergic conditions.

PO3389

LEAF CONCENTRATES; LOW COST NATURAL SUPPLEMENTS TO COMBAT MICRO NUTRIENT DEFICIENCIES

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Background and objectives: The World Health organization has estimated the prevalence of clinical and sub clinical vitamin A deficiency in India is among the highest in the world. According to National Family Health Survey (NFHS), seventy three percent of Indian population suffers with anemia. Green leafy vegetables (GLV) are treasure trove of micronutrients but seasonal. Preservation of these GLV, ensures availability of nutrients round the year To preserve, develop nutrient dense leaf concentrates from seasonal GLV and to find out the appropriate dehydration method to minimize the nutrient losses.

Methods: seasonal locally available four GLV (piper betel,Murraya Koenigii,Trigonella foenum graecum, Mentha Spicata) were selected for the study, they were pretreated, blanched at 900C for 1 minute with magnesium oxide, and dried in solar cabinet driers which were with and without Ultra violet (UV) reduction filter. Time, temperature and yield of the leaf concentrate were noted. The leaf concentrates were analysed for carotene and iron content. Nutritionally dense traditional food products were developed using leaf concentrate, and organolepticaly evaluated.

Results: Carotene and iron concentration of leaf concentrates increased by 7 to 8 times in comparison with fresh green leafy vegetables. The nutrient and yield of the leaf concentrate was much higher from solar cabinet drier with UV reduction filter. The carotene content ranged from10821 - 14017µg/100g and iron content varied from 21.7mg- 88.1 mg/100gm. Statistical analysis of the organoleptic evaluation of traditional food items with leaf concentrate was excellent, (P value <0.1)

Conclusion: In developing countries multiple micronutrient deficiencies are common than single deficiency. The leaf concentrate powders can provide many micronutrients nutrients like carotene iron and others. Further research is needed to standardize dehydration technique with minimum nutrient losses and innovative ways to incorporate leaf concentrate in traditional foods.

Key words: Green leafy vegetables, leaf concentrate, micronutrient deficiency, solar driers.

PO3390

VITAMIN C FROM GUAVA CONSUMED WITH MUNGBEAN WITH MODEST NATIVE IRON INCREASES AVAILABLE IRON FOR ERYTHROPOIESIS AND HEMOGLOBIN BUT NOT IRON STORES

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Background and objectives: Consumption of modest native iron containing foods with vitamin C rich foods could be an effective strategy in improving iron status of schoolchildren. The study was aimed to assess the effect of mungbean based test meal with and without guava on iron status of rural schoolchildren

Methods: This study was conducted in Hisar district of Haryana State, North India. Mungbean based test meal i.e. mungdal and guava were analysed for energy, protein, fat, carbohydrate, iron, phytic acid, polyphenols and vitamin C. A randomized controlled, 7-mo, trial was conducted in 6–10-y-old schoolchildren (n = 200) who were randomly assigned to receive either a daily portion of mungdal alone (MB) or mungdal served with fresh guava(MBG). Average consumption amounts of mungdal and guava, height, weight, hemoglobin, soluble transferrin receptor, serum ferritin, α1-Acid glycoprotein and C-reactive protein were measured at baseline and at 7 mo.

Results: The molar ratio of iron and vitamin C served to MB group was 1:0.5 while for MBG group was 1:18. Providing guava with mungdal for 7 mo improved hemoglobin significantly by 3.7g/L (95% CIs: 1.6-5.6; P< 0.001) and reduces soluble transferrin receptors significantly by 7.6% (95% CIs: 2.1-12.7; P< 0.05) compared to mungdal alone. Though serum ferritin was improved in MBG however, this difference was not found to be significant (P= 0.34). MBG group had a non-significant change in body iron stores by 0.7 mg/kg of body weight (95% CIs: -0.3,1.6; P= 0.16), compared to MB.

Conclusion: Long term consumption of vitamin C (75g) from natural source (Guava) consumed with low iron (3.2 mg) meals reduces iron deficiency anaemia in schoolchildren. Absorbed iron is preferentially utilised to increase erythropoiesis over iron stores

Key words: Mungbean, guava, erythropoiesis, haemoglobin, children.

PO3391

AGRIMONIA PILOSA LEDEB. AQUEOUS EXTRACT IMPROVES IMPAIRED GLUCOSE TOLERANCE IN HIGH FAT FED RATS BY DECREASING HEPATIC INFLAMMATION

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Background and objectives: The purpose of this study is to investigate the effects of aqueous extract from Agrimonia pilosa on impaired glucose metabolism induced by high fat diet in rats.

Methods: Male Sprague Dawley rats were assigned to the following groups (n=10): normal fat diet (NF); high fat diet (HF); high fat diet with 0.1% A. pilosa aqueous extract (HFA). Experimental diets were fed for 16 weeks. At the end of the treatment, liver was isolated and serum was collected for biochemical analysis.

Results: HF group had significantly increased liver weight compared with NF group by inhibiting hepatic lipid accumulation ($p<0.05$), however there was a significant decrease in liver weight by supplementation of A. pilosa aqueous extract. In oral glucose tolerance test at 15 week, we observed the blood glucose levels of the HFA group were lower than those of the HF group at 30, 60, 120 min after glucose administration ($p<0.05$). In addition, dietary A. pilosa aqueous extract increased serum adiponectin concentration compared with HF group ($p<0.05$). These effects of A. pilosa aqueous extract were accompanied by reduced hepatic expression of tumor necrosis factor-α, suppressor of cytokine signaling-3, interleukin-6, and interleukin-1β ($p<0.05$).

Conclusions: These data suggest that A. pilosa aqueous extract can improve insulin resistance in high fat fed rats by decreasing hepatic inflammation.

Acknowledgements: This study was carried out with the support of the Research Program for Agricultural Science & Technology Development (Project No. PJ00883902).

Key words: Agrimonia pilosa, insulin resistance, hepatic inflammation.

PO3392

LIVE-CELL IMAGING STUDY ON ANTI-ADIPOGENIC AND APOPTOTIC EFFECTS OF A POLYPHENOLIC RESVERATROL DURING ADIPOCYTE DIFFERENTIATION

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Background and objectives: In the present study, using fluorescent live-cell imaging system, we demonstrate an apoptotic effects of resveratrol, a polyphenolic compound present in grapes and other foods, on adipocyte differentiation. We hypothesize that resveratrol inhibits adipocyte differentiation through an induction of apoptosis in early-stage cells of adipocyte conversion.

Methods: Adipocyte conversion and induction of apoptosis of 3T3-L1 cells were observed using fluorescent dyes, BODIPY and Alexa568-conjugated annexin V, respectively. Time-lapse cell imaging was performed using BioStation system (Nikon Tokyo), which consists of CO2 incubator incorporating fluorescent microscopy with CCD camera.

Results: Resveratrol treatments during differentiating stage induced apoptosis not in mature adipocytes but in early-stage cells of adipocyte conversion, which resulted in a dramatic inhibition of adipogenesis. Even in differentiated 3T3-L1 adipocytes (Day 6), mature adipocytes did not undergo apoptosis in response to 24 hr-treatments of resveratrol, whereas newly differentiating cells did. Next, we tried to elucidate anti-adipogenic effects of resveratrol in vivo, ob/ob mice were treated with resveratrol by daily oral administration (50 mg/kg B.W.). After 1-month treatment, 10% body weight loss was observed in these obese mice. Furthermore, CT scan before and after resveratrol administration showed that there were no clear regional differences in the reduction of adipose tissue mass, but abdominal subcutaneous adipose tissue seem to be reduced by these treatments.

Conclusions: These results suggest that resveratrol reduce adipose tissue mass in part through an induction of apoptosis in the early-stage cells of adipocyte differentiation.

Key words: Fluorescent live-cell imaging, apoptosis, adipocyte differentiation.

PO3393

A BIOLOGICAL SCREENING TEST TO DETERMINE THE ANTIOXIDANT POTENCIES OF WINE CONSTITUENTS

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Background and objectives: Several studies remarked the importance of consuming antioxidants-rich food in the daily diet. The beneficial effects rely on different phytochemicals, among which polyphenols. Many different methods have been reported for the in vitro study of antioxidant capacity of natural molecules. These are mainly chemical methods. Cell-based in vitro systems have also been reported. They might provide results on biological effects of molecules. We present a novel bioassay for the determination of food antioxidant potential using isolated red blood cell (RBC) membranes. The method was applied to test the protection effect of red wine samples against RBC membranes induced oxidative stress.

Methods: RBC membranes were isolated through filtration under vacuum of lysed erythrocytes. Isolated membranes were irradiated with UV-B light and malondialdehyde levels were measured as an indicator of lipid peroxidation. Red wine samples were characterized for phenolic composition and antioxidant activity by both Trolox Equivalent Antioxidant Capacity (TEAC) method and the RBC membranes bioassay.

Results: Total phenol content was estimated by Folin-Ciocalteu assay, total flavonoid and anthocyanin contents were determined by spectrophotometric methods. To classify red wine samples on the base of their chemical characteristic, principal component analysis was performed. The obtained score plot showed wines grouped in distinct clusters. Four wine samples dilutions were tested for the ability to protect isolated RBC membranes from UV-B-induced oxidation. Results showed a trend of protection, proportional to sample dilution and distinctive for each wine sample. Correlation analysis of results obtained from bioassay showed high coefficient values between antioxidant capacity and TEAC, total phenols and flavonoid levels. On the contrary, anthocyanin content seems to have no direct relation with antioxidant activity.

Conclusions: The isolated RBC membranes based bioassay represents an effective alternative to common chemical methods for determining the antioxidant potential of food matrices.

Key words: Antioxidant capacity, polyphenols, erythrocyte membranes.

PO3394

BIFIDOBACTERIUM BREVE TREATMENT IS AS EFFECTIVE AS BUDESONIDE AT REDUCING INFLAMMATION IN A MURINE MODEL OF CHRONIC ASTHMA

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Background and objectives: Asthma is estimated to affect as many as 300 million people worldwide and its incidence and prevalence are rapidly increasing throughout the world, especially in children and within developing countries. Recently, there has been a growing interest in the use of potentially beneficial bacteria for allergic diseases. This study is aimed at exploring the therapeutic effects of long-term treatment with two different beneficial bacterial strains (Bifidobacterium breve and Lactobacillus rhamnosus) and a glucocorticoid (budesonide), as a reference treatment, on inflammatory response in a murine model for chronic allergic asthma.

Methods: To mimic the chronic disease in asthmatic patients, we used the murine ovalbumin-induced asthma model combined with prolonged allergen exposure. Airway function; pulmonary airway inflammation; airway remodelling, mRNA expression of pattern recognition receptors, Th-specific cytokines and transcription factors in lung tissue; mast cell degranulation; in vitro T cell activation; and expression of Foxp3 in blood Th cells were examined.

Results: Lactobacillus rhamnosus reduced lung resistance to a similar extent as budesonide treatment in chronically asthmatic mice. Pulmonary airway inflammation, mast cell degranulation, T cell activation and airway remodelling were suppressed by all treatments. Beneficial bacteria and budesonide differentially modulated the expression of toll-like receptors (TLRs), nod-like receptors (NLRs), cytokines and T cell transcription factors. Bifidobacterium breve was the most potent inducer of regulatory T cell responses, increasing Il10 and Foxp3 transcription in lung tissue and augmenting the mean fluorescence intensity of Foxp3 in blood CD4+ T cells. These observations suggest that Bifidobacterium breve is an inducer of regulatory T cell responses in the airways as well as systemic.

Conclusion: These findings show that Bifidobacterium breve has strong anti-inflammatory properties that are comparable to budesonide and therefore may be beneficial in the treatment of chronic asthma.

Key words: Probiotics, allergy, inflammation, immunology, airway function, therapy.

PO3395

BUCKWHEAT ENRICHED BREAD PRODUCTION AND ITS NUTRITIONAL BENEFITS

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Background and objectives: Buckwheat is introduced into the diet as an alternative crop of renewed interest thanks to its nutritive and health-promoting value. Buckwheat grains and hull consist of some components with healing properties and biological activity (flavonoids, phenolic acid, phytosterols). The biological activities of flavonoids are related to their antioxidative effects.

Methods: A clinical study based on a daily consumption of 200 g of enriched bread (30 % buckwheat) was conducted on the group of 33 volunteers during a period of four weeks, after which the selected parameters in their blood were evaluated. Three intravenous blood samples were taken: before the clinical study, immediately after it and after another four-week period. The blood parameters (minerals, Mg, Fe, creatinine, urea, chloride, cholesterol, TAS, and triglyceride level) were measured by biochemical analyser.

Results: The daily consumption of buckwheat enriched bread (30 % buckwheat, 200 g bread, 3.8 g rutin) during the clinical study caused a significantly increased iron level in the blood of the volunteers and significantly decreased the triglyceride, HDL cholesterol, creatinine, calcium and magnesium level. The total cholesterol, urea and chloride levels decreased insignificantly. Data suggested that buckwheat was a significant antioxidant as TAS in human plasma and that the increased TAS level through doses of buckwheat bread could be useful as a free radical scavenger.

Conclusions: In general it can be concluded that the regular consumption of buckwheat enriched bread brings nutritional benefits to the consumers and with long-term consumption can have a protective effect thanks to the numerous nutraceutical compounds of buckwheat. Acknowledgements: The Paper was supported by the project: Development of International Cooperation for the Purpose of the Transfer and Implementation of Research and Development in Educational Programs conducted by the Operational Program: Education, ITMS code: 26110230085

Key words: Buckwheat enriched bread, antioxidants, biochemical blood parameters.

PO3396

EFFECTS OF A FERMENTED TEA MANUFACTURED BY MIXING GREEN TEA LEAVES AND UNRIPE ORANGE ON LIPID METABOLISM IN RATS

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Background and objectives: We manufactured a new fermented tea made with tea-rolling processing of green tea leaves and unripe orange. The fermented tea has good taste and good flavor. This tea extract contained a relatively high amount of hesperidin derived from unripe orange and black tea polyphenols generated from catechin in green tea leaves. In general, a water solubility of hesperidin is low, but hesperidin contained in this fermented tea has high water solubility, thus expecting high bioavailability. We examined effects of feeding the fermented tea on lipid metabolism in rats.

Methods: Third crop of green tea leaves and fresh unripe orange were mixed at a ratio of 3 to 1, kneaded with a tea roller at room temperature for 20 min, and dried by tea drier. We used freeze-dried powder of the fermented tea extract as a test sample. Male SD rats were fed a diet containing 0.5 or 0.75% sample powder for 4 weeks ad libitum. Next, the efficacy of feeding fermented tea on lipid metabolism was compared with green tea or unripe orange alone.

Results: Feeding fermented tea tended to decrease white adipose tissue weight and serum triacylglycerol concentration. This tea extract significantly and dose-dependently reduced liver triacylglycerol and cholesterol levels. Hepatic triacylglycerol-lowering activity of fermented tea was more potent than green tea and unripe orange.

Conclusions: We suggested that the new fermented tea manufactured by mixing green tea leaves and unripe orange exhibits hypotriacylglycerolemic properties through improving water-solubility of hesperidin.

Key words: Water-soluble hesperidin, unripe orange, green tea leaves, triacylglycerol, rats.

PO3397

IDENTIFICATION OF PHENOLIC COMPOUNDS BY LC-MS IN DRINKS OBTAINED BY GLUCONIC FERMENTATION FROM STRAWBERRY (FRAGARIA ANANASSA)

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Background and objectives: Strawberry is very well-known as a rich source of bioactive compounds (polyphenols, vitamins, etc.), however, it is a very perishable fruit which frequently produce surplus every season. Thus, the use of strawberry to produce new products such as fermented beverages is an industrial alternative providing an economic worthwhile solution. Gluconic fermentation is a biotechnological alternative which transforms the glucose into gluconic acid, leaving unaltered the original fructose. Furthermore, fructose remains in the product to confer sweetness and its consumption is tolerated by diabetics. The aim of this work is to determine the polyphenolic profile of this fermented product to accomplish the description of its bioactive compounds which may exert healthy effects.

Methods: The samples used were strawberry purees fermented with Gluconobacter Japonicum. A total of six gluconic (n=6) fermentation was completed giving a total of 12 fermented products (n= 6 x 2 duplicates). We analysed the polyphenolic compounds by LC-MS/MS method.

Results: A total of 22 phenolic compounds were identified including phenolic acids, hydrocycinnamic acids, procyanidins, flavanols, tannins and stilbenes. Resveratrol and polydactin (resveratrol-glucoside) were identified for the first time in strawberry gluconic fermented product. Tannins compounds such as agrimoniin, sangin H10, HHP-galloyl glucoside and monogalloyl glucoside, described in strawberry, were still present in the product after the fermentation process.

Conclusions: The final products result in a rich source of bioactive compounds, being of interest from a nutritional and commercial perspective, especially for those consumers with dietary restrictions such as diabetics, who can benefit from a non-glucose drink with healthy properties.

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Key words: Phenolic, strawberry, LC-MS/MS, fermented, gluconic.

PO3398

IMPROVEMENT OF FUNCTIONALITY OF RICE BY NEW FERMENTATION METHOD OF RED MOLD

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Background and objectives: Red mold rice is a traditional oriental food and has been used as a healthy food. It has a bioactive compound such as monacolin K, which is reducing serum cholesterol level. Red mold rice is generally produced by solid state fermentation of Monascus strain and production of monacolin K depends on the type of fermentation system and cultivation conditions. In this study, red mold rice was produced in the new solid state fermentation system, roller bottle, which is compared to the general cultivation system, upright bottle.

Methods: Roller bottle system was developed for the solid state fermentation of red mold rice, modified from drum type bioreactor. Many glass bottles were laid down and rolled on the roller system. Monascus ruber KCTC 6122 was cultured in the liquid media for 3 days, and 8% (v/w) seed was inoculated to the autoclaved rice in the bottle. The inoculated rice was incubated at 25°C for 40 days, in the upright glass bottle and roller bottle, respectively. Results: Monacolin K content in the red mold rice produced in roller bottle system was as about 1.5 fold as that of in upright bottle system. The ratio of active form was similar to each other. Coefficient of variation was much smaller in roller bottle system than in upright bottle system, which means that the rice is fermented uniformly in roller bottle system.

Conclusions: The roller bottle culture system as a new solid state fermentation system was very useful to improve the functionality of rice and could be applied to a commercial production.

Key words: Rice, monacolin K, functionality, fermentation.

PO3399

INFLUENCE OF MODERATE RED WINE CONSUMPTION IN THE PREVENTION OF CARDIOVASCULAR DISEASES AND METABOLIC SYNDROME

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Background and objectives: Epidemiological, experimental and clinical investigations have shown that diets supplemented with moderate quantities of alcoholic beverages lead to biochemical changes, that are widely regarded to prevent cardiovascular disease. Red wine contains a naturally rich sources of antioxidants which may protect the body from oxidative stress. We investigated the relationship between red wine intake and civilization diseases.

Methods: Research consisted of regular consumption of wine recommended doses according to predetermined conditions during the period of 6 weeks (7 days a week). It was attended by 11 women and 13 men aged 28-64 years. The consumption of wine has always conducted during dinner after a day abstinence. Dose of alcohol was determined to 200 ml red wine Lemberger (WINERY MASARYK, Slovakia). Consumed diet did not affect us in any way, the probands were without changing their eating habits and also without changing their lifestyle. We measured subjects blood pressure, anthropometric parameters and biochemical blood parameters.

Results: Daily intake of Lemberger during six weeks was associated with lower plasma levels of total cholesterol (5.66±1.12 vs 5.36±1.04), triglycerides (1.68±0.23 vs 1.47±0.66), LDL cholesterol (3.46±0.81 vs 3.26±0.76) and glucose (5.35±0.82 vs 5.26±0.78). On the contrary we recorded higher level of „good„ HDL cholesterol (1.42±0.63 vs 1.80±0.58). Systolic and diastolic blood pressure was also decreased.

Conclusions: Research results have shown that moderate consumption of red wine have a positive impact on changes of WHR index. Our study demonstrates a positive association between moderate wine consumption and risk of cardiovascular disease and metabolic syndrome.

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Key words: Wine, metabolic syndrom, cardiovascular disease, lipide profile, blood pressure.

PO3401

PROTECTIVE EFFECTS OF PHYTOESTROGENS LIKE DAIDZEIN AND GENISTEIN AGAINST OXIDATIVE STRESS IN THE CACO-2 COLON CARCINOMA CELLS

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Background and objectives: Colorectal cancer is one of the most common carcinomas observed in humans and it has been reported that increased oxidative stress is associated with human colorectal cancer. The objectives were to study the effects phytoestrogens such as daidzein (Dz) and genistein (Ge) on Caco-2 cell lines and the impact of exposure of these compounds on various antioxidant biomarkers were investigated.

Methods: The cells at a density of of 2 x 104 cells per well were allowed to grow initiatially for 24 hrs and then exposed to Dz (75 mM), Ge (75 mM) and to the combination of both Dz+Ge (50 mM) under controlled conditions for another 24 hrs. The effects of these compounds on oxidative stress parameters such as lipid peroxidation, catalase, superoxide dismutase, reduced glutathione and vitamin C were investigated Along with cell viability.

Results: In the unexposed cells MDA levels were significantly increased whereas other antioxidants such as reduced glutathione, catalase, superoxidxe dismutase and vitamin C were significantly decreased when compared to the exposed cells. The levels of MDA in the unexposed cells were 18.2 ± 0.165 nmol/ml where as in the cells exposed to Dz, Ge and combination of Dz and Ge were 11.26 ± 0.125, 12.56 ± 0.134 and 8.5 ± 0.186 respectively, showing a significant decrease in the levels. The glutathione, Catalase and Superoxide dismutase levels were significantly increased in the Dz, Ge and in combination when compared with unexposed cells. The results for the cell viability assay showed that viability was more in the unexposed group when compared to the groups exposed to Dz and Ge and the results were discussed in the present paper.

Conclusions: The obtained results show that combination of Daidzein and Genistein are efficient antiproliferative and antioxidant agents.

Key words: Genistein, daidzein, oxidative stress, Caco-2 cells.

PO3400

PROTECTIVE EFFECT OF PERACETYLATED EGCG VS. EGCG ON ULTRAVIOLET-B INDUCED DAMAGE OF HACAT CELLS

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(-)-Epigallocatechin-3-gallate (EGCG), known as the major ployphenol constitute in green tea catechins, possess significant photoprotective activities in cell culture, animal models and human skin. However, the active polyhydroxy structure of EGCG is responsible for the low bioavailability in physiological conditions. Peracetylated EGCG (AcEGCG), the product of molecular modification of EGCG, has shown higher biological stability and cancer-preventive activities in vivo and vitro, but it is still unclear whether AcEGCG can work as well as EGCG. Taken human keratinocyte cell line (HaCaT cells) as experiment materials in this paper, we investigated the effects of both EGCG and AcEGCG on UVB-induced reduction of cell viability and elevation of the levels of oxidative stress. Meanwhile, two administration strategies were performed including prevention mode (administrate agent before UVB exposure) and restoration mode (administrate agent after UVB exposure). Our results suggested that the adverse effects of UVB can be reversed by EGCG and AcEGCG in attenuating UVB-induced depression of cell viability and the activities of superoxide dismutase (SOD), glutathione peroxidase (GSH-Px) as well as inhibiting the production of malondialdehyde (MDA). Regarding the antioxidant effect of those two drugs in prevention mode and restoration mode, our data suggested that pretreatment of cells with agent prior to UVB irradiation was a more effective mode in comparison to another.

Key words: Peracetylated EGCG, EGCG, UVB, keratinocyte.

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T7. Food culture practices and Nutritional Education

PO3008

VITAMIN D DEFICIENCY OCCUR IN TROPICAL COUNTRY WOMEN, NOT DEPENDING ON ADIPOCYTE STATUS

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Background and objectives: Low circulating 25-hydroxyvitamin D [25(OH)D] serum may increase risk of morbidity and mortality, especially in obese women and vitamin D deficiency are considered new markers for obesity and diabetes mellitus. We investigated whether deficiency vitamin D occur in normoweight and overweight-obese women who lived in abundant sunlight exposures area such Indonesia.

Methods: This was a cross-sectional study, we include healthy normoweight women subjects (n=41) and overweight-obese women with no other disease subjects (n=41), we investigated by ethnicity, age, sunlight exposure, way of dressed, using sunscreen, whitening, and nutrient intake. We included other parameters such systolic and diastolic pressure, Body Mass Index (BMI), waist circumference, fat distribution, 25-hydroxyvitamin D, and calcium serum.

Results: There are no different between two group in ethnicity, sunlight exposure, sunscreen and whitening using, and nutrient intake, but there are significant different in systolic (p=0.0012) and diastolic pressure (p=0.019), BMI (p=0.000), waist circumference (p=0.000), and fat distribution (p=0.000) between two group. Interestingly, there are no significant different in 25-hydroxyvitamin D (p=0.140) and calcium serum (p=0.464) between two group.

Conclusions: The results indicate that vitamin D deficiency can be found in tropical countries and there is no different between non-obese and obese women, and it is important to decide the requirement for different population. Many factors can influenced the deficiency such vitamin D intake and lifestyle to not avoid sunlight exposure to much. This should be attention in preventing diabetes mellitus.

Key words: vitamin D, adipocyte status, women.

PO3009

SURVEYS ON SELLING CONDITIONS, USE AND CONSUMPTION OF CRUDE PALM OIL IN DOUALA, CAMEROON

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Background and objectives: Crude palm oil (CPO) is the richest known food in provitamin A. It is therefore very important to tackle vitamin A deficiency (VAD). However, populations do not always take precautions to maximize this potential. The objectives of this study were to identify some risk factors of carotenoids loss during the selling and the use in households of CPO and to evaluate its place in the fight against VAD in Cameroon.

Methods: We carried out three surveys in the town of Douala and its rural surroundings. The first consisted to collect information on selling conditions of CPO nearby 55 sellers. The second was made with 199 housewives in order to collect information on the use of CPO. The last carried out nearby 309 individuals and consisted in collecting information on the consumption of dishes prepared with unbleached CPO.

Results: It was noted that 87% of CPO sellers exposed oil to open air in spite that 44% knew that the sun could have a negative impact on oil quality. Light heating or exposure to sunlight was the methods used to liquefy oil. It was equally noted that 98% of household used CPO in both cold and hot made dishes. Moreover, 93% bleached oil although 64% knew its negative impact on oil quality. It was noted a significant influence (P<0.05) of social status of housewives on this result. We also noted that 87% of surveyed peoples consumed the dishes prepared with unbleached CPO with a significant influence (P<0.05) of life mode and origin Region.

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Conclusions: Sunlight and heating could be regarded as risk factors of loss of carotenoids in CPO in Cameroon. In spite of this, it could be used there to fight against VAD.

Key words: crude palm oil in Cameroon, carotenoids degradation, selling, cooking, consumption.

PO3010

CONSUMER PERCEPTION AND NUTRIENTS COMPOSITION OF SOME TRADITIONAL FOODS IN SOME AREAS IN ASHANTI REGION (KEDJETIA, ASAFO, TAFO AND MAAKRO)

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Background and objectives: Traditional foods are often regarded as rich source of nutrients. However, foods indigenous to Ghana are characterized by low patronage in favour of exotic foods. Spreading 'nutrition knowledge' is sometimes necessary to improve consumer food behaviour.

Methods: A public survey was therefore conducted in Ashanti region to investigate the level of knowledge and attitude of people on consumption pattern of traditional foods in Ghana. Three traditional foods from the Ashanti region; 'apreprensa' (main meal), 'awiesu' (snack) and 'ntunkum (drink)', were selected based on their low level of availability and were analyzed for macronutrients (carbohydrate, protein, fat, ash, fibre and moisture) and minerals; Sodium (Na), Calcium (Ca), Phosphorus (P), Potassium (K) and Magnesium (Mg) using standard methods.

Results: Generally, respondents demonstrated high level of knowledge on traditional foods but low knowledge on their nutrients composition. The average consumption rate of traditional food was low (averagely 5 out of 200 respondents consumed the foods three times per week). There was a positive correlation (r=0.35) albeit weak, between consumer knowledge and attitude towards traditional foods. Respondents' demographic profile had significant effect (P=0.018) on level of knowledge on traditional foods.Results from the survey suggested that 'nutrition knowledge' is key but not sufficient factor for changing consumers' behaviour towards traditional foods in Ghana. The nutrients composition of 'apreprensa', 'awiesu' and 'ntunkum' also indicate that they are valuable in meeting macro- and micronutrient needs of Ghanaians. 'Apreprensa' had high contents of proteins (21.86 %), fat (20.07 %), fibre (6.04 %), and moisture (44%), Na (1.17 %), Ca (1.00 %) and K (3.40 %). 'Awiesu' had the highest content of carbohydrates (33.69%). 'Ntunkum' also had highest moisture (89.97 %), Ca (1.33 %) and high K (3.31 %).

Conclusions: Findings from this study may provide a basis for developing strategies to promote consumption of traditional foods in Ghana.

Key words: traditional foods, nutrition knowledge, consumers' behaviour, consumers' attitude, consumers' knowledge.

PO3011

HOME-GROWN CLIMATIC VARIABILITY ADAPTATION STRATEGIES IN MUBENDE DISTRICT

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Farmers in Mubende compile information to predict annual variability in the timing and amount of rain, since they rely on rain-fed agriculture for food supplies and income. These farmers premise their prediction on: Longstanding familiarity with the seasonal patterns of precipitation and temperature; A set of local traditional climatic variability indicators; Observation of meteorological events and information about the progress of the seasons elsewhere in the region. These variables are examined and reflect the synergies amidst them. The social contexts in which this information is perceived is discussed, evaluated and applied. The cultural frameworks that support the use of this information are explored. This system of home-grown strategies leads farmers to act as agents as well as consumers in programs that use modern climate science to plan for and adapt to climate variability and climate change.

Key words: home-grown, climatic variability, climatic adaptation.

PO3012

FOOD ACQUISITION FORMS – BRAZIL, 2002-2009

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Background and objectives: In Brazil, rising incomes, including the rural population, expanded the purchasing power of the population. Considering the interdependence of the agricultural sectors and those related to access to food, analy-

zed the changes in the forms of food acquisition of Brazilian families in the last decade.

Methods: Descriptive study with data from the 2002-2003 and 2008-2009 Household Budget Survey on food and beverage acquisition for household consumption, conducted by the Brazilian Institute of Geography and Statistics (IBGE). The form of household food acquisition per capita annual monetary or non-monetary (produced, fished, hunted, collected or received in Exchange, donation, among others) was obtained by the IBGE Automatic Recovery System (SIDRA) according to the sector location (urban or rural area, region).

Results: In 2002, the non-monetary form of products whose acquisition corresponded to at least 10% of the total quantity acquired were: coconuts and chestnuts (44.7%); fish, eggs, milk (ranged from 23% to 29.6%) and cereals, legumes, vegetables, fruits, flours and starches, pasta, poultry, pork meat and other meat (other than beef) (ranged from 10.4% to 19.3%). In 2008, this food group was reduced to fish, legumes, eggs, milk, other meats, coconuts/chestnuts. The reduction of the contribution of the non-monetary to total foods acquired occurred more intensely in the category 'own production' and, especially, in the rural area. Exception to the vegetables, pork meat and other meat, eggs and milk, whose percentage reduction were higher in urban area.

Conclusions: The increase in monetary form of food acquisition may represent positive characteristics of the Brazilian diet, however aspects related to food and nutritional security in terms of supply and access to food should be considered, especially with the increasing levels of urbanization in the country.

Key words: food acquisition, food securiry, nutritional security, urban, rural.

PO3013

ANALYSIS OF THE ASSOCIATION BETWEEN VISUAL FATIGUE AND DIETARY PATTERNS AMONG STUDENTS OF UNIVERSITIES IN XI'AN, CHINA

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Background and objectives: To explore the association between dietary patterns and visual fatigue among students of universities in Xi'an, China.

Methods: According to the inclusion and exclusion criterions, 1 500 undergraduate and postgraduate from four universities were included in this study. The dietary intakes, life styles and symptoms of visual fatigue were accessed through questionnaires. The factor analysis and regression analysis were applied to assess associations between dietary patterns and visual fatigue.

Results: Four dietary patterns were found in the factor analysis, including "western" pattern, "plant" pattern, "high cholesterol" pattern and "prudent" pattern. "Plant" pattern (OR=0.89, 95 % CI : 0.80, 0.99) were associated with decreased risk of visual fatigue, while "high cholesterol" pattern were shown to be positively associated with visual fatigue (OR=1.12, 95 % CI: 1.01, 24). No associations were found between hypertension and other two dietary patterns.

Conclusion: Increased the dietary intakes of plant and decreased the intake of cholesterol was consistent with the decreased risk of visual fatigue for students of universities.

Key words: visual fatigue, dietary pattern, factor analysis

PO3014

INCREASING FOOD SECURITY THROUGH NATURAL RESILIENCE AND COPING STRATEGIES IN RURAL COMMUNITIES

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Background and objectives: The study explores the viability of increasing food security through natural resilience and coping strategies in rural communities.

Methods: Data was collected using semi-structured questionnaires, personal interviews and focus group discussions.

Results: Finding indicated that communities depend on the use of natural resilience and coping strategies in sustaining small hold farming which for the core source of food. Small hold farmers use adaptive available materials to survive their crops through the hash environments. They employ small scale simple technologies to control pests and diseases, sustain post harvest handling and storage systems that make them food secure. They have viable local preservation methods that they use to preserve food for future consumption and seed for next season.

Conclusions: A strong conventional extension service is needed complimented with community based lead farmers as trainers of trainers to enhance action learning to improve productivity and production.

Key words: food security, natural resilience, coping strategies, rural communities.

PO3015

PHYSICAL FITNESS AND ACADEMIC PERFORMANCE AMONG UNIVERSITY STUDENTS IN SELANGOR, MALAYSIA

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Background and objectives: Academic performance is the outcome of education. University students' achievement problems are often highlighted in academic literature and the mass media and therefore it is pertinent for educators to be aware and to study the factors related to student achievements such as health and physical fitness. This study explored the associations between health-related components of physical fitness which are consisted of morphologic fitness (body fat, BMI and waist circumference) and metabolic fitness (blood glucose, lipid profiles and hemoglobin) with academic performance.

Methods: This cross-sectional survey was conducted among 324 under graduate students whom (51.4%) were females from University Technology Mara (UiTM) Selangor, Malaysia, during 2010-2012 which were selected by systematic random sampling. The survey measured students' morphologic fitness by anthropometric measurements. A finger prick sample of blood was drawn by a trained laboratory technician to measure metabolic fitness. Students' registration numbers linked the responses of both questionnaires together, and subsequently linked the questionnaires to the university database to import the Cumulative Grade Point Average (CGPA) that students achieved.

Results: A Pearson's product-moment correlation showed that there was a weak, negative significant relationship between waist circumference and current CGPA (r=-0.120, p=0.034). Hence, there was a negative medium significant relationship between LDL-cholesterol and academic performance (r=-0.505, p=0.017). Running of Linear regression analysis (enter method) showed that entry level CGPA, household income and waist circumference contributed significantly towards academic performance (F=7.29, p<0.05).

Conclusions: It was concluded that the findings support a conceptual framework suggesting reciprocal relationships between physical fitness as a health component of physical fitness and academic achievement. Comprehensive health promotion programs may have the potential to influence relevant predictors of academic achievement in university students.

Key words: physical fitness, academic performance, university students.

PO3016

EXPLORING ENVIRONMENTAL, HEALTH AND NUTRITION IMPLICATIONS OF MEDITERRANEAN DIETARY PATTERNS

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Background and objectives: Improving nutrition is of paramount importance for effectively preventing and combating non-communicable diseases (NCDs) and achieving environmental sustainability. Dietary patterns are a significant factor in a number of critical sustainability issues such as climate change; public health; social justice; biodiversity; energy, land and water use; and food and nutrition security. This paper aims at providing an overview of the main implications of the Mediterranean food consumption patterns on nutrition, health and natural resources (water, land and biodiversity).

Methods: The work is based on an extended review of secondary data. FAO food balance sheets and standard footprint data were used to characterize the Mediterranean dietary patterns (MDPs) and to discuss water, carbon and ecological footprints of food consumption.

Results: The share of animal-based energy in the MDPs is lower than in North European and American ones. MDPs promote the use of a wide range of cereals, fruit and vegetables. About 2,300 plant species are consumed in the Mediterranean. Moreover, the use of less animal-source foods reduces the impacts of the livestock sector on biodiversity and natural resources. Adherence to the traditional MDP allows meeting better nutrient and micronutrients requirements for a healthy and active life. There is strong evidence on the beneficial effect of the MDP on death risk from obesity, type 2 diabetes, cardiovascular diseases and some cancers. The per capita ecological footprint, water footprint and carbon footprint in the Mediterranean, especially in Southern and Eastern Mediterranean countries, are lower than those recorded in North Europe and North America. Nevertheless, food consumption represents the highest share of water footprint of consumption in the Mediterranean.

Conclusions: Promotion of more sustainable diets in the Mediterranean - through increased adherence to the traditio-

nal MDP - can contribute to NCDs prevention and sustainable natural resources management.

PO3017

DIETARY ITEMS DEFINING A NORDIC DIET – AN A PRIORI INVESTIGATION IN THE EPIC COHORT

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Background and objectives: A recent study found decreasing mortality with increasing adherence to a Nordic dietary index. This suggests a preventive potential in promoting health-enhancing aspects of the Nordic diet. However, it has not been examined whether these components are exclusively related to the Nordic countries, or if they are inherent in other European diets as well, suggesting a broader preventive potential. This study's objective was to describe the intake of seven a priori defined health-beneficial food components of a Nordic diet-culture (apples/pears, berries, cabbages, dark bread, shellfish, fish, and root vegetables) across 10 countries participating in the European Prospective Investigation Into Nutrition and Cancer (EPIC).

Methods: A 24-hour diet recall was administered to 36,970 men and women, aged 35-74 years, constituting a random sample of approximately 520,000 EPIC-participants. Information on intake of the included components was collected through a standardized software programme across countries, containing country-specific foods and recipes. Crude, sex-specific mean food intake and share of overall food groups (vegetables, fruits, bread, meats) consumed as healthy Nordic food items were calculated for each centre/country. All analyses were weighted by day and season of questionnaire collection.

Results: Cabbages and berries showed the highest intake in Central European countries, apples/pears showed the highest intake in the Southern European countries, dark bread showed the highest intake in Norway, Denmark and Greece, fish showed the highest intake in Southern as well as Northern countries, shellfish showed the highest intake in Spain and root vegetables in Northern and Central European countries. However, there was large centre-variation within countries.

Conclusions: Some healthy dietary components are strongly related to a Nordic dietary tradition; especially dark (rye) bread, root vegetables and fish. Apples/pears and shellfish on the contrary shows the highest consumption in Southern Europe.

Key words: Nordic diet, Europe, food habits, health promotion.

PO3018

GREEK DIET: NUTRITIONAL COMPOSITION OF 24 CRETAN EDIBLE WILD PLANTS

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Background and objectives: Wild plants are rich sources of antioxidants and omega-3 fatty acids. Recent evidence has confirmed the importance of plant foods. It is therefore, important to investigate the nutritional composition of diets such as the Cretan diet which has been shown to be associated with a decreased rate of cardiovascular disease and cancer.

Methods: This study was carried out at the Mediterranean Agronomic institute of Chania (Crete) to analyze the nutritional composition of tender leaves of 24 wild leafy plants widely eaten in Crete. Their contents of alpha-tocopherol, total phenols, nitrates and minerals (K, Na, Ca, Mg, Fe, Cu, Mn, Zn, and P) as well as their antioxidant activity were determined using advanced analytical methods.

Results: The results showed that all the plants contained considerable amounts of antioxidants and mineral elements. Tordylium apulum contained the higher amount of a-tocopherol, 2.426 mg/100g wet weight. Rumex ssp. contained the highest amount of total phenols, 102.56±3.13 mg/100g wet weight followed by Cichorium pumilum 93.643±0.28 mg/100g. Whereas Oenothera pimpineloides was more efficient antioxidant than the rest of the plants (EC50=0.222±0.018). All analyzed wild plants contained small amounts of nitrates (8±0.002-203±0.016 mg/100g wet weight), whereas, they contained considerable amounts of minerals. Tragopogon sinuatus and Scandix pecten-veneris had the highest quantity of calcium comparing to the rest of the plants, 3120±1.2 and 2790±1.43 mg/100g dry weight respectively. Ranunculus ficarioides presented the maximum quantity of zinc, 7.01±0.82 mg/100g dry weight, while Rumex ssp. has shown the maximum level of phosphorus equal to 804±1.11 mg/100g dry weight.

Conclusions: The Cretan diet being rich in edible wild plants may be a reference standard for modern human nutrition and a model for defense against certain disease of affluenc.

Key words: wild plants, Cretan diet, polyphenols, antioxidant activity, mineral elements.

PO3019

THE MEDITERRANEAN DIET OF THE MAGHREB AND CANCER

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Background and objectives: The term 'Mediterranean diet' is very loose since geographical, political and religious limits prevent a uniform dietary pattern across the Mediterranean countries and directly influence the dietary customs and habits. Thus, defining the Mediterranean diet at a regional level may provide more information than describing a common Mediterranean food pattern. Under these constraints, we will discuss the Mediterranean diet in the Maghreb (Algeria, Libya, Morocco and Tunisia).

Methods: The composition of the diets of the Maghreb was determined in terms of absolute quantities per consumption unit per year. The source of the presented food consumption data are mostly generated nationally, but collected, analyzed and published in a standardized manner by the FAO.

Results: The Maghreb diet is characterized as being a diet particularly high in cereals since they provide more than 50% of the dietary energy and protein intake. This diet is also rich in fruits and vegetables and thus rich in vitamins, antioxidants and fiber. In addition, the diet of the Maghreb is low in total fats (they provide less than 30% of the total energy), low in saturated fats (less than 6% of the total energy) with low amounts of added fats, predominantly vegetable oils. Animal product consumption is also very low. High levels of proteins from animal products may not only injure the walls of the coronary arteries; which can start the buildup of cholesterol; they can also promote blood clots; which can be the ultimate cause of a heart attack.

Conclusions: Despite the overall changes regarding dietary patterns, the Maghreb diet could be protective against obesity, cancer and other chronic diseases.

Key words: Mediterranean diet, Maghreb, cereals, fruits, vegetables.

PO3020

FOOD PRACTICES CHANGES AND CARDIOVASCULAR DISEASE RISK FACTORS OF SAHRAOUI ETHNIC GROUP IN SOUTH OF MOROCCO

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Background and objectives: Food habit of all populations that knew a lifestyle modification, didn't escape of this change with both positive and negative health consequence. We assess lifestyle change and its related cardiovascular disease risk factors of Sahraoui population in south of Morocco.

Methods: Data were collected from two samples of regional surveys conducted in 2001 (n=249) and 2011 (n=201) and from a sample of older women (n=21) who had a nomadic lifestyle. The samples was randomly selected among adult healthy women aged 15 years and older, non pregnant.

Results: The traditional diet was based largely on dairy products and barley. Currently, several traditional foods are consumed either frequently such as soup, rice, couscous, camel meat or less frequently such as camel milk, dates and dishes from barley flour. The camel products are still appreciated whereas those of cow are not. The intake of sweet drinks is relatively high. Eating fat on meat and adding sugar to some dishes and to traditional drinks are also reported by the majority. In addition, eating from a common plate is still a very important part of this ethnic way of life and in contrast to nomadic lifestyle, urban population is implicated in many sedentary activities. Moreover, cardiovascular risks factors among sahraoui women were very prevalent and its have also increased during the last ten years. Also, between 2001-2011, there was a significant increase of percentage of women who want to lose body weight but the desire to gain weight remains very high. Obesity was negatively associated with time spent in walking and positively with some sedentary activities.

Conclusions: Changes in food consumption associated with obesity and sedentary may increase the risk for several chronic diseases, suggesting apparent needs for immediate attention in terms of prevention and health education.

Key words: food practices, Saharaoui, Morocco.

PO3021

INDIVIDUAL DIFFERENCES IN THE METABOLISM OF ISOFLAVONES AFTER SOY INGESTION IN 5 AGE-MATCHED YOUNG WOMEN

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Background and objectives: Much attention has been paid to the metabolism of isoflavones daidzein (Dein) and genistein (Gein) with regard to the prevention of several hormone-dependent diseases. It was recently reported that several glucuronic and/or sulfuric acid conjugated metabolites of Dein and Gein are also biologically active. The aim of this study was to investigate whether individual differences in the amount of biologically active metabolites in body after ingestion of kinako (baked soybean flour) to age- and sex-defined volunteers exist or not.

Methods: Ten grams of kinako was ingested to 5 healthy Japanese women aged 21 to 22 years. The quantifications of 16 isoflavone metabolites in plasma and urine obtained 0 to 48-h after ingestion of kinako were performed by LC-MS/MS.

Results: Total areas under the curves (AUC) (0-48 h) of Dein and Gein metabolites were 3.3-9.6 ƒÊmol/L and 10.1-26.0 ƒÊmol/L, respectively. Major metabolites of Dein and Gein in plasma were estrogenic active Dein-7-glucuronide-4'-sulfate and Gein-7-glucuronide-4'-sulfate, and inactive Gein-4',7-diglucuronide. The AUC values of these metabolites varied 2.8-3.6 fold among subjects. The amounts of Dein-7-sulfate to exhibit hypotensive effect widely varied among subjects (33.7 fold). The compositions of isoflavone metabolites in urine and plasma were greatly different. Approximately half of the 48-h urinary excretion of total Dein metabolites consisted of Dein-7-glucuronide. Gein-7-glucuronide was 40% of the total amount of the urinary Gein metabolites.

Conclusions: Biologically active conjugated metabolites of Dein and Gein in plasma and urine varied widely in young women of almost the same age. Individual differences in the amounts of the active metabolites of isoflavones in body fluids could be due to the dietary habits and genetic polymorphism of metabolic enzymes, leading to different biological effects (estrogenic effect, natural killer cell activation effect and hypotensive effect) after soy ingestion among individuals.

Key words: isoflavone, glucuronide, sulfate, sulfoglucuronide.

PO3022

ACCEPTABILITY OF COMPLEMENTARY FOODS WITH INDIGENOUS ANIMAL SOURCE FOODS AND CORN SOY BLEND PLUS AMONG YOUNG CHILDREN/MOTHERS IN KENYA

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Background and objectives: We assessed acceptability of two flours and porridges of complementary foods based on germinated grain amaranth and maize with or without edible termites and dagaa small fish named "Winfood Classic" (WFC) and "Winfood Lite" (WFL), respectively, compared to Corn Soy Blend Plus (CSB+) among mothers and young children in a rural setting in Western Kenya.

Methods: In a cross over design, Fifty seven (57) healthy children consumed each of the three foods on separate days with one-day washout between foods. Each food was considered acceptable if the child consumed at least 75% of the serving. Mothers too ranked the flours and the prepared porridges based on a 5-point hedonic scale with 1-dislike extremely to 5-like extremely. Morbidity data (for the past one week) based on caretakers recall was also assessed.

Results: Most mothers preferred WFL flour and porridge (63.2% and 70.2%, respectively) compared to WFC (24.4% and 10.5%) and CSB+ (12.3% and 19.3%). Children consuming at least 75% of served porridge were 43%, 19.6% and 21% for WFL, WFC and CSB+, respectively. No adverse effects were observed for all the foods throughout the study period and follow up lasting 4 weeks.

Conclusions: All foods were acceptable and can further be developed and be tested for efficacy.

Key words: amaranth grain complementary food; Dagaa fish; edible termites; acceptability; CSB+.

PO3023

SOCIOECONOMIC AND ANTHROPOMETRIC PROFILE OF RICE-BASED FARM FILIPINO HOUSEHOLDS

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Background and objectives: Farming communities remain poor and nutritionally-vulnerable in many developing countries. In the Philippines, many of the rural poor families are rice farmers. This study determined policy-relevant socioeconomic factors associated with nutritional status of rice-based farm Filipino households.

Methods: Socioeconomic characteristics and anthropometric measurements were obtained from 389 respondents of rice-based farm households (with five members per household on the average) in six provinces of Central Luzon, Philippines.

Results: Many of the rice-based household heads completed 1st to 2nd year high school and have major occupation. More than half (58%) obtain their main income from agriculture with mean farm area of 1.74 hectares (ha) of which 1.66 ha is devoted to rice farming and the remaining 0.08 ha for vegetable and fruit production. Majority (90%) of the sample respondents farm less than three ha of agricultural area and only 10% with greater than three ha. Annual income of many sampled households (81%) is at least PhP 18,981 (US$474). Based on the results of anthropometric measurements and World Health Organization standard (WHO, 1995), there is a high prevalence of acute and chronic undernutrition among children aged 0-10 years old. In terms of weight for age, height for age and weight for height, 21.9% of the children were underweight to severely underweight, 20.7% were stunted, and 17.8% were wasted, respectively. Interestingly, a considerable number of children were tall (15.8%) in terms of height for age and 8.9% were over their ideal weight for age.

Conclusions: Results from this study showed that agriculture and rice farming remain as the main source of income for rice-based farm Filipino households in rural areas. High prevalence of malnutrition remains to be a public health concern among our rice farmers and their family members.

Key words: anthropometric measurement, socioeconomic characteristics, rice-based farm households.

PO3024

BREASTFEEDING PRACTICE OF ETHNIC GROUPS IN RURAL WESTERN CHINA

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Background and objectives: Breastfeeding is an important factor for infant health, and there have been few previous studies on breastfeeding practice in the different ethnic groups in western China. We aimed to compare breastfeeding rates among four main ethnic groups (Han, Uygur, Tibet and Zhuang) living in rural western China.

Methods: The study was a cross-sectional survey conducted in 2005 in ten provinces of western China. A sample of 11783 children (8960 Han, 1281 Uygur, 792 Tibet, 750 Zhuang) less than 36 months old and their mothers were recruited by stratified multistage cluster random sampling method. Mothers were interviewed to collect information on feeding practice by a designed family questionnaire including initial time and duration of breastfeeding, etc.

Results: Exclusive breastfeeding rates under six months in four ethnic groups (Han, Uygur, Tibet and Zhuang) were 11.6%, 0.8%, 4.4% and 13.8% respectively. The continued breastfeeding rates at 2 years were 8.5%, 25.7%, 3% and 4.3% in four ethnic groups respectively. Uygur babies were least likely to be exclusive breastfed while Zhuang babies were most likely to be exclusive breastfed. Uygur babies were most likely to have a longer duration of breastfeeding than other ethnic groups.

Conclusions: Exclusive breastfeeding rates under six months and continued breastfeeding rates at 2 years were different in Han, Uygur, Tibet and Zhuang ethnic groups and they were far below that WHO recommended. Health education on feeding practice is needed in rural western China.

Key words: breastfeeding, ethnic groups, western China.

PO3025

NUTRITION TRANSITION, ADVERTISING AND MEDICALIZATION OF FOOD IN BRAZIL

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Background and objectives: The nutrition transition process in Brazil has been predominantly analyzed from theoretical frameworks in the field of Biomedicine. According to Lipovetsky, this nutrition phenomenon marks the hypermodern world of consumption, requiring other approaches from the Human Sciences. Food advertising has been considered more than just a sales agent, but a mechanism establishing influences and reconstruction of identities and consumption practices, including dietary patterns. We seek to reflect critically on the advertising discourses encountered on magazines designed to women. Such media advertises weight losses of 20 to 50 kg in a few months or weeks by means of shakes, drugs, and diets allegedly natural. Easy weigh losses are advertised in the form of inexpensive products that do not offer risks to health.

Methods: Based on Foucault, we submitted to the analysis of discourse the popular magazines "Sou Mais Eu!" and "VIVA! Mais", published in 2011, which are among the top magazines marketed in Brazil.

Results: In line with Conrad, we consider that this advertising model is part of a food medicalization process consisting of consumption patterns or codes that lead to an ideal body, strongly eroticized and from which individual problems will be solved. We also argue that according to Hall, Giddens, and Marx, the consumer society requires us to be saleable and that the arrangement comprising women's magazines covers, food and medicalization is also underlined by a reification process that tranforms people into merchandise.

Conclusions: The magazines that were analyzed operate in processes of construction of individual and collective identities in the contemporary society. Addressed as mere consumers and objects of consumption, women are socially emptied of their potential ability to take care of their own nutrition and health. Such phenomenon is part of a scenario of increasing levels of obesity in the Brazilian nutrition transition.

Key words: g. women's magazines, medicalization.

PO3026

CONSUMPTION OF CASSAVA LEAVES AND KNOWLEDGE OF THEIR NUTRITIONAL VALUE AMONG GHANAIAN FARMERS FROM THREE GEOGRAPHICAL BELTS

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Background and objectives: A problem with cassava leaves consumption is the presence of cyanogenic glycosides which release cyanide. Consumption of a cyanogenic plant is linked to iodine deficiency. However, with adequate processing, the cyanide can be reduced to safe residual levels. The study aimed at investigating the consumption and knowledge about the nutritional value of cassava leaves among Ghanaian farmers.

Methods: Nine communities, three each from southern, middle and northern Ghana were selected. The study was conducted on 100 cassava farmers from the selected communities. A pretested semi-structured questionnaire was used to collect data on cassava leaves consumption, farmers' knowledge about their nutritional value and methods for processing cassava leaves for consumption. Chi-square was used to find any significant differences in the responses from farmers among the three geographical locations.

Results: Consumption and reservations about consuming cassava leaves were significantly associated with geographical location of the respondent (p=0.001). Approximately 81.8% of those in northern Ghana consumed cassava leaves compared to 39.0% and 31.4% in middle and southern Ghana respectively. There were differences in the way cassava leaves were processed for consumption, by geographic location. In northern Ghana cassava leaves were always processed by pounding followed by boiling, while in middle and southern Ghana, the leaves were sometimes chopped followed by boiling; or just boiling without any pre-treatment. Respondents with no knowledge of the nutritional value of cassava leaves were located more in the middle (23.0%) and southern (22.7%) parts of the country, compared to 16.5% in the northern part.

Conclusions: Farmers in northern Ghana widely consume cassava leaves. They are familiar with their nutritional value and use adequate processing techniques (pounding followed by boiling) for preparing cassava leaves for consumption, compared to farmers in middle and southern Ghana.

Key words: cassava leaves, consumption, Ghana.

PO3027

ASSESSMENT OF MILK CONSUMPTION IN YOUNG ADULTS

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Background and objectives: Milk and dairy products are nutritious food items containing numerous essential nutrients, but in the last few decades, soft drink consumption has steadily increased while milk intake has decreased. Excess consumption of soft drinks and low milk intake may pose risks of several diseases such as dental caries, obesity, and osteoporosis. Identification of the independent effects of milk and or calcium intake during specific periods of life is important for efficient targeting of interventions to maximize their long-term benefit. So the present study is planned to assess the consumption of milk in these young adults.

Methods: Dietary milk intakes was taken by using food-frequency interview of 100 medical MBBS students which includes 64 female and 36 males aged between 18-25 yrs with recall of previous milk intake of last 3 month. This milk intake was taken if it is daily , weekly or monthly basis. The percentage and frequency was noted and data was analysed by using chi square tests.

Results: We found that 75% males and 68% females was taking milk of different type like milk. 51% females and 52% males consuming daily milk. 25% males and 32% female not consuming any type of milk. Remaining were consuming milk on weekly or monthly .There is no significant difference for consumption of milk between male and females ($p > 0.05$).

Conclusions: Areas that need immediate attention and future research imperatives like other dairy product consumption. Health benefits of milk should be emphasized to the student for their long term health in adulthood. And follow up with intermittent food questionnaire administration for improvement of milk consumption.

Key words: milk consumption, long term health benefits, young adults.

PO3028

DIETARY PATTERNS OF PAKISTANI ADULTS AND THEIR ASSOCIATIONS WITH SOCIODEMOGRAPHIC, ANTHROPOMETRIC AND LIFESTYLE FACTORS

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Background and objectives: Dietary pattern analysis is a technique to characterize the complexity of food among populations into meaningful representation. Our aim was to identify dietary patterns among low income urban Pakistani adults and examine their relationship with sociodemographic, anthropometric, and lifestyle factors.

Methods: Principal component factor analysis was used to identify dietary patterns in 5491 adults from the Control of Blood Pressure and Risk Attenuation (COBRA) study. Relationship between these patterns and sociodemographic, anthropometric, and lifestyle factors were assessed by analysis of variance, Chi-square, and general linear model statistics.

Results: Three major dietary patterns, fat and sweet, fruit and vegetable, and seafood and yogurt patterns, were identified with 20% variance in dietary intake. The fat and sweet pattern was characterized by food purchased from outside the home including Pakistani bread, fried snacks/foods desserts, organ meats, and bakery products. The intake of this pattern decreased among participants who were male, older and with high BMI, waist circumference, and waist-to-hip ratio. Fat and sweet pattern scores were higher in those who were single and physically more active. The fruit and vegetable pattern included fruits, juices, raw and cooked vegetables, lean meat, and low fat milk and their scores increased for non-tobacco users and educational attainment. The seafood and yogurt pattern, characterized by prawn, fish, potato, and yogurt, was associated with increased age and physical activity, and decreased waist circumference and waist-to-hip ratio.

Conclusions: Low income Pakistani urban adults have unique and culturally relevant dietary patterns that are associated with gender, age, education and some of the anthropometric and lifestyle variables. Given the nutrition transition and associated diet-related diseases in Pakistan, our results have important public health implications in developing culturally

relevant dietary and lifestyle guidelines to promote improved health and prevent diseases.

Key words: dietary patterns, factor analysis, Pakistan, lifestyle behaviors.

PO3029

TASTE PREFERENCES AND NUTRITIONAL INTAKE IN RELATION TO OBESITY PREVENTION IN THE XINJIANG DISTRICT OF CHINA

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Background and objectives: In the Xinjiang Uygur Autonomous Region in northwestern China, remarkable increases in urbanization and motorization have led to the emergence of a number of lifestyle-related diseases, including obesity. This study aims to determine the roles that taste preferences and nutritional intake play in relation to obesity, and to develop strategies based on these findings that will promote improvements in eating habits and obesity prevention.

Methods: Typical foods were collected from the cities of Urumqi and Turpan in August, 2012. They were then analyzed using a taste sensor. Both the initial taste (the taste experienced immediately after food enters the mouth) and aftertaste (the taste which remains after the food has been swallowed) of the five basic tastes (umami, bitter, salty, sour, sweet), as well as astringency, were evaluated and assigned numerical scores. In addition, nutrition intake were calculated after food composition analysis.

Results: The traditional noodles of the region have a relatively plain and natural taste compared to Japanese noodles. Their sodium and sugar contents (0.8% and 5%, respectively) also differed from those in Japanese noodles (1.1% and 6.5%, respectively). Uygur grapes had higher sugar content and were less sour than Japanese grapes. Daily food and energy intake measurements were 2270 grams and 4800 calories, respectively, with an energy ratio of 53:35:12 for carbohydrate, fat, and protein, respectively. Average daily energy intake at breakfast, lunch, dinner and between-meals was calculated as 16%, 34%, 38% and 12%, respectively.

Conclusions: Based on these results, the following points should be considered important for obesity prevention: (1) reducing the quantity of food consumed; (2) reducing eating speed; (3) changing order to eat; (4) reducing fat intake; (5) consuming more vegetables; and (6) adding some seasonings attracting attention to taste.

Key words: Uygur, food taste, taste sensor, nutritional intake, obesity prevention.

PO3030

KNOWLEDGE AND ATTITUDES OF DIETITIANS CONCERNING SEAFOOD CONSUMPTION AND COMMON PROCESSING/ PRESERVATION TECHNOLOGIES

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Background and objectives: This survey was carried out to measure well-educated (bachelor-degree) consumers' attitudes and knowledge regarding seafood consumption and common processing and preservation technologies. The goal was to compare knowledge level of the respondents, educated in nutrition science, to the other bachelor-degree respondents. Eighty-five of the respondents were educated in nutrition science (dietitians) and 221 in other sciences (non-dietitians).

Methods: First of all the data was organized and visualized for each variable. Then descriptive statistics and frequencies were computed. Finally to see the relationship among the variables Chi-square independance tests were made. NCSS statistical software was used for the analysis.

Results: It was seen that opinions of the respondents were generally dependent of being a dietitian ($p<0.05$). Dietitians were generally against or not recommending the consumption of mussels, crustaceans, lakerda, salted and smoked seafood and kitosan, while non- dietitians more prone to their consumption. On the other hand, dietitians had a positive approach to the technological products such as canned and frozen seafood, fish oil, surimi, sous vide and MAP packed seafood, spirulina, and aquaculture fish, while they were not supported by the non- dietitians.

Conclusions: It was seen that, most of the processed seafood products are not known by the respondents. Receiving high percentages of the answer "I do not know what it is" from the dietitians was also remarkable, indicating their lack of knowledge. These results validate the importance of education on various seafood products and common processing /preservation technologies to create more informed dietitians.

Key words: dietitian, seafood, attitudes, fish, survey.

PO3031

TACKLING MALNUTRITION BY IMPROVING ECONOMICAL SKILLS AND NUTRITIONAL AWARENESS OF "PORRIDGE MUMS": RESULTS AND LESSONS LEARNT FROM GUINEA-CONAKRY

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Background and objectives: In response to worrying malnutrition rates (20,8% underweight), ACF-Spain and its partners supported women (aka 'porridge mums') producing and selling locally-made nutritious foods (mostly based on rice, corn, millet) in urban communities of Guinea-Conakry. Main objectives were to increase incomes and enhance porridge mums' role in the prevention of malnutrition through community-based activities.

Methods: This 18-month program targeted 300 women within two of the most food insecure districts of the capital city. Activities included trainings on nutrition education, technical and entrepreneurial skills, processing and preservation of local products. Regular monitoring was conducted to measure the effects of activities on beneficiaries and achievement of project objectives.

Results: The socio-economic impact on families of beneficiaries is positive. An increase in number of clients and income (44%) was noticed for most women, based on acquired knowledge and equipment provided by the project. Extra income was largely spent to meet basic needs of families, with women contributing 56% of household income. Balance of macronutrients within the porridge recipe has improved ; introduction of food safety measures were clearly observed for 91% of women. However, the nutritional effects have been limited to the family circle of beneficiaries (improved diet for 87% of them) and have not extended to their clients, mostly due to their reluctance to increase the selling price of an enriched porridge.

Conclusions: The project evaluation suggested that food-based income generating activities could be a good strategy to prevent malnutrition for categories of mothers with children more inclined to suffer malnutrition. Links should be reinforced between porridge mums and producers of affordable nutritional supplement of micronutrients such as Moringa oleifera. Finally, including local health structures and targeting Community Health Workers could complement a sustainable model of funding nutritional screening and sensitization activities.

Key words: nutrition, education, income, porridge, Conakry.

PO3032

TRADITIONAL SOLUTIONS FOR HIGH LEVELS OF CHILDHOOD ANAEMIA IN THE PERUVIAN ANDES

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Background and objectives: Recent surveys show that up to 75% of children under three suffer from anaemia in the rural Peruvian Andes. The research area, Huanta, Ayacucho, is largely Quechua-speaking, and some villages are several hours walk from market and health services. 46% of Quechua speaking children live in extreme poverty, compared with 12% of Spanish speaking children. Government multi-micronutrients have low take up rates due to cultural factors. This study aimed to identify traditional practices with implications for the availability of iron in the diet.

Methods: 16 families with children under three years of age in four locations of varying altitude and market access participated in a one-year anthropological study.

Results: This study unearthed the almost-forgotten tradition of blood "charqui" - boiling and drying of animal blood for later consumption. Although blood charqui is no longer practiced, preparing blood-based dishes (fried blood, blood sausage) is culturally acceptable, and drinking blood is recognized by the elderly as a cure for weakness. However, in the last generation blood has begun to be treated as waste and fed to dogs. Although rural families believe that home-grown food is best for health, urban practices are replacing local food culture, a process linked to cultural discrimination faced by rural indigenous people, often expressed through authority figures such as health professionals.

Conclusions: Blood charqui is a low-cost, iron-rich food and is does not require complicated techniques, especially for families accustomed to drying meat (a tradition still common in the Andes). Blood charqui can be stored and cooked especially for toddlers (while dried meat is quickly consumed by family members as a snack). As well as helping to reduce anaemia, including blood charqui in Health Services programs can help breach the cultural gap between State services and rural users.

Key words: anaemia, blood drying, Andes, culture.

PO3033

MIGRATION AND GENDER ROLES IN RELATION TO HIGH LEVELS OF CHILDHOOD ANAEMIA IN THE PERUVIAN ANDES

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Background and objectives: Surveys show that 75% of children under three suffer from anaemia in the rural Peruvian Andes. Government multi-micronutrients have low take up rates due to cultural factors. This study aimed to identify social relations and traditional practices with implications for the availability of iron in the diet.

Methods: A one-year anthropological study and hemoglobin tests were carried out with mothers and fathers of 16 children under three (one child per family) in four locations of varying altitude and market access.

Results: It was found that children with fathers who are absent (economic migration several months a year) or uninvolved were more likely to suffer from anaemia. Of 16 families, 5 fathers migrate, 2 are single mothers and 2 fathers are present but uninvolved in childcare. The 5 children whose fathers migrate all have anaemia, compared to 3 of the 9 children (33%) of non-migrants. Migration of fathers leads to higher workload for women and less decision-making capacity (mother in law controls work, meals and shopping). Mothers perceive children to be healthier when the father is home. If children of single mothers and uninvolved fathers are included along with those of migrants (for a total of 9 children), it was found that 7 of 9 (78%) are anaemic. In contrast, of the remaining 7 children (those with present and involved fathers), 4 suffered from anemia in the first hemoglobin test and 2 (22%) in the second (two recovered in the course of the study, perhaps as a result of learning of the threat of anaemia).

Conclusions: Women's agricultural workload makes it difficult to meet feeding needs of children. Children of migrating fathers appear to be a special risk group. Present and involved fathers enable mothers to react to children's' health problems.

Key words: anaemia, women´s role, migration, Andes.

PO3034

CULTURAL FACTORS RELEVANT FOR THE FIGHT AGAINST CHILD MALNUTRITION IN THE PERUVIAN ANDES

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Background and objectives: Chronic child malnutrition is 40% in rural Ayacucho in the Peruvian Andes. In order to contribute to government health programs to reduce child malnutrition, a study was carried out to examine underlying cultural factors of the Quechua-speaking rural population relevant for fight against malnutrition.

Methods: A team of five researchers carried out anthropological research in 4 villages in rural Ayacucho for 2 weeks a month for 6 months and regularly visited nearby Health Centres. Techniques included participant observation, interviews, discussion groups and surveys.

Results: Infant care practices that have been described as negligent are in fact related to detailed traditional knowledge. Rather than a lack of care or investment, researchers found that care practices evolved for the specific Andean way of life are not visible to outsiders. Some health professionals express that rural mothers have a reduced capacity to understand recommendations, are not interested, or do not love their children. In fact, mothers can distinguish between numerous types of diarrhea, or detect severity of fevers, for example, in order to choose medical or traditional remedies, combining both types of knowledge. They remember nutrition messages and request more information. However economic constraints and a heavy agricultural workload prevent families from putting recommendations into practice. Mothers describe a problematic relationship with healthcare providers: they feel that neither they nor their beliefs are respected and fear being insulted. Long waits that do not always result in attention, verbal abuse and a lack of provision of clear information have been observed.

Conclusions: Adapting nutrition advice to the local context and culture (seasons, resources, traditional norms) is likely to result in better uptake. However, it is most important to reduce discrimination in social relations so that families are motivated to make use of state services.

Key words: malnutrition, discrimination, healthcare, culture, Andes.

PO3035

DETERMINANTS OF MALNUTRITION AMONG WOMEN OF REPRODUCTIVE AGE IN URBAN POOR AREAS (INDIA)

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Background and objectives: Worldwide around 2.5 million of children under 5 directly or indirectly die from malnutrition every year. While mother malnutrition is widely recognized as a main determinant of child malnutrition, its own causes have only be partially explored. Among 95 million of India urban poor, as high as 59% of women of reproductive age are anemic and 39% are underweight. In a population where farming opportunities are scarce and food accessibility essentially relies on market supplies, the present study aims at unveiling a comprehensive view of woman malnutrition determinants.

Methods: The sample of 2,096 women of reproductive age was drawn from the latest India National Family Health Survey (NFHS-3, 2005-2006) by selecting women living in urban poor households and not currently or recently pregnant. Multivariate binary regression was subsequently run on woman underweight and woman anemic status.

Results: Young age, lack of contraceptive pill usage, low meat consumption and lack of iodized salt usage contribute to woman underweight status (OR=1.7; 1.7; 1.4; 1.3). Lack of contraceptive pill usage, unmarried status, a recent birth, and lack of iodized salt usage constitute as many risk factors for woman anemic status (OR=2.5; 1.7; 1.6; 1.3).

Conclusions: Among urban poor, extra attention should be brought to the nutritional status of younger women - even the ones not bearing a child yet -, prevalence of contraceptive pill usage should be extended beyond the current 5%, and basics on nutrition should be broadly taught.

Key words: women, malnutrition, urban poor, underweight, anemic.

PO3036

DIETARY HABITS AND NUTRITIONAL CHANGES OF IMMIGRANTS IN THE REGION OF MURCIA

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Background and objectives: To describe the main characteristics of dietary habits and nutritional changes of immigrants in the Region of Murcia (Spain) regarding their countries of origin.

Methods: A cross-sectional study based on nutritional education courses to immigrants of different associations in the Region of Murcia was carried out. 419 immigrants older than 18 years that live in the Region of Murcia were interviewed. Dietary habits questions and measures of height, weight, % body fat (%BF), body mass index (BMI), blood pressure (BP) and pulsations were collected. Statistical analysis was performed using SPSS 17.0 software.

Results: Age 32±10 years, 70% female. 82% live in Spain for more than two years, being the place of origin: Africa (36%), South America (44%), Eastern Europe (7%) and other (13%). Smokers (20%), alcohol intake (55%), BMI: 26.4±6.2 Kg/m2, %BF: 31±9 %, BPmax: 12.1±1.6 mmHg, BPmin: 8.1±6,5 mmHg and pulse: 72±12 ppm. 56% of the participants have gained weight from living in Murcia, 28% of these immigrants have introduced changes in the type of food consumed (significant increase in the consumption of meat, fish and legumes, and a significant decrease in the consumption of cereals), 30% have changed the meal times, 11% have increased the number of meals per day and 15% have changed the cooking way. 63% of these immigrants use boiling as first culinary technique, 8% roast, 10% frying and 7% grill. 44% of volunteers use olive oil, 42% oil seeds (sunflower or corn), 2% pomace oil and 3% other oils (sesame and soy). 8% of immigrants claim to consume mineral-vitamin supplements, 5% energy supplements, 9% other (laxatives, slimming...) and 78% do not use dietary supplements. 48% of participants drink less than 1 liter of water per day.

Conclusions: It is necessary a complete nutritional education to immigrants that come to Spain.

Key words: Immigrants, dietary habits, nutritional changes.

PO3037

DIETS2: EUROPEAN DIETETIC ADVANCED COMPETENCES- EDAC 2012

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Background and objectives: DIETS2 (Dietitians ensuring education, teaching and professional quality) is an EU Thematic Network bring together an active network of dietetic (and nutrition) associations and higher education institutions. The intention is to improve European nutritional health through education and practice. 'Health 2020' (WHO, 2012) calls for a new working culture fostering cooperation across Europe

to enhance healthcare necessitating a great emphasis on lifelong learning for health professionals. Advanced competence standards for dietitians, which describe the higher levels of knowledge and complex responsibilities required, have now been developed.

Methods: Invitation to access an on-line questionnaire (Lime-survey) was sent out via European Federation of Associations of Dietitians (EFAD) and DIETS2 partners in 2011. The questionnaire collected information on demographics, working environments and identified second and third cycle dietetic competences.

Results: 2030 dietitians from 35 countries over a range of occupational fields; Clinical (66%), Public Health (35%), Administrative (30%), Higher Education Teaching (20%) and Research (18%) responded. Competences identified for working at advanced level were Advanced Knowledge and Understanding of Dietetics; Dietetic Process and Professional Reasoning; Professional Relationships; Professional Autonomy and Accountability; Educator Skills; Research and Development in Dietetics and its Science; Leadership and Management of Professional Dietetics; Entrepreneurial Skills and Business Development of Dietetics. The identified advanced competences (EDAC, 2012) and their performance indicators are now accepted by EFAD for Pan-European application and form the basis for Lifelong Learning for dietitians post qualification.

Conclusions: The EDAC Framework represents the first definition of the competences required by nutrition and dietetic professionals to meet the Health 2020 agenda and provides a benchmark against which health professionals and their clients can judge their competence.

Key words: advanced competences, dietitians, lifelong learning, WHO.

PO3038

EATING HABITS OF A REMNANT QUILOMBO COMMUNITY IN A MUNICIPALITY OF BRAZILIAN NORTHEAST AFTER IMPLEMENTATION OF CONDITIONAL CASH TRANSFER PROGRAM (BOLSA FAMILIA PROGRAM)

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Background and objectives: Quilombo communities are social groups descended from fugitive black slaves, who escaped from captive conditions. These individuals formed traditional communities that have a peculiar way of survival, aiming environmental sustainability and preservation of their cultural identity. This study aimed toidentify the eating habits of a remnant black quilombo community at the state of Sergipe, Brazilian Northeast , after the implementation of Bolsa Familia Program.

Methods: Cross-sectional study with 68 families living in the community of Rua da Palha, Sergipe. A food frequency questionnaire about some food groups was applied to identify their eating habits and changes in diet. It was also asked if they are or not benefited from Bolsa Família project. The beneficiaries were asked about possible changes in diet after the implementation of the government program. Descriptive statistics were used to characterize the population.

Results: It was observed that the main foods daily consumed by the population studied were: rice, beans, bread, and the group of oils and fats, coffee and tea. This shows that this community continues to consume foods that are considered traditional in Brazilian diet. It was observed that after receiving the Bolsa Família benefit, the families had a better access to foods traditionally consumed, but also, it was introduced industrialized foods, like cookies, cakes, sugar and pasta. Low intake of fruits and vegetables were stated by this population.

Conclusions: The Bolsa Familia Program can help to promote nutritional food security, but after its implementation the population has also increased the acquisition of high-calorie and low nutritional value food. The implementation of nutritional education programs would support this community to better food choices and the maintenance of their cultural identity, expressed in its food practices.

Key words: traditional communities; food consumption; food; government program.

PO3039

PREVALENCE OF OVERWEIGHT AND OBESITY IN SECONDARY SCHOOL STUDENTS IN NEGARA BRUNEI DARUSSALAM

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Background and objectives: Childhood obesity in countries undergoing rapid economic growth is a public health concern. Brunei Darussalam is experiencing increasing numbers of overweight children at primary school age but there is little information about the nutritional status of secondary school children. The aim of this study was to estimate the prevalence of overweight and obesity in secondary school students and to investigate associated factors such as dietary habits and physical activity.

Methods: This was a cross-sectional study in a representative sample of 95 Brunei students aged 13-16 years recruited from 15 public secondary schools in Bandar Seri Begawan. Ethical approval was obtained from University of Glasgow and from local education authorities. Height and weight were measured using standard procedures. Information on dietary habits and physical activity was obtained using self-reported questionnaires. BMI was calculated using z-scores. The relationship between BMI, gender, dietary habits and PA was analysed using Chi square analysis, one way-ANOVA and Kruskal-Wallis tests.

Results: Forty four percent of students were classified as overweight and from these 22% were obese. There was an increasing trend in eating out and of using convenience foods and takeaways among both normal weight and overweight children but no significant associations with BMI-z-scores were seen. This may have been due to misreporting and small sample size. Most students were moderately active but none reported high levels of physical activity, although females were significantly more physically inactive than males ($p<0.05$).

Conclusions: There is an alarming prevalence of overweight children in this population. The diet of Bruneian secondary school students is shifting towards unhealthy eating patterns and there also is a lack of physical activity. Nutrition and health awareness programmes to improve the diet and lifestyle factors of the secondary school students are needed.

Key words: body mass index, adolescents, physical activity, dietary habits.

PO3040

ROLE OF NUTRITION EDUCATION TO OVERCOME FOOD TABOOS AND IMPROVE IRON TABLETS DEMAND DURING PREGNANCY IN ETHIOPIA: WONCHI DISTRICT

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Background and objectives: In most developing countries mothers avoid certain foods in fear of big baby and difficulties associated with it during labor and delivery. This also affects uptake of nutritional supplements such as iron tablets and intake of nutritious foods. To assess the impact of World Vision Ethiopia, in partnership with district ministry of health, on nutrition education in nutrient rich foods intake and iron tablets demand among pregnant women in rural communities in Ethiopia.

Methods: A pre and post intervention cross sectional study was conducted using Lot Quality Assurance Sampling (LQAS) method. Ninety sampled pregnant mothers were taken and all of them participated in the survey. A total of 122 and 110 children were assessed for anthropometry at the start and end of the study respectively. In addition, focus group discussions were conducted with the beneficiaries. Trained voluntary community health workers conducted the nutrition education on importance of taking nutrient rich food and iron intake during home visits and nutrition education sessions in the course of the program.

Results: The proportion of mothers that avoid nutrient rich food stuffs such as milk, meat, eggs, potatoes and sweet potatoes have reduced from 90% to 40%. Moreover, the proportion of mothers who received iron tablets has increased from 5% to 32.6%. The prevalence of underweight (weight-for-age Z score <-2SD) has reduced from 27.1% to 22%. Focus group discussions revealed that nutrient rich food intake as well as mothers' demanding for iron tablets and taking it has improved in the community.

Conclusions: nutrition education that targets barriers can improve the nutrient intake among pregnant women. Community based nutrition education needs to address barriers to significantly reduce the burden of malnutrition in the community.

Key words: nutrition education, iron intake, nutrient rich food, pregnant women.

PO3041

EFFECT OF ENDOGENOUS ENZYMES ON COOKING MIXED RICE AND BARLEY AND ITS IMPACT ON NUTRITION

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Background and objectives: Barley grain contains dietary fibers which is getting much attention for its health benefits. There are few chemical changes in components during cooking. The purpose of this study was to examine the characteristics of barley enzyme, and clarified the effect of enzymes on cooking mixed barley and rice and its impact on nutrition.

Methods: Hydrolysis activity of crude enzymeextracts from 60% milled barley and 90% milled rice to soluble starch, barley starch, and rice starch was examined in the range of 4-80 °C.Model experiments using crude enzyme extracts in a mixture of barley and rice during cooking were performed. Activitywas measured at 50 °C and 60 °C using a mixture of rice and barley starch as substrate. Sample flours were separately incubated at 30-80 °C, and amount of sugars were measured. The amount of reducing sugar generated was measured when the barley crude enzyme extract was added to the rice flour and

incubated. Barley was soaked at 50 °C and water absorption, texture of cooked barley was measured.

Result: Barley crude enzyme extract at the optimum temperature of around 50 °C, produced maltose mainly, but rice crude enzyme produced a large amount of glucose and at an optimum temperature of around 60 °C. Barley with rice starch mixture as substrate, in which case action of mixture of two crude enzyme extract, generating reducing sugars and glucose were higher than the theoretical value calculated from the activity of each enzyme. When barley was cooked after soaking at 50 °C, water absorption and generation of reducing sugar was enhanced.

Conclusions: Cooking mixed barley and riceresulted in the interaction of each enzyme thatincreased the generation of sugar compared to cooking separately.

Key words: Enzyme, barley, rice, starch degradation, nutrition.

PO3042

A SURVEY OF NEW YEAR CEREMONIAL DISHES IN JAPAN PART. 2. OSECHI-RYORI

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Background and objectives: Japanese people have usually prepared special dishes called osechi-ryori for the New Year. However, this custom is disappearing. Nowadays, many people buy ready-made osechi dishes at stores instead of cooking them at home. Thus, the objective of this study is to investigate the eating habits of traditional new year dishes.

Methods: This survey was conducted by the Japan society of cookery science: A survey of ceremonial and ritual meals in Japan. Subjects were 24,858 living in 47 prefectures. The intake of typical new year dishes such as kobumaki (boiled sea weed), kinton (mashed sweet potato) , nisime (simmered vegetables), namasu (vinegared vegetables), datemakitamago (rolled omelet mixed with fish paste), kamaboko (fish cake), fish and meat dishes were studied. Intake frequency was surveyed by a questionare whereby they could choose only one of the following 4 categories: 1. eaten every year; 2. eaten sometimes; 3. eaten only recently, 4. now eating less. Intake during the present and past was choosen for these 5 categories: 1. cooked and eaten; 2. presented then eaten; 3. bought and eaten; 4. eaten at parents or relatives; 5. eaten at a restaurant, and when the date/time changed was surveyed.

Results: The osechi-ryori which was eaten every year, some times, recently, or now eaten less were 70~90%, 8~22%, 0.4~2.5% and 1.6~6.4%, respectively. The osechi-ryori cooked and eaten at home was greatest to least; nisime 67.4% > namasu 61.9% > meat dishes 55.1% > kinton 39.4%, respectively. The osechi-ryori bought was kamaboko 68.7% > datemaki 49.2% > kobumaki 46.2% > kinton 39.2%, The number of people who ate at parents or relatives or ate at restaurants was 13~15% or 1~2%, respectively.

Conclusions: Cooked, presented or bought osechi-ryori was eaten at home or at relatives.

Key words: Ceremonial meals, Japanese new year dishes, osechi-ryori, eating habits.

PO3043

RELATIONSHIP BETWEEN THE FOOD MAPPING AND SELF-EFFICACY AND BEHAVIOR ON COOKING AMONG JUNIOR HIGH-SCHOOL STUDENTS IN THAILAND AND JAPAN

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Background and objectives: The distance learning program of food safety and food hygiene education was conducted among Japanese and Thai junior high-school students for three years from 2009 to 2011. Relationship between the food mapping surveys before and after the lessons and self-efficacy and behavior on safe cooking is studied.

Methods: All subjects were the third-year students of junior high-schools in Japan (95 students: 56 boys and 39 girls) and Thailand (105 students: 49 boys and 56 girls). The distribution patterns were categorized by six according to the position on the x and y axes. The six nutritional types were determined from the nutritional characteristics of the foods on the first quadrant. Chi-square tests and cell residual analysis were applied to the patterns by country and nutritional types. The answers to the cooking behavior questionnaires regarding the five items of knowledge, interest, subjective norm, self-efficacy and behavior were scored and factor analysis was applied. The

graphs of mean factor scores of each attribute were analyzed by country and sex, BMI, pattern and nutritional type.

Results: The statistically significant was as shown in the patterns by country ($p<0.01$). In Japan, P.L. (Positive linear concept) pattern was 15.8%, E.V. (Every food valuable) was 42.1% and N.U. (Negative unbalanced) was 23.2%. In Thailand, P.U. (Positive unbalanced) was 64.8%. As for the mean factor scores of each attribute, oberweight and underweight students had high scores in interest and self-efficacy and low behavior scores. The Thai girls, P.U. pattern, the well-balanced type had high scores in behavior and self-efficacy. P.L. and E.V. patterns had high behavior scores. The unbalanced pattern and the fast food type had low scores in behavior and self-efficacy.

Conclusions: The students of a positive thinking for eating and well-balanced type had high scores of interest, self-efficacy and behavior about cooking.

Key words: food mapping, nutrition concept assessment, cooking behavior, self efficacy.

PO3044

THE CHANGES OF DIETARY HABITS ASSOCIATED BONE DENSITY IN YOUNG CHILDREN IN MONGOLIA

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Background and objectives: Mongolian traditional culture of food consumption, habits and food technology are very different from modern Mongolians. Mongolians had very deeply knowledge about healthy eating and healthy life, but Mongolians changed food consumption and habit to western way in last 20 years. These changes directly associated epidemiology of life style related disease in Mongolian children and adult. One of lifestyle disease such as osteoporosis has origins in childhood, and both are affected by dietary intake and physical activity. Our objective was to identify dietary patterns related to bone density in elementary school children during the age period of 7-9 y. Two-group (total of 100 children) randomized controlled trial.

Methods: Study at baseline and at 1, 3 months included 24-hour recalls diet, and bone density measured (BQI-bone quality index) by bone densitometer Sonost-3000 as ultrasound for beginning and ending of intervention.

Results: The result of 24 recall survey shown that calcium daily intake of all children's (80%) was 250-500mg. For experimental groups, we suggest high calcium intake diet though 3 months. A dietary pattern characterized by a high intake of dairy products was related to high bone density ($p<0.05$).

Conclusions: Diets calcium rich in dairy product such as hot cow milk, curd, aaruul (it means traditional diary product), and traditional bone soup can lead to healthy bone mass accrual in young children.

Key words: dietary habit, children, bone density.

PO3045

ASSESSMENT OF HEALTH AND NUTRITIONAL STATUS AND ENERGY EXPENDITURE OF POSTMEN, BUSDRIVERS AND HOUSEMAIDS IN MUMBAI CITY, INDIA.

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Background and objectives: Diversity of occupation can have a bearing on the nutritional needs and lifestyle related factors of a given population. Female housemaids, postmen and government bus drivers are a very important segment of workforce in India with varied levels of physical activity and nutritional challenges. There is a felt need to generate database of these populations to sensitize on nutrition priorities and plan intervention programmes.

Methods: The present study was an observational cross sectional study of a total of 210 housemaids, postmen and bus drivers from different suburbs of Mumbai.The variables of the study included anthropometry, energy expenditure and dietary information using standardized and customized pretested tools.

Results: The population studied related to low and middle socioeconomic strata. The majority of housemaids had food insecurity and their average nutrient intake was 50 % of the RDI for all the nutrients. The dietary pattern of postmen and bus drivers was also found to be inadequate and showed excess consumption of fats. Low consumption of milk, dairy products, fruits and vegetables was observed in all the groups. The levels of physical activity, lifestyle pattern stressors and medical problems, varied in different groups.

Conclusions: Understanding nutritional needs and lifestyle concerns of specific occupational groups will help plan appropriate strategies to improve their health and nutritional status.

Key words: nutritional status; energy expenditure; dietary pattern.

PO3046

QUALITY ASSESSMENT OF TABLE SALT CONSUMED BY CHILDREN AND ADOLESCENTS IN THE CITY OF RIO DE JANEIRO, BRAZIL

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Background and objectives: Salt has an important role in public health. However, a high amount of salt intake is related to a high intake of iodine. The exposure of thyroid gland for a long period and excessive amount of iodine may predispose the population to early development of autoimmune thyroiditis and risk of hyperthyroidism. Hence, becomes relevant to monitore the amount of iodine added to salt. The main objective of this study is describe levels of iodine in salt consumed by Brazilians.

Methods: We analyzed the levels of iodine present in 24 salt samples from 8 different brands. These samples of table salt were collected from patients selected to participate in a project to analyze the Urinary iodine. The samples were analyzed according to the technique recommended by the Brazilian Ministry of Health, in order to evaluate the amount of iodine present in the salt was consistent with the Brazilian legislation.

Results: The mandatory addition of iodine to salt determined by ANVISA (National Health Surveillance Agency) from 2003 is 20–60mg of iodine/kg of salt. All samples were in accordance with the ANVISA legislation, excepting two samples presenting an average value of 62.01 mg /kg and 18.63 mg /kg.

Conclusions: The majority of samples colected were in accordance with the legislation. This monitoring should be conducted frequently to obtain a control of the quality of the salt consumed by the population to prevent iodine deficiency without risk of diseases associated with excessive intake of this micronutrient. In result of a high consumption of salted food in Brazil, ANVISA is aiming to change the legislation to 15-45 mg /kg of Iodine added in table salt .

Key words: table salt, iodine, legislation, disease.

PO3047

NUTRITIONAL EVALUATION OF ARGENTINEAN QUINOA CROPS FROM DIFFERENT ECOTYPES

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Background and objectives: Quinoa (Chenopodium quinoa Willd.) is one of the oldest crops of the American continent and itis now of great interest to the scientific world due to its high nutritious value. Quinoa grows from sea level to the Andean highlands, so it is generally classified in five ecotypes: sea level, valley, subtropical, salar, and altiplanic. Our aim was to study the chemical and fatty acids composition of 2 different crops of Argentinean quinoa: one from northwest (ecotype altiplanic) (QN) and one from Pampa´ region (ecotype sea level) (QP); and compared to Quinoa Real (QR) (commercial quinoa from Bolivia).

Methods: Moisture, ash, fat, protein and total dietary fibre (TDF) were determined by AOAC methods. Carbohydrate content was estimated by difference. The fatty acids analysis was performed by gas chromatography.

Results: Protein and fat content (g% wb) of QP was lower than QN and QR (Protein: 11.44 vs 12.35 and 11.51; Fat: 3.82 vs 5.09 and 5.67). QP had higher TDF content (g% wb) compared to QN and QR (12.95 vs 10.68 and 11.66). Respect to the fatty acids composition, the content (%) of palmitic acid (C16:0) of QP was lower than QN (11.90 vs 18.72). QP had 10% more of linoleic acid (C18:6) than QN and QR (61.32 vs 46.41 and 50.27). Also, QP had higher content (%) of linolenic acid (C18:3) than QR (7.13 vs 5.45). Otherwise, the ratio w6/w3 of quinoa oil was 8.6 (QP), 4.9 (QN) and 9.2 (QR); and the ratio of PUFA/SFA was 6.7 (QP), 5.9 (QN) and 7.8 (QR).

Conclusions: These results are the first approach to the analysis of the chemical and fatty acids composition of different Argentinean quinoa ecotypes. They would indicate its promising nutritional quality.

Key words: Argentinean quinoa, ecotypes, fatty acids, chemical composition.

PO3048

WHAT IS FOOD LITERACY AND DOES IT INFLUENCE WHAT WE EAT?

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Background and objectives: Globally, the food system and the individual's relationship to that system are changing in their complexity. Recent public health nutrition plans call for a re-orientation to the knowledge, skills and behaviours required to meet nutrition recommendations within this changing environment. The term "food literacy" has emerged to describe these. This research sought to empirically define this term, identify its components and model its relationship to healthy eating.

Methods: Three studies were undertaken: a) a Delphi study of food experts b) a phenomenological study of 16-25 year olds living in disadvantage and responsible for feeding themselves c) a review of existing and published interventions. Each looked at all elements of the research question. Constructivist Grounded Theory was used to analyse results. This included constant comparison of data within and between studies.

Results: Food literacy is defined as the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours used to meet needs and determine food intake. Eleven components were identified and grouped into four domains: planning and management, selection, preparation and eating. Food literacy supported healthy eating through improving certainty, choice and pleasure. The strength of this relationship was affected by the social determinants of health, in particular their influence on local food environments and early childhood experiences with food.

Conclusions: A shared understanding of the term food literacy, what it includes and its relationship to nutrition, are important foundations to inform investment, action and further research.

Key words: food literacy, food preparation, skills, knowledge.

PO3050

A STUDY ON THE CONSCIOUSNESS OF THE YOUNGER GENERATION OF THE RICE CONSUMPTION AND THE SUCCESSION OF JAPANESE FOOD CULTURE

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Background and objectives: The consumption of rice has been reduced by half since 1962 in Japan. At the beginning of the New Year, Japanese eat glutinous rice cakes ('mochi') in soup with vegetables or fishes, called 'zouni'. In order to study the consciousness of the younger generation of the rice consumption, we planned a questionnaire survey of the consciousness of university students and older consumers.

Methods: We conducted (1) a questionnaire survey of university students' consciousness that focused on the frequency of eating rice in a week, the most favorite staple food in school lunch, the awareness of rice flour food, and the frequency of eating 'mochi', and (2) a questionnaire survey of older consumers' consciousness of eating 'mochi'. We analyzed the data using SPSS (19.0).

Results: The average frequency of eating rice as a staple food was 3.08 times for breakfast, 5.46 for lunch, and 5.66 for dinner in a week (n=178). The survey found that gender and family situation influenced the rice consumption behavior. Many students answered the most favorite staple food was rice in elementary school lunches (45.7%, n=175) and in junior high school lunches (44.7%, n=94). Many students (29.9%) have eaten 'zouni' only January 1-3rd (n=177). The consciousness of university students was compared with older consumers in terms of cooking 'zouni'.

Conclusions: The present study resulted in many students did not eat rice as a daily staple food, especially for breakfast, and had no customs to eat 'mochi' except 'zouni' in January. It suggested the close relations between a decrease of the rice consumption and non-succession of Japanese food culture to the younger generation. We discuss how to educate the consumer systematically, in school, with regard to the healthy dietary habits and environmental sustainability in Japanese food culture.

Key words: rice consumption, food culture, rice cake.

PO3054

WE LIKE TO EAT TURKISH KEBAP, YOGURT, HOMEMADE SOUP

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Background and objectives: The purpose of this study was to identify the factors that affect the food selectivity like cost, flavor, appearance, smell, nutritional value, habituation, psychological state and body weight.

Methods: One hundred fifteen voluntary people (41.7% male and 58.3% female), living in Çankaya district of Ankara, Turkey participated in this study. Data was collected with a questionnaire.

Results: The mean age, and body mass index of the participants were 37.8 ± 11.9 years, and 24.6 ± 4.6 kg/m2 respectively. About sixty two percent of the participants thought that they were eating a well-balanced diet. 77.4% of them did not have a chronic disease. 65.4% of the participants who had a chronic disease imported that their disease had a selective effect on deciding which type of foods. According to the participant, the meaning of eating meal for 39% of them it was supplying the daily need, for 37% of them it was healthy life, for 14% of them it was always an activity that was giving happiness and enjoyment, for 5% of them it was an activity when they were stressful conditions, for 4% of them it was the reason for living. The most selected purposes of eating meal were protecting their life (46%), leading their lives (36%) and enjoying (9%) respectively. The participants felt happiest while they were eating meal with their family (88. 7%). The first three factors that affected the food choice; palatability (51. 3%), nutritional value (22.6%) and appearance (19.1%). The foods and beverages that participants especially like consuming were cultural foods like Turkish kebap (90.4%), homemade soup (89.6%) yoghurt (85.2%), and black tea (82.7%) respectively.

Conclusions: In this study maintain healthy life, palatability and tradition were priority areas on food choice.

Key words: food choice, palatability, nutritional value, cultural foods.

PO3055

FOOD CONSUMPTION PATTERNS IN EUROPEAN UNION

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Background and objectives: European Union Member States are quite diversified in their level and structure of food consumption. This results both are from economic and noneconomic factors, mainly geographical, which gear the main food production and fishery development directions, as well as cultural factors that include dietary habits. Significant impact on the shaping of food consumption profile has been observed in the case of dietary recommendations promoting rational (healthy) diet and new consumer behavior profiles. The aim of the paper was the identification and characterization of patterns of food consumption in European Union.

Methods: For the identification of patterns of food consumption taxonomy methods – cluster analysis was used. Grouping of 27 countries of EU according to food consumption patterns was carried out using Ward's hierarchical agglomeration method. Each country was characterized by 14 diagnostic variables.

Results: As a result of this grouping, 8 clusters have been identified. In those eight clusters eleven different food consumption patterns have been identified: Luxembourger, Maltese-Portuguese-Lithuanian, British-Irish, Italian-Greek, Spanish-Cypriot, Polish-Latvian, Hungarian-Czech, Slovakian-Bulgarian, Swedish-Finnish, French-Belgian and German-Austrian.

Conclusions: Among the analyzed food consumption patterns there is no one pattern which would meet all dietary recommendations of the Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO). In every single one of these patterns there are both insufficiencies in desired food products and the excess of inexpedient products, which have adverse impact on human health.

Key words: food consumption patterns, health, European Union.

PO3056

THE EFFECT OF WOMEN'S MANAGEMENT OF HOUSEHOLD INCOMES ON CHILD NUTRITION IN TWO RURAL COMMUNITIES OF NICARAGUA

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Background and objectives: Undernutrition remains an issue in Nicaragua, with approximately 23% of pre-school age children (PSAC) suffering from chronic malnutrition. Many studies suggest that intrahousehold gender relationships, dynamics and inequalities are crucial for child nutrition. In this regard, evidence from a variety of contexts indicates that women's income has a greater effect on PSAC nutrition than men's income. However, who manages the income may be more important than who earns it. This study in two communities in Nicaragua, explores whether intrahousehold income allocation and control is associated with child nutrition.

Methods: The insights from this study are derived from a 2-year intrahousehold gender-sensitive research that applied qualitative and quantitative methods. Information was gathered from all households (148) in both communities, whereas detailed inquiries were carry out in 30 households. The trust relationship established with those interviewed and the use of more than one information collection method (triangulation), assured the trustworthiness of the qualitative data gathered.

Results: Greater control over the family budget by the mother was associated with improvements in height-for-age Z-score and protein adequacy of PSAC. Qualitative data gathered showed that these results were linked to the micro-strategies adopted by women in food insecure families to cope with food scarcity. Women are more likely to manage the family budget aiming at food and child welfare, while men appear more focused on their personal consumption.

Conclusions: Findings show that Nicaraguan rural women's position in the household is more closely linked to the nutritional status of children than men's. Although results from gender and intrahousehold analyses are specific to cultural, social, and institutional settings, which precludes generalization, the present study emphasize the importance that must be given to gender issues in development programs and policies working to eradicate malnutrition.

Key words: Nicaragua, income allocation, gender, malnutrition, intra-household research.

PO3057

FOOD AND NUTRITIONAL EDUCATION AS A CONFRONTATION OF OPPRESSION AT BASIC SCHOOL

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Background and objectives: To share educational interests in the education activities of daily living expected in the basic school curriculum can provide local solutions for the Brazilian historical nourish nutricional transition problems. The feeding in this prospective does not come down to a narrow realm of the Nutrition course, but to a social and humanitarian practice. In this study, the nourish and nutritional education strategy turns to fragilized situation of a school community. The objective is to value the local dieting conditions with comprehensive resignification, exceeding the hygienist trait, considering that the social relations, from generation to generation, keep great possibilities to behavioral and life style changes. There is not a right pattern of eating or thinking. The right pattern is an act legitimized by social practice. The Paulo Freire's theory against the oppression (1997) faces the idea of an eat well pattern, as well as the misleading free choice or food diversity of the large urban centers.

Methods: This work was placed as an elective weekly discipline additional to the basic curriculum in an experimental kitchen at the municipal school João Goulart at the community of Pavão/Pavãozinho/Cantagalo in Rio de Janeiro. The strategy is based on enhancing culture of the entitlement - a political instrument of social inclusion and a permanent reconstruction of a collective project of welfare with local solutions aimed to equity, intersectoriality, social participation, interdisciplinarity, socialization and sustainability.

Results: The result is a collection of artistic activities such as paintings, drawings, poetry, narratives, recipes and rules of coexistence jointly build around nourish.

Conclusions: The guiding thread of this work is the daily exercise of nourishing resignification guided to autonomy aiming to transform the destiny of an oppressed and symbolically violated population, recovering this destiny as a collective welfare project at school.

Key words: basic school, theory against the oppression, nutritional education strategy.

PO3058

CAN THE NORDIC DIETARY POLICIES BE A ROLE MODEL?

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Background and objectives: Nutritional policies in the Nordic countries (Norway, Sweden, Denmark, Finland, Iceland, Ferroe Islands, Greenland and Åland) have long time been founded on evidence based models for nutritional recommendations and dietary guidelines. To combine the evidence based recommendations and increased food cultural awareness will create a complete model for influence consumer behaviour towards Nordic food. Nordic Council of Ministers (NCoM) has supported a program called New Nordic Food (NNF) aimed to influence food culture in order to promote positive changes in eating behaviour. The focus in this presentation will be on the activities aimed at increasing a positive attitude towards Nordic food culture, health and welfare.

Methods: NNF programme with the background in evidence based nutritional recommendations and dietary guidelines, has established a series of activities in order to strengthen food culture using Nordic food and hereby changing eating behaviour, as the third element in a complete dietary policy system.

Results: The programme has been executed in collaboration between authorities, food industries, chefs and academia in order to develop healthy Nordic food to targeted sectors and vulnerable groups such as school meals for children, SME production of food with high cultural and sensory qualities, public meals in hospitals and institutions. In addition to the NCoM programme each country has complementing activities such as the OPUS programme in Denmark and "Matlandet Sverige" in Sweden.

Conclusions: The concept of NNF is an innovative approach to traditional foods combined with strong health perspectives and an ethical production philosophy. The interdisciplinary cooperation is the key success factor in the Nordic model with main focus on food, nutrition and welfare.

Key words: Nordic food, eating behaviour, welfare.

PO3059

FROM GREECE WITH USEFUL KNOWLEDGE?

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Background and objectives: The course ERN900 The Mediterranean Diet (10 ECTS), for students and teachers has its roots in Lesvos in Greece where the University of Agder has a course- and study center in a restored monastery. The course has been taught in a Mediterranean country, mostly in Greece. The evaluation of these courses has been very positive, but we are uncertain about what benefit students experience after their return home. Our questions are: What useable knowledge do students get from a course in the Mediterranean Diet? How do students "translate" their knowledge about Mediterranean diet to Norwegian conditions? Is it useful to teach students about the Mediterranean diet in a Mediterranean country?

Methods: In the presentation we describe the term "Mediterranean Diet" and why this diet is regarded as being very healthy. The course description for ERN 900 The Mediterranean Diet will be presented. To answer our questions, we have studied the students´ exam papers from 2006-2012. In addition we have looked at the evaluations of the courses. A survey among the participants of courses held from 2006 until 2012 have been conducted and the results analyzed. Past participants were asked what benefit they have subsequently had after attending the course in Mediterranean Diet.

Results: Most of the participants feel that they have befitted from the course. The themes of the exam papers and the results from the survey show that the students have reached the learning outcomes listed in the course description.

Conclusions: From the survey we see that the teachers use their knowledge in teaching and most of the participants use it in their daily life. The exam papers show that the students are able to translate their knowledge about Mediterranean Diet to Norwegian conditions.

Key words: Mediterranean diet, health, learning outcomes.

PO3060

DEVELOPMENT AND VALIDATION OF INTEGRATED-KOREAN DIETARY PATTERN SCORE

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Background and objectives: The purpose of this study was to develop an integrated conceptual index capable for assessing and measuring more precisely the Korean dietary patterns based on Korean food culture.

Methods: The Integrated-Korean Dietary Pattern Score (I-KDPS) was developed as an index for assessing Korean dietary patterns and diet quality. I-KDPS is composed of 7 categories and scored along a 60 point scale for the purpose of measuring ¡®the level of balanced and adequate Korean food consumption¡¯ on the basis of Korean food culture and ¡®Traditional table setting of three side dishes'. I-KDPS was tested and verified through applying to the Korean National Health and Nutrition Examination Survey (KNHANES) data.

Results: As the I-KDPS score increased from the lowest quartile group (Q1) to the highest quartile group (Q4), energy intake and nutrient density of calcium, iron, vitamin A, and vitamin C became larger, macronutrient consumption pattern became to the recommended carbohydrate : protein : fat ratio. Furthermore, the percentage of complementary nutrients consumption of the Korean Dietary Reference Intakes (%RDA or %AI) showed significant differences among the I-KDPS quartile groups. Higher the I-KDPS was, larger the adequacy of nutrient consumption was. According to the analysis of food consumption, Dietary Variety Score (DVS), Dietary Diversity Score (DDS), and consumption patterns of food groups (DMGFV), higher the I-KDPS was, higher the diversity score of food consumption was.

Conclusions: The I-KDPS newly proposed in this study was verified as a good instrument to assess food consumption trends, quality assessment of meals, nutrient intake level, and diversity of food consumption, balanced meals, and dietary patterns for Korean people.

Key words: I-KDPS, KNHANES, Korean food culture.

PO3061

USING POSITIVE DEVIANCE TO CHANGE LOCAL FOOD PERCEPTIONS AND IMPROVE CHILD GROWTH IN A ZAMBIAN VILLAGE

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Background and objectives: Child malnutrition is widespread in Zambia, and is compounded by cultural food perceptions which limit children's access to nutritious foods. The Positive Deviance/Hearth (PDH) approach, which leverages local wisdom to improve child nutrition, was piloted in Mabeka village in February 2012 by the Ministry of Health, World Vision Zambia and community members. The objective was to improve child growth by applying locally identified positive feeding and care practices.

Methods: PDH was implemented by trained community volunteers. A "positive deviant" inquiry identified local practices that positively impact child nutritional status, including consumption of foods often considered taboo. These practices were transferred to families of malnourished children through experiential learning during 12 days of "Hearth" sessions. Weights of the nine participant children were assessed at Day 1, 12 and 30 and three months after the start of Hearth, and compared to established PDH standards for weight gain.

Results: Traditional food taboos to exclude fruits and vegetables considered "round" in shape were modified by giving such foods to children as snacks during Hearth sessions. Using indigenous foods in Hearth meals and witnessing the improvements in energy level, mood and weight of their children changed caregivers' perceived value of these foods. Complementary positive practices included increased meal frequency, diet diversity, handwashing and accessing clean water. All nine children graduated from PDH by gaining at least 400 grams in 30 days. Eight children improved their classification of nutritional status, with one child moving from moderately malnourished to normal status within three months of Hearth. Mean weight-for-age z-scores (n=9) rose from -2.8±0.2 to -1.6±0.3 (p=0.00007) within three months.

Conclusions: PDH is a culturally sensitive and effective way to change traditional food perceptions and feeding practices to improve the growth of young children in rural Zambia.

Key words: positive deviance hearth, malnutrition, food taboos.

PO3062

PREVALENCE OF INFANT MALNUTRITION IN THE MOST VULNERABLE SOCIAL GROUPS IN HONDURAS

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Background and objectives: Honduras has a high prevalence of growth delay (32.9% in children under 5 years) that is the most common cause of short stature. A chronic food deficiency heads to a malnutrition status of proteins, energy, vitamins and minerals that is an important public health problem persistent and with a low probability of revert back to a situation of health status. Moreover, the wrong dietary habits lead to increase obesity that is included as a new nutritional disorder in Honduras. Our aim was to evaluate the infant nutritional status of children under 5 years in Honduras through anthropometric indicators such as carving weight (%), weight for height or Quetelec Index (body mass or index) supplemented with dietary inquiry.

Methods: The anthropometric parameters were evaluated using the non-probability methods in 141 Children under 5 years, health centers and public hospitals of both rural and urban areas of five departments in Honduras (Olancho (Juticalpa) Intibucá (La Esperanza) Lempira (Gracias), Francisco Morazán (Tegucigalpa), La Atlántida (La Ceiba San Francisco Urban-Rural).

Results: Malnutrition indicators in urban regions were found being around 8-15% of infants lesser than 5 years while in rural population 6-25% of infants showed malnutrition. The target population of this study also showed a high percentage of obesity (9%) in urban areas compared to the rural population (2%).

Conclusions: The prevalence of infant malnutrition and obesity in Honduras persist due to a poor nutrition education of mothers as well as an inadequate and lack of quality food and economic resources.

Key words: malnutrition, infants, obesity, Honduras.

PO3063

DIETARY PATTERNS OF BRAZILIAN ADOLESCENTS RELATED TO FAMILY INCOME

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Background and objectives: Adolescence is a period of forming food habits that can be maintained during adulthood. Studies from different countries indicate that the dietary patterns of adolescents is limited to snacks, sodas and sugary drinks. The analysis of dietary patterns in adolescents may contribute to better understanding relationship between diet and socioeconomics factors. Our objectives are to identify dietary patterns in adolescents and correlated to household income.

Methods: The data from the Household Budget Survey 2008-09 were used. Food intake information was obtained using a 24hDR. Foods were aggregated into 23 groups. Factor Analysis (rotation varimax) used to estimate dietary patterns practiced for adolescents. Was calculated mean of score for dietary patterns into fifth of income.

Results: Were identified five dietary patterns practiced by adolescents. The first and second dietary pattern had a low prevalence for all quintiles of income. The third pattern composed by eggs, milk, fruits and oil and poor in meats, processed meats, beverages and vegetables was prevalent in the fourth income quintile. The fourth pattern consisting of eggs, milk, fruits, oils and slightly correlated with processed meats, beans, vegetables, flour and pasta was positively associated with the first income quintile. The dietary pattern 5 was positively correlated with the consumption of processed meats, beans, vegetables, flour and pasta, and negatively correlated with meats, soups, stocks and oil was found in the second and fifth income quintile.

Conclusions: The presence of healthier foods is correlated with higher levels of income. However regardless of the household income the consumption foods low in nutrients prevails in eating patterns among adolescents.

Key words: adolescents, dietary patterns, household income.

PO3064

USING POSITIVE DEVIANCE TO IDENTIFY NUTRITIOUS RECIPES FOR COMPLEMENTARY FEEDING AND TO REDUCE STUNTING IN RURAL EGYPT

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Background and objectives: The United States Agency for International Development (USAID)-funded Maternal and Child Health Integrated Program (MCHIP) is implementing the Smart project in Egypt that focuses on reducing stunting in children younger than two years of age.

Methods: Focus group discussions (N=300) were conducted with mothers (n=1,000), fathers (n=1,000), grandmothers (n=1,000), and key care givers of well-nourished children 0-24 months of age about infant feeding and care practices in six Governorates in Smart project areas. Three focus group discussions were conducted per village (N=100 villages). Mothers with well-nourished children (positive deviants) were identified following routine growth monitoring, where children were classified into normal, underweight, stunted, or both underweight and stunted at local community development associations. Recipes were developed based on the foods positive deviant families were feeding their children. These recipes were analyzed using the Egyptian food consumption tables and modified to fulfill nutrient requirements of this age group for protein, vitamins A and D, folic acid, iron, and zinc.

Results: While the areas where mothers resided were poor, mothers with well-nourished children were identified. The recipes for complementary foods mothers used, including Sesamina and Molassina, were more nutrient-dense than those of mothers of underweight or stunted children. Recipes were modified to increase the protein and micronutrient content, particularly for iron and zinc, with ingredients that poor women could afford. Recipes were shared with and accepted by most mothers and had a positive impact on weight gain and stunting in children.

Conclusions: Even in poor villages with high rates of malnutrition, well-nourished children can be identified and best practices on infant feeding can be identified and shared with mothers.

Key words: positive deviance, local recipes.

PO3065

FOOD CONSUMPTION CHARACTERISTICS AMONG RIVERINE SOUTH BRAZILIAN

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Background and objectives: Brazilian food consumption is changing in all social classes since last century. The riverine population also performs a food consumption that can be associated to obesity, hypertension and diabetes. Analyze food consumption characteristics among riverine population in Tibicanga and Poruquara south Brazilian islands.

Methods: cross-sectional descriptive study with 29 riverine inhabitants in Tibicanga and Poruquara south Brazilian islands. Demographic and food consumption data were collected. The data were analyzed in Excel software and the results were described thought frequency.

Results: All interviewees were adults, the mean age was 38.5 years. The presence of sea food distinguishes in this population (96%). Also carbohydrates are prevalent in dinner in 28% of the sample (rice, pasta and polenta (porridge made of cornmeal)). To Tibicanga and Poruquara inhabitants the manioc has been the main local source of energy and can be considered the biggest local non- animal energy source. Soda is consumed by 30% of the sample. Fish is, undoubtedly, the best and more trustful protein source in both islands. Sea food and manioc also are the main memory food, totalizing 56% of the descriptions. Although this panorama, it can be viewed that 100% of interviewees eat beans at least five days a week, excluding holidays and weekends when meat are prevalent (58.6%).

Conclusions: The food consumption characteristics among riverine population in Tibicanga and Poruquara is compatible with low-income south Brazilian riverine family choices. In this process, "restricting" ecologic and economic factors are translated in a restricted number of variables, where choices and preferences keep in motion, and are also emotional and culturally linked. Such domains include the household and community micro-politics as well as broader local and national political-economy contexts.

Key words: food consumption, nutrition transition, Brazil.

PO3066

FOOD CONSUMPTION CHARACTERISTICS AMONG SOUTH BRAZILIAN LOW-INCOME YOUTH

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Background and objectives: Diet quality, family size, socioeconomic variables and home area can interfere in Brazilian consumption. The Young Apprentice Program is intended for qualification and professional knowledge to Brazilian low-income youth. Our objective was to analyze food consumption characteristics among south Brazilian low-income youth.

Methods: A cross-sectional descriptive study with 73 youth, among 14 and 24 years old, from TECPUC Young Apprentice Professional Qualification Program. The questionnaires were self-applied during health classes as alternative evaluation. Each question was explained by the nutritionist teacher. The data were analyzed in Excel software and the results were described thought frequency.

Results: All research participants live in a high social vulnerability area in Curitiba, Paraná, and therefore are inserted in this Program. Almost two thirds of the sample live in small houses with more than four people together. The present study main finds were that 54.8% have their meals watching TV, talking on the cell phone, in front of the computer or doing their job; 61.6% uses to eat sweets every day; 66% declare having 4 or more meals per day and 47.8% refer to delay their meals in more than 4 hours; 32% drink more than 5 glasses of water/day; 60% overeat pizza and over drink soda on the weekends; 78.1% mention never have done diet to lose weight, but are not satisfied with their body.

Conclusions: Health Education may be an important tool in health risk factors prevention associated to better food choices, assuring nourishing and nutritional safety to this population.

Key words: food consumption, nutrition transition, Brazil, low-income.

PO3067

LONG-TERM EFFECTS OF A CONTROLLED MEDITERRANEAN DIET INTERVENTION ON DIETARY AND ANTHROPOMETRIC VARIABLES IN MEN AND WOMEN

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Background and objectives: The traditional Mediterranean diet (MedDiet) is protective against several major chronic diseases such as cardiovascular diseases and cancer. Therefore the identification of successful strategies for the long-term adherence to this food pattern is of great interest. This study investigated the long-term effects of a controlled isoenergetic MedDiet intervention on dietary intakes and anthropometric variables, with a special attention to gender differences.

Methods: Participants were 37 men (42.6±7.3y, 29.2±3.2kg/m2) and 32 premenopausal women (41.2±7.3y, 29.6±5.4kg/m2) presenting >2 cardiovascular risk factors. During four weeks, all foods and drinks concordant with the MedDiet were provided to participants. At the end of the intervention, participants received information about the Mediterranean food pattern and MedDiet recipes, with no other contact until the long-term follow-up (six months after the intervention).

Results: The Mediterranean score increased at the 6-month follow-up compared to baseline (P=0.005) with no gender difference. More precisely, participants increased their consumption of fish and olive oil and decreased their intakes of refined grains products, red meat, eggs, dairy products and desserts (P<0.05). No gender difference was found for these dietary changes, except for dairy products (gender by time interaction, P=0.02), for which only men experienced a decrease. Compared to baseline, body weight remained unchanged at the end of the 4-week intervention in both genders (P>0.05), and a trend toward a decrease was noted only in women at the 6-month follow-up (men: -0.3±3.0kg, P=0.99; women: -1.0±2.7kg, P=0.07; gender by time interaction, P=0.06). No change was observed for waist circumference.

Conclusions: We concluded that being exposed to the MedDiet for a short duration, along with few dietary recommendations/tools, promote the long-term adherence to this food pattern in both genders and may help for the long-term management of body weight especially in women.

Key words: MedDiet, gender, dietary intakes.

PO3068

THE SOCIAL DETERMINANTS OF HEALTH OF THE CHILD-ADOLESCENT IMMIGRATION AND ITS INFLUENCE ON THE NUTRITIONAL STATUS

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Background and objectives: The aim of this study is to review the most characteristic social determinants of health of the child-adolescent immigration-using a revision of the scientific literature and to evaluate its effect on the nutritional status.

Methods: A Systematic review was carried out in the bibliographic databases below: MEDLINE (vía Pubmed) y The Cochrane Library, using (MeSH) descriptors "Emigrants and Immigrants", "Socioeconomic Factors", "Cultural Characteristics", "Social Class", "Nutritional Status", "Overweight", "Obesity", "Body Mass Index", "Body Weight Changes" y "Cohort Studies". Humans limit was used. An information control quality was performed using Strengthening the Reporting of Observational Studies in Epidemiology Guidelines (STROBE). As social determinants of health, the economic and socio-demographic factors were considered to evaluate its effect.

Results: Inclusion and exclusion criteria were used for the selection of 18 studies. The protective effect of the immigrant status characterized by the alimentary culture and linguistic isolation protects the first generation of overweight/obesity risk, while due the acculturation process the second and third generations are equalized in the gain of weight to the native population. Among ethnic groups, the overweight and later obesity prevalence is higher in the Hispanic population of the USA. No relation was found-between the studies-about differences in the nutritional status among sexes and about the protective effect of food aid programs.

Conclusions: The most influential social determinants of health on the child-adolescent generation were the socio-demographic conditions, between them: the length of stay differs among the three generations identified in the studies, whereas the linguistic isolation and ethnicity are truly the impacting ones on the biological response to the change experienced by acculturation, establishing differences in nutritional status.

Key words: emigrants and immigrants, socioeconomic factors, cultural characteristics, nutritional status, obesity.

PO3069

REFLECTIONS ON HEALTHY EATING FOR THE ELDERLY IN THE CONTEXT OF THE BRAZILIAN PUBLIC AGENDA

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Background and objectives: The rise in obesity and chronic diseases, the recent and accelerated aging process of the population and the propositions of the national policy on Food and Nutrition underlie this work. We discuss the following points: interrelationship between Nutrition and Food, health as a process which is based on everyday life and heterogeneity of aging. It is our goal to develop a reflection of what meanings inserted in the construction on healthy eating in Brazilian public agenda.

Methods: For the orientation on healthy eating for seniors, a document analysis was conducted on the documents provided by the Department of Health. These were the 'Food Guide for the Brazilian Population: promoting Healthy Eating', 'Ten steps to healthy eating' and 'Healthy eating for the elderly: a manual for health professionals".

Results: In dialogue with authors of the human and social sciences field, Sfez, Weber, Elias, Dumont, Canguilhem and Douglas, the following perspectives have been identified: accountability of individual attention regarding food and nutrition, with strong ascetic and control over the body; strong tendency towards rational and maximum reduction of the risk of disease, synonymous with healthy lifestyle; a strong emphasis on hygiene and food safety; the primacy of biomedical character of the Nutrition; and homogeneity and fragility marks as the aging process.

Conclusions: The idea of healthy eating involves necessarily, thinking about food and health. However, the documents tell us about nutrition and disease. It highlights the biomedical conditions and relegates to an economic cheaper plan, a structure social and cultural living and illness in the contemporary world. Eating needs to be thought in the mediation of biological social and cultural needs. Working from the perspective of access, autonomy, care, risk, self-satisfaction, are important concepts for a reflection of healthy eating for the elderly population.

Key words: food, healthy eating, elderly.

PO3070

FOOD AND NUTRIENT SECURITY INDICES TO MONITOR THE FOOD SUPPLY AND INTAKES FOR TAIWAN

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Background and objectives: To evaluate food and nutrient supply trajectories against nutrition recommendations and intakes by novel indices in order to alert to food insecurity. Taiwanese data are used for illustration.

Methods: We used Taiwan's food balance sheets from 1991 to 2010 to estimate the food/nutrient availabilities and adopted data from two Nutrition and Health Surveys in Taiwan (NAHSITs) (1993-1996 and 2005-2008) to assess food/nutrient intakes. Composite age and gender weighted food guides and Dietary Reference Intakes (DRIs) were used as references for food/nutrient needs. We multiplied food/nutrient availability-needs ratios by food/nutrient intake-needs ratios to obtain food security indices (FSI)/nutrient security indices (NSI).

Results: From 1997 to 2010, the availability for most food groups and nutrients decreased, with dairy and vegetables falling below nutritional recommendations in 2010. The mean ratios of the food availabilities to needs decreased annually from 1997 for all food items with the highest ratio drop in protein-rich foods (soy/fish/meat/egg, [-0.026]) and the lowest in cereals/roots [-0.008]. For food intakes, all except cereals/roots increased between the two surveys; only vegetables met the needs, and soy/fish/meat/egg were 1.8-fold in excess in 2005-2008. For nutrient intakes, calcium for both genders and iron for women were lower than DRIs for both surveys. FSIs were problematically low for dairy (0.21, 0.20 for 2 NAHSIT periods) and fruits (0.58, 0.83), and high for soy/fish/meat/eggs (3.18, 3.63) throughout, while that for cereals/roots fell (1.10, 0.86). For NSI, calcium (0.32, 0.37) and iron (1.22, 1.68) were of the most concern.

Conclusions: The FSI and NSI capture composite information about the food supply, intakes, and recommendations. Their combined and regular use allows food security to be monitored.

Key words: food security algorithms (FSA), nutrient security algorithms (NSA), food balance sheets (FBS), Nutrition and Health Survey in Taiwan (NAHSIT).

PO3071

CULTURAL DETERMINANTS OF UNDER FIVE YEAR CHILD FOOD CHOICE, PREFERENCE, PREPARATION AND FEEDING PRACTICES AMONG MOTHERS IN WESTERN KENYA

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Background and objectives: It is recognized that culture has a useful connection with food choice. The aim of this study was to gain a better understanding of how food choice, preference, preparation and feeding practices among mothers of infants and young children are influenced by culture.

Methods: Qualitative methods of data collection: key informant interviews, group interview and focus group discussions and observation were used to gather information on food cultural determinants.

Results: There is a rich corpus of food habits, beliefs taboos, that influences food choice and upholds some past food related traditions. Food choice, preparation and feeding are carefully done considering colour, flavour, nutritional value and safety of the child.

Conclusions: Cultural habits and tastes influencing food are embedded in social and cultural persist.

Key words: traditional foods, food habits, food beliefs, nutritional folklore.

PO3073

STREET FOOD AND ITS EFFECT ON SOCIETY AND CUSTOMER SATISFACTION IN MALANG CITY, EAST JAVA, INDONESIA

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Background and objectives: In developing countries, street food vending is a very important sector to generate income. Street food vendors have an important function in society. Especially people with low income have the chance to buy adequate food. To evaluate street food vendors, socio-economic profiles of the street food vendors were compiled and the customer satisfaction of street food was gathered.

Methods: After pretests a questionnaire with 17 closed questions was used for the street food vendors and a questionnaire with 22 closed questions for their customers in Malang City. 35 street food vendors and 245 customers responded between August to October 2010.

Results: The results showed that there was an increase in the level of welfare at the vendors´street food over time. This trend was characterized by an increased average income per month and an increase of buying some consumer goods, such as motorcycle, home, furniture, and television. The customers were satisfied with the location and price of street food as being tasty. There was a stromg correlation between customer satisfaction and location, price, tasty and food safety (34 %). The level of customer satisfaction was about 66 %.

Conclusions: The survey showed that the local government should consider to support street food vendors beyond providing capital or funding for their venture. Rather training programs, cheap sources of materials, and good selling location should be provided. Supporting street food vending therefore helps many small businesses which are important in a globalized economy.

Key words: street food, vendors, customers.

PO3074

TO WHAT EXTENT ARE DIETARY SHIFTS A POTENTIAL LEVER TO REDUCE GREENHOUSE GAS EMISSIONS? A SIMULATION STUDY

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Background and objectives: Food-related greenhouse gas emissions (GHGE) contributing around 30% of EU emissions, dietary changes may represent a major lever to achieve the 80% GHGE reduction target set by the EU 2050 roadmap. However, few studies assessed the GHGE reduction potential of dietary changes. Our aim was to simulate the maximum GHGE reduction achievable through dietary changes only, and the effect of fulfilling nutrient recommendations on the reduction potential.

Methods: A mean observed diet was derived from 1,142 women participating in the French INCA2 survey. Diet-related GHGE were estimated based on GHGE values collected in the literature for 73 widely consumed foods. Linear programming was then used to simulate three dietary changes scenarios which aimed to minimize diet-related GHGE while (i) keeping the energy intake constant; (ii) keeping weight intake constant; (iii) reaching all French nutrient recommendations. Scenarios' social acceptability was ensured by imposing maximum food quantities based on reported intakes. Nutritional adequacy of reported intakes and scenarios was assessed using the mean adequacy ratio (MAR).

Results: The observed diet's GHGE were 3,478g CO2eq/d; the MAR was 76%. GHGE were reduced by 82% in scenarios (i) and (ii). This was achieved by: (i) reducing diet weight shifting towards more energy dense foods; (ii) shifting towards low GHGE foods and lowering energy intake. These shifts led to poor nutritional adequacy, with MAR of 50% (i) and 29% (ii). Introducing the nutrient recommendations in scenario (iii), i.e. reaching a MAR of 100%, led to a much weaker GHGE reduction of 39%, mainly achieved through reduced content of meats and increased content of plant-based foods, dairy products and fish.

Conclusions: Dietary changes can help reducing GHGE but the potential is limited by nutrient needs. Further reduction of diet-related GHGE must be achieved through improvements in the food supply chain.

Key words: greenhouse gas emissions; food choices; sustainable diet.

PO3077

USING AGRICULTURE FOR IMPROVED NUTRITION: A CASE STUDY OF A USAID 'FEED THE FUTURE' INTEGRATED PROJECT IN SENEGAL

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Background and objectives: USAID's $3.5 billion 'Feed the Future' (FTF) strategy links agricultural interventions with nutritional outcomes across 19 focus countries. USAID/Senegal's Yaajeende project, implemented by NCBA-CLUSA, is one of the longest running FTF-funded projects worldwide, and reports as early successes the production of 211 metric tons of vegetables from community gardens, a 22% increase in Minimal Acceptable Diet for 6-23 month olds, and over 100,000 people reached with nutrition messages and agricultural training. The objective of this case study was to explore promising best practices, and share them with other FTF projects.

Methods: Following a desk review of project documents, qualitative data collection was conducted in three project regions– Dakar, Matam, and Bakel. Twenty four key informant and group interviews were conducted with a total of 63 individuals, including USAID Mission staff, government stakeholders, project staff, private sector partners, and community members. Observations during 10 site visits provided additional information on implemented activities.

Results: Case study findings showed that Yaajeende staff at all levels share a common vision of 'nutrition-led agriculture', and are enabled/empowered to use private sector and government mechanisms to respond to field-identified needs. USAID Mission officers facilitate work-plan coordination between Yaajeende and a national community health project, resulting in effective cross-training and sharing among community health agents. Yaajeende's integrated approach promotes a high level of host-country buy-in among the Ministries of Agriculture and Health, and the National Nutrition Board under the Office of the Prime Minister. Contractual relationships with private sector partners are established throughout the agriculture value chains.

Conclusions: Keys to Yaajeende's success include ensuring that the multidisciplinary nature of integrated FTF projects is reflected in both project designers' and implementers' vision and practice. Projects should coordinate with a variety of in-country businesses, government service-providers, or advisory bodies focused on either agriculture or nutrition.

PO3078

CONSUMER LITERACY ON NUTRITION LABELLING AND FACTORS PREDICTING ITS USE IN MULTICULTURAL SINGAPORE

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Background and objectives: Nutrition labelling provides point-of-sale information to help consumers make informed food choices. In fast-paced, multicultural Singapore, there is no in-depth study on consumer literacy and use of nutrition information panels (NIP). Our objective was to determine factors that predict consumers' actual NIP use grounded in behavioral elements. Hypotheses H1: The more nutrition knowledge consumers have, the more they perceive NIP to be useful; H2: Perceived usefulness of NIP is influenced by consumers' restrained eating. H3: The more consumers perform well in mathematics calculations, the more they perceive that NIP is useful; H4: Perceived usefulness of NIP will lead to its actual use.

Methods: Shop intercept survey (N=200) in two large supermarkets targeting homemakers and office workers shoppers.

Results: Respondents comprise of Chinese (72.4%), Malays (11.6%), Indians (14.1%), and Others (2%); more participants (24.1%) are from the 25-34 years age group. Most respondents had completed primary or O/N level secondary school (47%), however they scored poorly in general nutrition knowledge. Consumers' knowledge does not significantly predict actual NIP use. Age ($p<0.01$) and restrained eating ($p<0.001$) significantly influence perceived usefulness of NIP, while gender and education do not. Consumers who follow this restraint, whether self-initiated or prescribed for image or health reasons, are more conscious in reading NIP. Numeracy skill is not a significant predictor of actual NIP use. Majority of consumers have high numeracy skills but showed limited understanding on fundamentals of NIP and reported constraints of time in grocery shopping, rendering perceived easier NIP format to assist calculations of Recommended Dietary Allowances not an effective strategy in encouraging nutrition labels use. Perceived usefulness of NIP will lead to its actual use ($p<0.001$).

Conclusions: Stakeholders involved in nutrition labelling education programs should incorporate restrained eating and diet-health consciousness in encouraging nutrition labels use.

Key words: multicultural, nutrition labelling, restrained eating.

PO3079

THE SMALLER THE PIECE THE HEALTHIER CONSUMPTION – A CHOICE ARCHITECTURAL EXPERIMENT IN BEHAVIOURAL NUTRITION

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Background and objectives: Unhealthy dietary habits influence individual and societal well-being, since they are associated with the rise of chronic non transmissible diseases worldwide. Although several campaigns promoting healthier lifestyles have been implemented in Northern Europe, and consequently people are more conscious about nutritional recommendations, low intake of fruit and vegetables remains an issue in Scandinavia, calling for innovative ways of intervention. The aim of this pilot study was to investigate the influence of the portion sizes on the consumption levels of apples and cakes presented during the snack breaks. The hypothesis was that consumers could be nudged to healthier food choices by improving accessibility to sliced apples and make a "healthier" cake portion (small) the default.

Methods: The sample consisted of 391 people attending a congress in Copenhagen, Denmark. People were divided in two groups for snacking during breaks, and were informed that this was for logistic reasons. Two snack tables were set up, one with normal sized pieces of cake (usual sizes provided by the caterer) as well as whole apples (control N=189), and a table with halved pieces of cake as well as apples served in quarter pieces (intervention (N=202). Four students did observation using electronic counting system. Outcome was measured in quantity of cake and apples consumed.

Results: Total consumption of cake was 30.2% lower per person and apple consumption was higher by 83.9% per person in the intervention site when compared to control.

Conclusions: This pilot study supports the hypothesis that the presentation of snacks plays an important role in the consumption of fruit and cake among Danish adults. Further, it suggests that such approach could become a supportive tool set for achieving PHN objectives.

Key words: nudging, fruit and vegetables, snacks, healthy eating, consumer behaviour.

PO3080

SMALLER PLATES, LESS FOOD WASTE – A CHOICE ARCHITECTURAL EXPERIMENT IN A SELF-SERVICE EATING SETTING

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Background and objectives: With roughly one-third of food produced for human consumption lost or wasted globally (about 1.3 billion tons per year), the. impact on the environment cannot be anymore neglected. Actions at all points in the production chain are now urgent, including reductions in food waste at home, by retailers and producers. Northern European consumers are among the most environmentally concerned consumers, however, their concerns do not always translate in more sustainable food-related behaviours. Furthermore, food choices are not always rational and could be non-reflective. Hence, the objective of this pilot study was to investigate whether the size of the dishware would non-reflectively influence the amount of foods taken from an "ad-libitum" buffet and the resulting amount of waste.

Methods: Sample consisted of Danish business leaders that took part in a congress in Copenhagen, Denmark. Two buffet tables were set up on two separate floors; one with normal sized plates (usual sizes provided by the caterer, 27cm) that served as controls (N=75), and a table with smaller sized plates (24cm) that served as the intervention (N=145). Participants were allocated to each of the two floors, and informed that this was for logistic reasons. All food waste was collected in designated trash bags (different colour in each floor) and weighted in bulk by students.

Results: Smaller plates appear to have decreased food waste by 26% compared to the standard sized plates at a single serving in a self-service eating setting.

Conclusions: This pilot study supports the hypothesis that dishware size plays an important role in the amount of food wasted among Danish adults in a self-service eating setting. This finding has PHN implications: slight changes in the foodscape can contribute to sustainable food consumption goals.

Key words: nudging, buffet, sustainable consumption, environment, consumer behaviour.

PO3081

ADHERENCE TO THE MEDITERRANEAN DIET: THE PERSPECTIVE OF FUNCTIONAL FOOD CONSUMERS AMONG THE BALEARIC ISLANDS' ADULT POPULATION

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Background and objectives: In the literature, studies that examine the interest of functional food (FF) users to the healthy Mediterranean diet (MD) do not exist. The aim of this study was to assess differences in the adherence to the MD between FF users and non-users, and to compare the consumption of FFs and intake of functional components between FF users with high and low adherence to the MD.

Methods: A cross-sectional nutritional survey was carried out in the Balearic Islands adult population (16-65 years) in 2009-2010. Data were obtained from a validated semi-quantitative food frequency questionnaire, two non-consecutive 24-h recalls and a global questionnaire.

Results: The mean adherence of FF users to the MD was 51.2% (SD 14.3), while the mean adherence of FFs non-users' to the MD was 49.6% (SD 11.9). Consumption of probiotics, fibre rich bread/cookies, infusions, fish, soy milk and cholesterol lowering products was higher in adults with high adherence to the MD, whereas consumption of breakfast cereals, fruit juice, infusions and red wine was higher in adults with low adherence to the MD. Moreover, daily mean intake of functional components which are from plant origin foods, like dietary fibre, vitamin C, vitamin E, beta-carotene, folic acid was significantly higher in adults with high adherence to the MD.

Conclusions: A moderate adherence to the MD was observed among both FF users and FFs non-users'. Consumption of MD components like fruits, vegetables and whole grain cereals should be increased to obtain high adherence to the MD, thus the intake of inadequate nutrients in the diet will increase.

Key words: functional food, functional component, Mediterranean diet, adult population, Balearic Islands.

PO3082

ULTRA-PROCESSED FOOD AND DRINK PRODUCTS IN MOROCCO

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Background and objectives: While the role of ultra-processed food and drink products in the obesity and related chronic diseases pandemics is acknowledged today worldwide, their actual contribution to the food system is yet to be assessed in most developing countries. The objective of this study is to achieve this assessment for Morocco.

Methods: Analysis of the Moroccan Ministry of Industry and Trade data on production and distribution of ultra-processed products.

Results: Various aspects reveal that ultra-processed products are widely available in the Moroccan food system :

1- The spectacular growth of related food industries (figures are in thousands Moroccan Dirhams TMAD):
   - The production value of sweet products increased importantly between 1990 and 2004: 5 times for ice cream and sorbets (TMAD29279; TMAD155944); 4 times for biscuits (TMAD215374; TMAD796413); 3.5 times for sugar-added drinks (TMAD605718; TMAD2170252) and 2 times for candies and chocolates (TMAD283869; TMAD532662).
   - The processed meat industry production value rose by 25 times between 1995 and 2004: TMAD21281; TMAD535231.

2-The visible flooding of the Moroccan markets with imported ultra-processed products (formally imported and smuggled).

3-The multiplication of ultra-processed products distribution sites: supermarkets (expanded to poor neighborhoods), small grocery stores, dried fruits shops, dairy shops, street vendors and even rural markets. In addition, there has been a steady increase in the proportion of food expenditures spent outside the home: 3.7% (1984), 4.7% (2001) and 5.5% (2007). Because of their convenience, ultra-processed products tend to constitute an important share of these expenditures.

Conclusions: The above elements show a significant presence of ultra-processed products in the Moroccan food system. This calls for the need to assess their actual intake levels among the Moroccan population and consequently, the necessity to review current nutrition education programs and revise food production and distribution legislation.

Key words: ultra-processed food and drinks products, Morocco.

PO3083

APPLICATION OF MULTIDIMENSIONAL POVERTY INDEX METHODOLOGY TO SUSTAINABLE DIETS' MEASUREMENT: DIMENSIONS AND CONCEPT

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Background and objectives: The continued existence of malnourished individuals, increased incidence of NCDs, and awareness of adequate nutrition as an indicator of development and environment has led to the clamour for the promotion of sustainable diets. This promotion though has to be preceded by identification and classification of diets as sustainable or otherwise. The objective of this presentation is to propose a methodology to measure sustainable diets/food systems especially taking into account the potentials of underutilized indigenous African foods.

Methods: Alkire's methodology for Multidimensional Poverty index (MPI) was adapted to measure the sustainability of diets/food system. Dimensions measured include food and nutrition security, cultural acceptability, environmental and economic impact; each having its own specific measurable indicators. The sustainability index (SI) includes stepwise calculation of sustainability of diets and whole food systems, proposition of different cutoffs - across dimensions of given diets and food systems. The aggregation of the sustainability of a food system is proposed as the product of multidimensional ratio (M) and intensity of sustainability (T).

Results: Based on the four dimensions measured, a food is considered not sustainable if the SI > 0.25, with the range of 0 to 1 representing 'very sustainable' to 'not sustainable'. The final aggregated SI of food system gives an index for comparing sustainability across food systems.

Conclusions: After validation, this methodology has the potential of measuring sustainable diets, with endless benefits to research and policy making regarding food system especially in the presence of neglected and underutilized food species.

Key words: sustainable diets, sustainability measurement, methodology, neglected and underutilized species.

PO3084

URBAN FIJIANS' PERSPECTIVES ON THE ACCEPTABILITY OF FRUIT AND VEGETABLES IN THE DIET

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Background and objectives: Low fruit and vegetable intake has been found in Fiji and is a major risk factor for both micronutrient deficiencies and diet-related non-communicable diseases. The objective of this study was to explore influences on fruit and vegetable intake among urban Fijians and identify which product attributes are considered acceptable and valued. This information is needed to support the design and development of interventions and policy to address low intake.

Methods: Urban consumers living in the capital region were recruited through community and religious organizations to take part in focus group discussions. Four discussions were conducted with each of the two major ethnic groups in June and July 2012. The topic guide explored influences on the selection of fruit and vegetables and perceptions on the acceptability of various product attributes. Discussions were held in English, Fijian, and Hindi and data were analysed in Nvivo using thematic analysis.

Results: Participants identified fruits and vegetables as healthful foods and essential components of traditional eating patterns. Tropical fruits and dark green leafy vegetables were favoured by indigenous Fijian (iTaukei) participants, while a wider range of tropical and temperate fruits and vegetables were acceptable to Fijians of Indian descent. Participants in both ethnic groups found the local fruit and vegetable supply to be unreliable and often unaffordable or of poor quality. Product value and acceptability appear closely tied to price, freshness, the absence of physical damage, a pleasant retail environment, and inclusion in ethnic meals.

Conclusions: Participants expressed favourable perceptions of fruits and vegetables; however, the local supply was perceived to be sub-optimal, especially in regard to affordability and product quality. These findings suggest a public health benefit could be gained through interventions that address the underlying causes of price instability and product damage.

Key words: fruit, vegetables, Fiji, Pacific.

PO3085

SALT LEVELS IN PORTUGUESE SOUPS

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Background and objectives: Soup is regarded as an important vehicle for the ingestion of vegetables, whose health benefits remain unquestionable. In Portugal, most people consume soup on a daily basis, being increasingly bought outside home in snack-bars, restaurants, supermarkets, or take-away services. However, due to the generalized use of salt (NaCl) as major seasoning, soup is consequently a major source of Na. The objective of the present work was to obtain real figures associated with the current salt content in "non-homemade" soups, in order to address its representativeness to the daily ingestion of Na in the Portuguese population.

Methods: A total of 83 soups were evaluated, being the Na amounts quantified by flame photometry, using an analytical method developed and validated for the purpose.

Results: The soups presented a mean amount of 297±76 mg/100mL for Na, equivalent to 0.75±0.20 g/100mL of NaCl showing a high variability. Indeed, the Na amounts ranged from 126 to 513 mg per 100 mL. Taking into account an average dose of 250 mL per soup, the values on Na range from 315 to 1283 mg, or from 0.80 to 3.26 g when expressed as NaCl per serving. Based on a maximum recommended daily intake of no more than 2 g of Na per day, a single soup represents around 37%, though these figures could be worse.

Conclusions: These outcomes are of extreme concern, since the consumption of non-homemade soups is increasing. Based on these findings, and aware of the recommendation to reduce salt ingestion, when consumed outside home, soup can be regarded as an important source of Na in the Portuguese population, being mandatory to implement recommendations for food producers and effective sensorial alternatives.

Key words: sodium, NaCl, soup.

PO3086

INCREASING PULSE INTAKE TO REDUCE MALNUTRITION IN TRADITIONAL PULSE GROWING REGIONS IN SOUTHERN ETHIOPIA

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Background and objectives: An international research program (Saskatchewan & Hawassa Universities) has been established linking agro-food systems and communities to improve food security in rural Southern Ethiopia. In this project, we are investigating inclusion of pulses, which are high in protein and essential nutrients, as a vehicle to improve nutrition and food security status in vulnerable groups.

Methods: Our research methodology includes nutrition and dietary assessment, measurement of food insecurity, and the use of complimentary feeding practices and indigenous knowledge to ameliorate nutrient deficits in children, adolescent women and young mothers.

Results: In conducting baseline studies in traditional pulse growing communities, we identified undernutrition as a problem: Adolescent girls (15-19 y, n=188) had intakes of energy, calcium, vitamin C and zinc of 70%, 13%, 5% and 65% of requirements, respectively, and the prevalence of stunting was 31% (National average 30%). In another group of infants and young children (6-23 months, n=128) 38% were stunted and, except for vitamins A and B2, median intakes of micronutrients were below requirement. In these communities, and others in our study, pulses already contributed to the nutritional value of the diet, yet increased consumption would improve nutritional status. Results, however, vary when introducing complementary pulse-based foods. In the second study above, mothers showed little interest in integrating kidney bean into their complementary feeding practices even though it was regularly consumed in the household (43% once/twice monthly). Yet in another group of mothers with young children (19 months, n=169) where 40% reported providing pulse-based food to their children, a porridge of 30% added broad bean was found acceptable.

Conclusions: Pulses can effectively be used as a suitable and inexpensive addition to traditional starch-based foods;

however, com munity education in the appropriateness and nutrition value of pulses would be beneficial.

Key words: pulse-foods, malnutrition, food security, women, children.

PO3089

A SURVEY OF NEW YEAR CEREMONIAL DISHES IN JAPAN – PART 1. TOSO, ZONI AND IWAI-ZAKANA

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Background and objectives: New Years celebrations are the most important events in Japan. Japanese people prepare toso (spiced sake), zoni (mochi rice cake soup) and special dishes called osechi-ryori for the first three days of the new year. However, this custom is disappearing. Nowadays, many people buy ready-made osechi dishes at stores instead of cooking them at home. Thus, the objective of this study is to investigate the eating habits of traditional new year dishes.

Methods: This survey was conducted by the Japan society of cookery science: A survey of ceremonial and ritual meals in Japan. Subjects were 24,858 living in 47 prefectures. The intake of typical new year dishes, toso, zoni and iwai-zakana (kuromame=sweetened black soybeans, kazunoko=herring roe and tazukuri=small dried sardines) was studied. Intake frequency was surveyed by a questionare whereby they could choose only one of the following 4 categories: 1. eaten every year; 2. eaten only sometimes; 3. eaten only recently, 4. now eating less. The intake in the present and the past was choosen for these 5 categories: 1. cooked and eaten; 2. presented then eaten; 3. bought and eaten; 4. eaten at parents‘ or relatives; 5. eaten at a restaurant, and the date/time it changed was surveyed.

Results: Meals eaten every year were toso 54.1%, zoni 94.2% and iwai-zakana 73~85%, and meals cooked and eaten were toso 32%, zoni 80% and iwai-zakana 30~48%, respectively. Zoni (91%) was cooked and eaten at home, while 44% of toso and 27~48% of iwai-zakana were bought and eaten. People whose habits changed during 1984~2004 were 52~53%. The influence of the mother or father regarding ceremonial dishes was 54.5% and 14.9%, respectively.

Conclusions: Zoni is cooked and eaten at home now. However, many people buy toso and iwai-zakana.

Key words: ceremonial meals, Japanese new year dishes, toso, zoni, iwai-zakana.

PO3090

HOUSEHOLD FOOD SECURITY IN A MOUNTAIN DISTRICT OF NEPAL

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Background and objectives: Interim constitution of Nepal 2006/7 has recognized food security as a fundamental human right of all citizens. National nutrition policy and strategy 2008 identified household food security as a long term strategy to ensure that all people can have adequate access, availability and utilization of food needed for healthy life. This study aimed to elucidate household food security experiences and views of key informants in a mountainous district of Nepal.

Methods: A qualitative study was conducted by means of interview to key informants of food security network at community and district level in a mountainous district, Jumla, of Nepal. Altogether sixteen key informants: community leaders, female community health volunteers, local shop keepers and members of district food security network (government officials) participated in the study. Content analysis was applied.

Results: In the analysis of experiences and views of key informants on household food security, four categories and nine sub-categories were developed: Food availability (own production, available at local market), accessibility (access to local market, affordable), utilization (food distribution and consumption practices, food values and food taboos) and sustainability (year round availability).

Conclusions: As other anecdotal studies in Nepal have shown, most of the households in Nepal are food insecure. This study adds a new perspective by describing the understanding of the people living in mountains on food security and explaining the barriers of food availability and accessibility in higher altitude. Rice was considered as the major staple and prestigious food despite other cereal. Lack of rice in local market, households and in meal was understood as sign of food insecurity in the district, quality was of not much importance. Supplementation of rice was identified as main solution.

Key words: food security, households, Nepal.

PO3091

THE MODIFICATION OF TRADITIONAL THAI GREEN CURRY PASTE RECIPES FOR HEALTH PROMOTION

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Background and objectives: Thai food is the cultural heritage that represents Thai nationality. It is outstanding in the combination of tastes and the diverse of herbs and spices that

useful for health. The objective of the study was to modify the traditional green curry recipes made from green curry paste and mussaman curry paste.

Methods: The popular green curry and mussaman curry paste recipes were selected and modified using low sodium curry paste and fish sauce, modified fat coconut milk. The recipes were then standardized and analyzed for nutrient contents using INMUCAL and chemical analysis. The recipes'acceptability were tested on five hundred subjects living in Bangkok using simple random sampling. The modified recipes and health benefits were disseminated by training the group of dietitians working in hospitals.

Results: The results showed that the five most popular green curry paste recipes were Green curry spare-rib with black pepper, Fried egg and spinach in green curry , Nam-ya green curry, mussaman Kung and Kua-Guing. Sodium and fat content of the developed recipes were reduced by 60 % and 50 % respectively. However, potassium is increased about 17%-133% compared to the original recipes due to the substitution of potassium chloride for sodium chloride. The chemical analysis of nutrient contents of the modified recipes demonstrated that saturated fat was reduced by 50 % resulting from the modified fat in coconut milk. The acceptance of the modified recipes were in moderately like to extremely like. The pre-test of the training program demonstrated that majority of dietitians recognized curry paste containing antioxidants as flavonoid and polyphenol.

Conclusions: After training, they learned the additional benefits of Thai curry paste on inflammation reduction. The scientific data and research supporting the health benefits of Thai curry paste are needed to promote Thai Food to kitchen of the world.

Key words: healthy, Thai, curry paste, recipe, antioxidants.

PO3092

DEVELOPMENT OF STANDARDIZED HEALTHY RECIPES FROM THAI CURRY PASTE AND THE DISSEMINATION OF HEALTH BENEFITS TO PROMOTE THAI FOOD MARKETING

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Background and objectives: Thai food is considered to be nutritious with aromatic herbs and spices ingredients. The purpose of this study was to develop the standardized Thai healthy recipes made from low sodium red curry paste and modified fat coconut milk.

Methods: The five most popular red curry paste recipes were selected and modified using low sodium curry paste, modified fat coconut milk and low sodium fish sauce. The recipes were then standardized and analyzed for nutrient contents using computerized INMUCAL program and chemical analysis. The acceptance of the developed red curry was tested on four hundred consumers in Bangkok using simple random sampling. The public relation of the developed recipes and their health benefits were disseminated by training the group of dietitians working in the hospitals and by distributing the brochure to the customers.

Results: The five most popular red curry paste recipes were Kangsubnok seekrong aun, Kangpedkai, Shushikung, Panangmoo and Todmunplakrai. The sodium and fat contents of the modified recipes were reduced by 60 % and 15 % respectively compared to the original. The chemical analysis of nutrient contents on the red curry sauce showed that saturated fat and sodium were decreased by 40 % and 60% respectively whereas potassium was increased by 60 %. These may be due to the substitution of potassium chloride for sodium chloride in low sodium red curry paste. The consumer acceptance of the developed recipes were in moderately like to extremely like. The pre-test result of the dissemination of the developed healthy recipes and their health benefits to the group of dietitians working in the hospitals demonstrated that majority of the trainees were recognized that the red curry paste contains antioxidants such as flavonoid but no awareness in polyphenol content.

Conclusions: Further research studies to support the health benefits of the developed red curry recipes are needed.

Key words: development, Thai healthy red curry paste recipes, health benefits.

PO3093

POTENTIAL CONTRIBUTION OF AFRICAN LEAFY VEGETABLES TO THE NUTRITIONAL STATUS OF CHILDREN

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Background and objectives: Children in South Africa, particularly those living in rural farm communities, are still affected by micronutrient deficiencies. Micronutrient rich African Leafy Vegetables (ALVs) might alleviate this hidden hunger. However, knowledge on and use of this "poor people's food" has decreased. This study assessed the potential contribution of ALVs to the nutritional status of children in a semi-rural farm community in South Africa.

Methods: Anthropometric indices, serum iron, zinc and retinol concentrations were determined in school children aged 5-13 years (n=155). Dietary intake was evaluated by three 24-

hour diet recalls. ALVs (Amaranthus cruentus, Cleome gynandra, Cucurbita maxima, Vigna unguiculata) were assessed for nutrient composition. Focus group discussions with primary caregivers gave important insights about ALVs.

Results: Stunting (11%) was the most prevalent indicator of malnutrition. Zinc deficiency (serum zinc <65 µg/dL) was highest at 74.8%. Slight deficiencies in iron (serum ferritin <15 µg/L; 15.5%) and vitamin A (serum retinol <20 µg/dL; 3.2%) prevailed. Median dietary intakes of iron, zinc and vitamin A were generally above the Estimated Average Requirement. ALVs could contribute substantially to the Recommended Dietary Allowance for these nutrients in children. Iron content of studied ALVs ranged from 1.4-3.2 mg/100g edible portions. Zinc content of the ALVs ranged from 0.7-1.4 mg/100g edible portions. The â-carotene content of the ALVs ranged from 182-314 ìgRAE/100g edible portions. Caregivers had knowledge and positive attitudes towards ALVs.

Conclusions: Although not severe (with exception of zinc deficiency), micronutrient deficiencies exist in this population. ALVs are potentially good sources of iron, zinc and â-carotene. The contribution of ALVs, existing micronutrient deficiencies, knowledge of ALVs and positive perceptions imply a potentially positive future response to interventions promoting consumption of ALVs, thereby helping to alleviate micronutrient deficiencies.

Key words: African leafy vegetables, micronutrient deficiencies, nutritional status.

PO3094

THE EFFECTS OF FOOD PREFERENCES ON BONE MINERAL DENSITY AND OCCLUSAL FORCE IN YOUNG WOMEN

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Background and objectives: According to the National Health and Nutrition Examination Survey carried out by the Health, Labour and Welfare Ministry of Japan in 2011, 29% of women in their twenties are underweight (BMI<18.5), many of whom have an unbalanced diet. In particular, their calcium intake is insufficient, and there is concern that they will develop osteoporosis when they reach middle- to old age. The present study examines what influence of food preferences on young women's bone mineral density and occlusal force.

Methods: A survey was conducted regarding dietary preferences, including preference for vegetables, root vegetables, soybean products, milk and dairy products; how food is chewed; and exercise history. The bone mineral density was measured by ultrasound bone densitometer. The ability of mastication was evaluated by assessing the occlusal force using an occlusal pressure measuring system.

Results: The study did not find a clear relationship between food preferences and bone mineral density, but as for the connection between food preference and occlusal force, the study found that women who liked root vegetables and milk had a stronger bite. Also, in regards to how food is eaten, subjects were generally unaware of how well they chewed their food.

Conclusions: The results show the necessity of increasing the amount of green and yellow vegetables, milk and dairy products that women with low bone mineral density eat. Also, in order to improve bite strength, it seems necessary to improve the number of times one chews food as well as the firmness of the foods consumed.

Key words: bone mineral density, occlusal force, food preference.

PO3095

INDIGENOUS AND TRIBAL FOODS FOR ADDRESSING FOOD AND NUTRITION SECURITY IN TWO TRIBAL COMMUNITIES OF JHARKHAND, INDIA.

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Background and objectives: Food and nutrition insecurity is a major concern for tribal populations. Jharkhand state has 30 Scheduled Tribes; Santhal and Oraon being two most populous.; 2% of tribal population face chronic hunger; 10% experience seasonal food insecurity. Chronic energy deficiency affects 39% men and 48% women in Jharkhand. A rich habitat of indigenous foods in tribal environments have potential to promote food security, nutrition and health. Understanding food systems of indigenous peoples and strengthening them in context of nutrition and health pose unique challenges. The objective of our study was to identify common indigenous foods in two tribal communities of Jharkhand and assess their contribution in addressing food security.

Methods: An exploratory, cross sectional study on Santhal and Oraon tribes (140 households each) in selected districts and stratified by villages. Robust study protocol employing mixed methods. Qualitative methods include Participatory Rapid

Assessment, Free listing, pile sorting and ranking, FGDs and Interviews. Quantitative methods include anthropometry, 24-hour dietary recall, food frequency questionnaire, socio-demographic profile, food consumption patterns and food security assessment and lab analysis.

Results: Quantitative and qualitative tools will be piloted to complement each other. Qualitative tools will be standardized to utilize them for indigenous foods identification and identifying factors influencing their consumption. Sample collection methodologies will be standardized. Labs will be identified and one lab finalized for analysis. Food security questionnaires will be adopted to assess household food security in Indian tribal population.

Conclusions: Scientific appraisal of dietary patterns of tribal communities can help in developing systems whereby communities can be encouraged to strengthen use and knowledge of local food and food systems. This can inform policies needed to improve food security, and promote indigenous food to mitigate the nutrition transition and help prevent environmental degradation, food chain contamination, and promote long-term sustainable ecosystems and health.

Key words: indigenous foods, tribes, nutrition security.

PO3096

COMMUNITY-LED FORMATIVE RESEARCH TO DETERMINE PRIORITY NUTRITION BEHAVIORS FOR AN INNOVATIVE PARTICIPATORY VIDEO FEASIBILITY STUDY

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Background and objectives: USAID's global nutrition flagship project, SPRING, is currently collaborating with Digital Green, to adapt a community-driven, participatory video and human-mediated social and behavior change communication (SBCC) approach for the promotion of high impact nutrition practices in 30 villages in Keonjhar District of Orissa, India. The program builds on Digital Green's success in the agricultural domain. Locally produced videos showcase and celebrate innovators, facilitators and early adopters of maternal, infant and young child nutrition (MIYCN)-focused or –sensitive practices. A first phase formative research was conducted to clarify current practices, barriers and likely facilitators for the adoption of improved practices, and identify and prioritize video content.

Methods: Formative research, conducted using a participatory model in a subset of six villages, included 12 focus group discussions and 24 in-depth interviews. Nightly team meetings and debriefs facilitated a rapid initial analysis of the findings, which greatly reduced delays in programming start up.

Results: The formative research found that breastfeeding is commonly supplemented during the first 6 months, while timing, diversity, density, and frequency of complementary feeds are not well understood; and handwashing is seldom practiced before preparing or feeding infants. Mother-in-laws play integral roles in the family structure, often deciding the quantity and frequency of food that pregnant and lactating women can eat, what work must be done by whom, and how food is allocated within the family. Husbands also hold powerful positions within the household, often exhibiting interest in and support of their wives. Women get little rest during pregnancy and many foods are thought of as "harmful" to the baby and mother.

Conclusions: Formative research informed the development of nutrition training materials, served to identify priorities for the videos, and was the key to designing a successful nutrition video production, dissemination, and adoption tracking plan.

Key words: SBCC, participatory video, MIYCN.

PO3097

BLOOD PRESSURE AND FOOD CONSUMPTION PATTERN OF URBAN AND RURAL PEOPLE IN WEST SUMATRA, INDONESIA

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Background and objectives: Hypertension is increasing along with obesity and changing in diet and lifestyle in Indonesia. This study was conducted to investigate the relationship between consumption of spices, fruits and vegetables to blood pressure between people in urban and rural areas in West Sumatra Province, Indonesia

Methods: This was a cross sectional study conducted in 2 cities (urban) and two municipalities (rural) in West Sumatera, Indonesia. 437 respondents were chosen systematic-randomn samplings from a list of adults (>30 years old) in the villages. Data of demography, health, lifestyle, food frequency questionnaire were compiled by interviewing the respondents. Anthropometry assessments and blood samples were taken.

Results: The study was conducted mostly to women (68%), more than 40 years old (73%). Obesity was found in 51% of

the respondents. There were significant differences in hypertension prevalence and consumption of fruits and vegetables between respondents in the rural and urban areas. No difference was found in spices consumption. There was a significant relationship between spices consumption with body weight and body mass index, but they were not significance when controlled by energy and carbohydrate intake. Significant difference was found between spices consumption and systolic pressure.

Conclusions: Consuming spices was associated with lower blood pressure. In excess of total energy and carbohydrate along with consumption of fruits and spices were associated with higher body weight and waist circumference.

Key words: spices, antioxidant, blood pressure, body mass index.

PO3098

INTEGRATING NUTRITION IN AQUACULTURE INTERVENTIONS IN BANGLADESH

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Background and objectives: In Bangladesh, with rich water resources, fisheries and aquaculture are important for livelihoods, income and nutrition, especially for the rural poor. In the last 25 years, aquaculture in Bangladesh has flourished, especially polyculture of carps in ponds; and in recent years, production of tilapia and pangasius catfish. The Government of Bangladesh, together with development partners have focused on aquaculture with the aim of increasing fish production and productivity, as well as income. In light of the recent global emphasis on agriculture for improved nutrition and health, WorldFish and partners have taken steps to integrate nutrition in aquaculture interventions.

Methods: An aquaculture-nutrition linkages package with the following components is now being integrated in interventions which begin with small-scale household aquaculture: pond polyculture of carps and micronutrient-rich small fish; micronutrient-rich vegetable production on pond dykes and in the homestead; promotion of increased consumption of nutrient-rich foods, especially for women, adolescent girls, as well as infants and young children; behaviour change communication for improved knowledge and practice of essential nutrition and essential hygiene actions; gender equity; and process and impact monitoring and evaluation. Implementation of the package is carried out by field staff, lead farmers and through regular meetings with farmer groups, as well as home visits, with contact to both female and male household members; in collaboration with staff from local government and partner organisations.

Conclusions: Building on experience from agriculture-nutrition interventions which focus primarily on homestead vegetable production, and with the added benefits of increased consumption of nutrient-rich fish, we expect to see a positive impact on nutrition. As aquaculture-nutrition linkage is new; process evaluation, and thereafter impact evaluation are needed for further refinement of the package and wider dissemination.

Key words: Aquaculture-nutrition linkage, micronutrient-rich fish, Bangladesh.

PO3099

FOOD DIVERSITY AND ADEQUACY OF FOODS CONSUMED BY HIV/AIDS INFECTED WOMEN IN MUMIAS DISTRICT – KENYA

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Background and objectives: The research aims at developing a food-based intervention strategy for HIV positive women, by adopting the principal of food diversity and adequacy in their micronutrient content, using locally available and affordable food stuffs in form of a Menu prepared using a developed recipe optimized to conserve selected micronutrients necessary for Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) victims. Such a strategy is critical for the HIV/AIDS victims due to the confounding nature of nutritional and health status of people living with HIV/AIDS on progression of their HIV/AIDS condition The objective of this study therefore was to find out the food diversity available to HIV/AIDS women, Their content of selected micro-nutrients, consumption patterns and nutritional and clinical status of the HIV/AIDS positive women.

Methods: This study was composed of a cross-sectional and intervention study designs. Phase one was composed of a cross-sectional study of 137 women living with HIV/AIDS in Mumias district to determine their nutrient adequacy. The P value for statistical significance test was set at <0.05.

Results: Quantitative analysis was achieved using SPSS software package. Descriptive statistics such as means and standard deviations were used to organize, describe and summarize the data on socio-economic and anthropometric measurements of the respondents. Anthropometry was used to provide valuable information on development in size and body composition of the women More than half of the women were found to consume foods that were inadequate in nutrients.

Conclusions: Given that more than half of the women were malnourished there was need to develop a Food based intervention from foods locally produced and consumed by the women and the product commercialized so as to empower these women and improve their livelihoods and health.

Key words: nutritional status, HIV/AIDS, food diversity.

PO3101

DEVELOPMENT OF A CLASSIFICATION SYSTEM FOR POTATOES

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Background and objectives: In South Africa potatoes are produced throughout the year in 11 production regions with different agricultural practices i.e. dry land and irrigation. The aim of the project was to develop a classification system for these potato cultivars with the purpose to guide consumer choice on culinary applications, fit for purpose with easy to understand front of pack information.

Methods: Nine different potato cultivars from five production regions were evaluated. Different potato cultivars typical to each region, with Mondial and BP1 included in each trail, were assessed by means of a trained experienced sensory panel at the sensory laboratory of the Agricultural Research Council (ARC), Irene. The physical tests were conducted at the University of Pretoria and nutrient analysis was conducted by the ARC Analytical laboratory, a SANAS (South African National Accreditation Services) accredited laboratory.

Results: In order to understand which attributes contributed the most to the textural characteristics of the different potato cultivars from the different regions, the dependent and independent variables were summarized and statistically analysed (PLS). Only attributes that explained the most variances in the data, (variances from 50% and above) were included, and comprised of the sensory attributes: mealy, waxy, hardness with a knife, fracturability in the mouth, compactness, coarseness; and objective attributes: shear force resistance of raw potatoes and total starch content.

Conclusions: Three categories were identified from the PLS plot, i.e. waxy, waxy/floury and floury. Each category was described by textural characteristics and suggested cooking methods typical to cultivars that fall within the specific category. The information gained form this study has enabled the potato industry to develop a consumer education initiative by labeling and marketing potatoes according to their cultivar classification.

Key words: potatoes, cultivars, classification.

PO3102

MILK CONSUMPTION PATTENS AMONG RESIDENTS IN BEIJING

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Background and objectives: Calcium deficiency is prevalent in Beijing, while milk consumption, the most important dietary source of calcium, is unknown.

Methods: A subsample of the China Health and Nutrition Survey in Beijing was used. 1,329 residents from 24 communities in 6 districts in Beijing were randomly selected by using multistage random cluster sampling schedule. Dietary data were collected with three consecutive 24-hour recalls and average consumption was adjusted to per standard person per day. Milk consumption included fresh milk, powdered milk, and yogurt, excluding milk drinks.

Results: On average, 74.4% of children aged 2-6 years, 68.4% of children and youth aged 7-17 years, 52.8% of young adults aged 18-44 years, 46.3% of adults aged 45-59 years, and 60.4% of adults aged 60 and older drank milk daily. The amount of milk consumed in each age group was 233.6 grams/day (g/d), 132.4 g/d, 75.8 g/d, 96.6 g/d, and 163.4 g/d, respectively. The proportion of milk drinkers and amount of milk consumed were higher among women than men, higher among young children and elders than youth and adults, and higher among high income people than low income people.

Conclusions: Milk consumption is increasing in Beijing, China, but the amount consumed is still much lower than the recommended level.

Key words: milk consumption, calcium intake, nutrients intake.

PO3103

FOOD-INTAKE PROFILE IN LOW-WAGED POPULATIONS IN SOUTHERN BRAZIL

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Background and objectives: Food-intake profile has changed in Brazil since late 20th century, with decrease in natural food rich in fibers and micronutrients and increase in indus-

trialized food featuring high fat, salt and sugar rates. Low-waged populations have also changed to a food-intake profile associated with obesity, hypertension and diabetes. Collectors of recyclable matter, who earn their living collecting, selecting and selling paper, cardboards, glassware, iron and non-iron material, are included in this group. Current research verifies the food-intake profile in collectors of recyclable materials.

Methods: A cross-sectional and descriptive study, comprising demographic, anthropomorphic and food-intake data, was undertaken with 273 collectors of recyclable matter from 15 cooperatives in seven towns in southern Brazil. Regular intake of food, such as beans, fruits, vegetables, fried food, refreshments and sweets, full milk, meat fat and breakfast, was investigated. Data were analyzed by Excel and results described according to frequency.

Results: Sample comprised 92% adults, 73% females, 59% non-whites and 51% overweight. Food-intake profile of the above population comprised regular low consumption of fruit (84%) and vegetables (53%), high consumption of fat meat (64%), full milk (55%), lack of breakfast (62%), and a high intake of sweets (29%), fried food (24%) and soft drinks (19%), although 84% intake beans at least five days in the week.

Conclusions: Food intake of low-waged populations is similar to or worse than that of the Brazilian population as a whole. High intake of food rich in sugars and fats may be associated with high overweight, diabetes and hypertension rates in these populations as verified in other studies in Brazil. Policies to enhance the intake of healthier food and to discipline industrial food advertisements should be taken.

Key words: food-intake profile, obesity, nutritional transition, Brazil.

PO3104

PREDOMINANCE OF LOW STATURE AND ASSOCIATED FACTORS IN ECONOMICALLY AND SOCIALLY VULNERABLE POPULATIONS IN SOUTHERN BRAZIL

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Background and objectives: Low stature is associated with nutrition deficiencies during the growth and development stages in childhood. It is actually a frequent condition in economically and socially vulnerable populations and, according to Barker´s theory, may trigger deleterious effects in adulthood. Adaptive mechanisms which make such people particularly susceptible to chronic diseases (obesity, hypertension, diabetes) are unleashed. Collectors of recyclable matter, who earn their living collecting, selecting and selling paper, cardboards, glassware, iron and non-iron material, are included in this group. Current research determines the predominance and association of low stature in collectors of recyclable materials.

Methods: A cross-section study, comprising demographic, anthropomorphic and biochemical data, has been undertaken with 273 collectors of recyclable matter from 15 cooperatives in seven towns in southern Brazil. Low stature was determined by lower rates than 5º percentile of WHO´s growth standard. Data were analyzed by SPSS and Pearson´s test at $p< 0.05$ was undertaken.

Results: Sample was largely composed of adults (92%), females (73%) and non-whites (59%), of which 17% were diabetics, 22% had a low stature, 25% were hypertensive, 51% were overweight and 66% featured cardiovascular risk (waist circumference : stature). Low stature was associated with age, schooling level, weight, cardiovascular risk, body fat, haemoglobin, total cholesterol, LDL-cholesterol, glycaemia and creatinine ($p<0.05$).

Conclusions: Frequency in low stature, overweight, diabetes and hypertension in the above-mentioned vulnerable population is similar to or higher than that in Brazilian population as a whole and is associated with numberless variables confirming Barker´s theory. Data show that low-waged populations live with deficit illnesses such as nutritional excesses, although without any availability to and attention from the public policies.

Key works: Cardiovascular risk, collectors of recyclable materials, food-intake profiles, low stature.

PO3105

PATTERNS OF ALCOHOL CONSUMPTION IN LIAONING, CHINA

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Background and objectives: To examine the patterns of alcohol drinking among adults in Liaoning province.

Methods: Data on 1,039 adults aged 18 years old and older from 480 households participated in the China Health and Nutrition Survey were used. A multistage stratified cluster random scheme was used to draw the sample in Liaoning. Alcohol consumption data were collected by using food frequency questionnaire and three consecutive 24-hour recalls.

Results: 34.0% of participants drank alcohol regularly (58.0% in men and 11.7% in woman). The average alcohol in-

take was 26.0±33.5 grams/day (g/d, weight of ethanol) among drinkers (29.1±35.1 g/d in men and 11.7±19.7 g/d in women). Heavy drinkers were those aged 45-59 years (62.5%, 33.8±35.9 g/d), living in rural areas (59.9%, 34.8±38.5 g/d), and with lower education (50.6%, 37.3±38.1 g/d) among men, and those aged 18 - 44 years (16.1%, 15.8±27.6 g/d), and with higher education (25.6%, 6.0±6.4 g/d) among women. 35.9% of male drinkers drank daily and the favorite types were liquor (72.3%) and beer (63.0%). 30.2% female drinkers drank 1-3 times a month and the favorite types were beer (66.7%) and wine (31.7%). Excessive, dangerous, and harmful drinking were 13.8%, 11.1%, and 11.1% among male drinks and 9.5%, 9.5%, and 4.8% among female drinkers, respectively. Dangerous and harmful drinking were higher in rural (40.4%) than in urban (20.0%) areas and higher in low education (43.2%) than in high education (25.6%) groups.

Conclusions: Alcohol consumption is high and varies significantly among gender, education level and living areas in Liaoning, China.

Key words: nutrition survey, alcohol consumption.

PO3106

MULTI-SECTOR LINKAGE MODELS FOR COMMUNITY-BASED NUTRITION IN ETHIOPIA-MODEL 1: MARKET APPROACH OF LOCAL COMPLEMENTARY FOOD PRODUCTION

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Background and objectives: In order to achieve the Millennium Development Goal 4: Reduce Child Mortality in Ethiopia, it is a major stumbling block that almost a half of Ethiopian children under five years old are stunted and more than 10% wasted. The JICA project, designed to be gender-sensitive and multi-sectoral, implements activities including production of complementary food (CF) (Model 1) and growing vegetable gardens (Model 2) by women's group, aiming to develop effective models for nutrition improvement through multi-sectoral coordination in Oromia region, Ethiopia.

Methods: Model 1 adopts a market approach where issues of access and utilization are addressed by promoting consumption of nutrition-rich locally processed CFs. In this regards, a women's group was established to generate income from the production and sales of CFs at a shop. The income generating activity is linked to BCC, particularly cooking demonstrations of CF for mothers with under two children. The nutrition value was enriched by roasting/germinating grains/legumes in the locally processed CFs.

Results: After 6 month of the implementation, CF sales by the women's group increased 50% from the initial period and 30% of the total population of under two children covered by cooking demonstrations.

Conclusions: We need further determinations for the impact of the model in mother's behavioral change of CF preparation as well as nutrition status of the children.

Key words: malnutrition, complementary food, local food production, multi-sector linkage, community-based nutrition.

PO3107

MULTI-SECTOR LINKAGE MODELS FOR COMMUNITY-BASED NUTRITION IN ETHIOPIA -MODEL 2: A FOOD AVAILABILITY MODEL

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Methods: Model 2 adopts a food availability model where issues of availability of and access are addressed by development and promotion of nutrition-rich food. A rapid assessment on food availability was conducted in November 2011 to assess local production patterns of crops for household consumption and market as well as available resources that could be tapped for production of missing ingredients. Based on the information from the assessment, a community action planning was organized with participation of community cabinet members and the two key activities agreed were: cooking demonstration of complementary foods using the recipes developed; and production of missing food items in the diet though households that have private rainwater harvesting ponds as an entry point.

Results: After 3 month of the implementation on these key activities, 70 % of total population under 2 children covered by cooking demonstration and dietary diversity in target households was increased.

Conclusions: A further monitoring of the model activities is needed to consider impacts of the model at community level.

Key words: malnutrition, food availability, local food production, multi-sector linkage, community-based nutrition.

PO3108

NUTRITIONAL STATUS OF ALGERIAN CHILDREN AGED 6 TO 12 YEARS

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Background and objectives: Currently, nutrition education is difficult to apply because the power of the child depends not only the family but also in society. Our work aims to compare observed between diet and advised Algerian children 6 to 12 years to correct some errors foods.

Methods: Our study is a qualitative description of the food situation in 2196 Algerian children aged 6 to 12 years using a qualitative data analysis, 7 studies only 67 studies that talk about the food situation of Algerian children 6 to 12 years. Then a comparison between the observed and the power supply recommended (2001).

Results: The decrease in daily energy intake of children in relation to recommended intakes. Energy shares breakfast and lunch are lower. An imbalanced distribution of macro and micronutrients. Breakfast is neglected, the composition of the morning snack and snack foods with high energy density, snacking is common among children all the time watching television. Food snack foods are the kind Junk Food. A decrease in the practice of regular physical activity.

Conclusions: It seems that the eating habits of Algerian children are not different from those of industrialized countries; they reproduce the same mistakes food, it is urgent to develop appropriate prevention and implementing awareness programs especially in institutions school.

Key words: Algeria, situation food, nutrition education, healthy children 6 to 12 years, recommended nutritional intakes 2001.

PO3109

DEVELOPMENT AND VALIDATION OF FOOD-FREQUENCY QUESTIONNAIRES IN IRAN - A REVIEW

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Background and objectives: The food-frequency questionnaire (FFQ) has been widely used in large-scale nutritional epidemiological studies. Due to great differences in food habits, FFQs must be tailored for use with specific populations. The aim of this review is to review FFQs developed and validated in Iran.

Methods: A literature search was undertaken to trace articles reporting on development of FFQs for Iranian populations.

Results: Some FFQ validation studies include the following: A semi-quantitative FFQ developed for Tehran lipid and glucose study that was found to be reliable and valid for assessing the intake of several food groups, nutrients, and dietary patterns derived from it. A short FFQ for screening women of childbearing age for vitamin A status in northwestern Iran developed too. There are also studies about development of FFQs to assess fruit and vegetable intake in adults and a FFQ for calcium intake in 9-13 years old children in the city of Tehran. Furthermore, a study was done to evaluate validity and reproducibility of energy and nutrient data derived from a FFQ design for a prospective study on diet and esophageal cancer in Northern Iran.

Conclusions: There is a research gap in developing FFQs for different study goals and target populations in Iran. Further more studies are needed to develop FFQs especially short FFQs for different purposes among Iranian individuals.

Key words: Foor-frequency questionnaire, nutritional epidemiological studies, validation.

PO3110

FOOD INSECURITY AND METABOLIC SYNDROME AMONG WOMEN FROM LOW INCOME COMMUNITIES IN MALAYSIA

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Background and objectives: Previous studies have shown that food insecurity is associated with risk of chronic diseases. There is no published information on the relationship between food insecurity and metabolic syndrome in Malaysia. This cross-sectional study examined the relationship between household food insecurity with Metabolic Syndrome (MetS) and its individual risk factors among women (n=625) in low income communities.

Methods: The Radimer/Cornell Hunger and Food Insecurity instrument was utilized to assess food insecurity. Diet diversity, anthropometry (waist circumference and body mass

index), blood pressure and fasting venous blood for serum lipid and plasma glucose were also obtained. MetS was defined as having at least 3 risk factors and according to the Harmonized criteria.

Results: The prevalence of food insecurity in this sample was 78.4% (26.7% household food insecure, 25.3% individual food insecure, 26.4% child hunger). The percentage of women with abdominal obesity, hypertension, low HDL-C, high TG, high FPG and MetS was 39.7%, 32.8%, 59.0%, 14.1%, 33.0% and 25.6%, respectively. Women in food insecure households, particularly those reporting individual food insecure and child hunger, were more likely to have reduced number of metabolic risk factors ($p<0.05$) and lower risk of abdominal obesity ($p<0.01$), elevated total cholesterol ($p<0.05$) and LDL-cholesterol ($p<0.05$) compared to food secure women. The risk however, increased as food insecurity improves.

Conclusions: Efforts to improve food insecurity among low income households should address availability and accessibility of healthy food choices that could reduce the risk of metabolic syndrome and chronic diseases.

Key words: food insecurity, metabolic syndrome, low income communities.

PO3111

WORLDWIDE CONSUMPTION OF EDIBLE INSECTS OF ORTHOPTERA ORDER

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Background and objectives: Entomophagy term generally used to refer human consumption of insects is common in cultures of many ethnic groups since ancient times in different parts of the world, such as Latin America, Africa, Asia, India, Australia and New Zealand. Over 1,000 insects are known to be eaten in 80% of the World nations. However, in some societies mainly in Europe, insect eating is uncommon, today insect eating is rare in the developed world, but insects remain a popular food for many developing regions worldwide. Some of the more popular insects eaten either raw or prepare with other staples around the world include crickets, cicadas and grasshoppers. The aim of this study was to investigate which countries consume insects from the Orthoptera order and to analyze the macronutrients of them.

Methods: Insects were collected in Mexico, obtained in local markets of Thailand, China, India, Japan, South Africa, Kenya, Australia and New Zealand and macronutrient analyzed by AOAC methods.

Results: Data obtained show that insects provide a good source of macronutrients, however contain of each parameter vary according the environment conditions among other factors. They are available at any ecology system, reproduce at a faster rate, generally have high protein conversion efficiency and do not compete for water.

Conclusions: Orthoptera order insects, represent a good source of nutrients, their consumption should be promoted to include them in a daily diet to improve nutrition of malnourish people of developing countries.

Key words: edible insects, entomophagy, Orthoptera order.

PO3112

NUTS CONSUMPTION AND FREQUENCY IN PHYSICIANS AND NURSES

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Background and Objectives: Epidemiological studies have consistently demonstrated that frequent nuts consumption is associated with reduced risk of developing coronary heart diseases, type 2 diabetes, or death by overall mortality causes .Nuts are fatty foods and presumably for this, until recently, were ignored or treated with a great deal of caution on most dietary recommendation .The aim of this study is survey nuts consumption in physicians and nurses that work in education hospital in Kerman.

Methods: A cross sectional study was done in 2011-2012. Three hundred nurses and 200 physicians were included .The study has done by a questionare that involved demographic information and questions about eating and frequency behaviors. All statistical analysis was performed by SPSS and P value less than 0.05 was considered as statistically significant. **Results:** Population of this study was 300 nurses and 200 physicians. Four hundred forty one of them completed the questionnaire .Mean of age was 34.45±8.3. Mean of BMI was 23.94±4.17. Less than 10% of population consumed nuts habitually and 18.8% of them never ate it. The majority of the population eat them weekly.

Conclusions: Despite of nuts importance, their consumption is low among this population. Educational programs needed for developing of their knowledge and their usefulness of consumption.

Key words: consumption behavior, frequency behavior, nut, nurses, physician.

PO3113

FROM SOUL FOOD TO FAST FOOD: THE MODERN AFRICAN-AMERICAN DIET

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Background and objectives: African-Americans statistically have higher rates of obesity and nutrition-related illnesses, due to unhealthy diet and sedentary lifestyles. This study characterizes the evolving diet of modern African-American people which has shifted from agrarian based to more processed foods, contributing to their current health condition.

Methods: Five 2-hour focus groups were held with African-Americans living in Davidson County, TN for a project aimed to promote weight management among African-American children. One focus group consisted of community members, two with parents/guardians, and two with children deemed at risk for adulthood obesity. A series of questions about dietary habits and media influence on diet were discussed within a cultural context.

Results: (1) Modern soul food and/or 'black food" consists of food that is cost-efficient and energy dense but not home cooked; (2) Economic disparities limit access to fresh, healthy food options; (3) Time constraints inhibit the planning and preparing of healthy home-cooked meals; and (4) Media targets African-American consumers with the least nutritious and nutrient-dense products.

Conclusions: Focus group participants identified a number of fast food chains and manufactured foods as 'black food' and consumption of these high caloric, low-nutrient dense foods occur frequently. While older focus group participants reflected how the traditional African-American diet used to include fresh produce , younger participants commented that economics and accessibility prevented them from incorporating produce in their diets. Media and advertising were identified as a contributing influence on diet by all age groups.

Key words: African-American, fast food, soul food.

PO3114

FACTORS THAT INFLUENCE EDIBLE WILD FRUIT CONSUMPTION AND CONSUMPTION HABITS: A CASE OF GULU DISTRICT, UGANDA

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Background and objectives: Rural communities in many parts of this district benefit in many ways from consuming wild edible fruits. However, compelling factors and daily consumptions habits of these fruits are not documented. The objectives of the study were therefore to document the main daily community's consumption habits of these fruits, to document compelling factors for consuming these fruits and to establish community's daily practices towards these wild fruits. This study was conducted in Awach, Paicho, Patiko, Ongako, Lalogi and Bobi Sub-Counties, and 350 respondents were interviewed.

Methods: Data were collected using semi-structured questionnaires during interviews with respondents. The edible fruit trees under study were obtained from our previous study and included Vitex doniana Sweet, Vitelleria paradoxa Gaertn, Borassus aethiopum Mart., Tamarindus indica L. and Anonna senegalensis Oliv.

Results: The result showed that consumptions of these fruits were highly influenced by sensory responses (55%), social factors (13%), availability and accessibility (16%), and hunger. These factors significantly varied among the fruit species ($P<0.05$). Children (52.3%), pregnant women (23.7%) and the sick (19.1%) were more encouraged to consume these fruits, intentionally to derive satisfaction and pleasure from them. Gender inclusion in fruit harvest insignificantly varied ($P>0.05$). Correlation analysis was positive for both preferred fruits and frequency of consumption ($r=0.2942$), and preferred time for consumption ($r=0.0635$). Children younger than 15 years were found to be very active consumers. Very few individuals showed interest in including fruits as part of their daily meals.

Conclusions: Many factors influenced the consumption fruits, but varied among fruit species. Besides, inadequate knowledge existed on nutritional and health benefits associated with eating these fruits.

Key words: wild fruits, consumption habits, Gulu.

PO3115

CATALYZING HOUSEHOLD SUPPORT FOR IMPROVED MATERNAL CARE: A RANDOMIZED CONTROL TRIAL OF NEW METHODS FROM BANGLADESH

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Background and objectives: In Bangladesh, recent research has found higher rates of undernutrition among pregnant women compared to non-pregnant women. Additionally, over 50% of babies are born with low birth weight. Cultural practices around food and care likely increase the risk of undernutrition among pregnant women and infants. HKI identified a need for behavior change communication (BCC) materials targeting households, particularly husbands and mothers-in-law, with the objective of improving knowledge and practices around nutrition of pregnant women.

Methods: BCC materials were developed following formative research, which identified facilitators and barriers to behavioral objectives as well as key words and phrases for use in the materials. It also examined households' usage, comprehension and preferences regarding communication materials. The effectiveness of these interventions is currently being tested in a randomized control trial (RCT).

Results: Following multiple rounds of field testing, two BCC materials were finalized. One is a game with dice and cards depicting positive and negative behaviors related to maternal and child health and nutrition (MCHN). The second is a calendar that spans from the fourth month of pregnancy through six months post-partum, with monthly messages and actions to promote household support of MCHN. The immediate goals of these materials is an increase in male knowledge of best care practices for pregnant women and infants, as well as increased support for mothers in terms of childcare and other household tasks. In the long run, the materials are expected to have an impact on child nutritional status.

Conclusions: Based on evaluation results, these materials may provide a scalable option to reach households with messages to improve cultural practices around food and care for pregnant women.

Key words: behavior change communication, pregnant women.

PO3116

BUILDING COMMUNITIES OF CARE: GENDER EQUITY AS THE HEART OF FOOD SECURITY

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Background and objectives: Gender discrimination is a structural cause of the alarmingly high rates of food insecurity and malnutrition in Bangladesh. Formative research undertaken at the start of many of Helen Keller International's (HKI) projects has indicated that the low status of mothers within households is a significant obstacle to the adoption of nutrition practices such as exclusive breastfeeding or taking extra food and rest during pregnancy. HKI sought to design a new training curriculum to challenge existing gender norms and support young women's autonomy in order to break the intergenerational cycle of malnutrition.

Methods: The curriculum is based on activities from "Stepping Stones" and previously developed HKI's behavior-change communication modules, and builds on existing knowledge and local practices. The curriculum strongly emphasizes action at the personal, inter-personal, family and community levels while building skills in communication, assertiveness and problem-solving.

Results: Following pilot-testing in rural communities in the north of Bangladesh, the adaptation of this curriculum, called "Building Communities of Care", has been finalized, including the development of a facilitators' manual in both Bangla and English, and guidelines on the adaptation of the curriculum contents, facilitation skills, and a qualitative assessment. The curriculum gives family stakeholders (women, husbands, mothers-in-law, and fathers-in-law) the opportunity to discuss nutrition and gender-related issues among their communities and improve or change nutrition and food security practices. This intervention is currently being tested using a cluster randomized design.

Conclusions: The structure of the training has been well-received by both field workers and families in two rural areas. The evaluation results will help to target this intervention for further dissemination in other programs seeking to improve the food security and nutrition of individuals and improve gender relations.

Key words: nutrition practices, food security, behavior-change communication.

PO3117

COMPARING THE QUALITY OF EATING OUT AND EATING AT HOME IN BRAZIL

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Background and objectives: Some papers suggest that out-of-home eating in Brazil is less healthy than food consumed at home, linking the former to junk food. Our objective is to show that such view is mistaken.

Methods: We use data from the Brazilian Nationwide Dietary Survey conducted along with the 2008-2009 Household Budget Survey (POF 2008-2009). Usually the comparison is between those who eventually eat out (40.2%) and those who eat only at home (59.8%). This means comparing very different groups of people. Those who eventually eat out on average have a higher family income per capita (45% higher), schooling (8.8 years as compared to 6.4) and higher daily calories consumption (2,063 kcal versus 1,801). In order to estimate the impact of 'eating out' on diet quality it is necessary to control for the effects of other factors, in particular income levels. Unobserved variables such as gluttony might also have an impact. Using the information about people eating out or at home (sample of 12,045 persons in POF 2008-2009) we estimate the impact of 'out-of-home eating' controlling for all the individual characteristics, even gluttony. An appropriate estimate is obtained by considering, for each individual, the difference in the value of the dependent variable between eating outside home and eating at home.

Results: We show that, for each 100 kcal of food consumed away from home fat and salt content is lower, and fruit and C vitamin content is higher. On the other hand, food outside home presents lower A vitamin and iron content and more sugar. It is also shown that away-from-home eating is associated with a lower probability of an adult presenting overweight or obesity.

Conclusions: On average, eating out-of-home may be healthier than eating at home.

Key words: away-from-home eating, obesity, overweight, Brazil.

PO3118

FOOD CONSUMPTION CHARACTERISTICS AMONG SOUTH BRAZILIAN LOW-INCOME YOUTH

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Background and objectives: Diet quality, family size, socioeconomic variables and home area can interfere in Brazilian consumption. The Young Apprentice Program is intended for qualification and professional knowledge to Brazilian low-income youth. Analyze food consumption characteristics among south Brazilian low-income youth.

Methods: Cross-sectional descriptive study with 73 youth, among 14 and 24 years old, from TECPUC Young Apprentice Professional Qualification Program. The questionnaires were self-applied during health classes as alternative evaluation. Each question was explained by the nutritionist teacher. The data were analyzed in Excel software and the results were described thought frequency.

Results: All research participants live in a high social vulnerability area in Curitiba, Paraná, and therefore are inserted in this Program. Almost two thirds of the sample live in small houses with more than four people together. The present study main finds were that 54.8% have their meals watching TV, talking on the cell phone, in front of the computer or doing their job; 61.6% uses to eat sweets every day; 66% declare having 4 or more meals per day and 47.8% refer to delay their meals in more than 4 hours; 32% drink more than 5 glasses of water/day; 60% overeat pizza and over drink soda on the weekends; 78.1% mention never have done diet to lose weight, but are not satisfied with their body.

Conclusions: Health Education may be an important tool in health risk factors prevention associated to better food choices, assuring nourishing and nutritional safety to this population.

Key words: food consumption, nutrition transition, Brazil, low-income.

PO3119

FARM FAMILY DECISIONS IN BANGLADESH: WHAT MOTIVATES MEN'S SPENDING TO IMPROVE NUTRITION FOR WOMEN AND CHILDREN

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Background and objectives: Gains in agricultural production and income often translate poorly into nutritional gains for women and children. Use of agriculture-derived income to purchase specific nutritious foods likely would improve the nutritional impact of this income. Nutrition education concerning the nutritional needs of women and children, and the nutrient value of various food items, may help consumers make more nutrition-positive purchases, but successful promotion of such purchases requires understanding which food and nonfood items normally are purchased when agriculture income increases, and why individuals choose these items. The objective of this investigation is to understand the motivations of Bangladeshi farmers when making specific food purchases, and the purpose is the development of promotional approaches to motivate the purchase of nutritional foods for women and children.

Methods: Male farmers from Barisal and Khulna, Bangladesh, participated in focus group discussions (FGD) concerning attitudes about items available in local markets. Only male farmers participated because Bangladeshi men generally conduct all household marketing. Using pile sort techniques, participants categorized pictures of food and nonfood items according to "the way people see" each item. Categories represented economic concerns (e.g., things purchased at every market visit), health (e.g., good for women and/or children's health), and social values (e.g., things a responsible husband provides, luxury items). Following the FGD, 24 FGD participants provided in-depth interviews detailing their personal attitudes toward the items and categories.

Results: The results of the FGD and interviews provided the basis for promotional messages provided to agricultural extension agents, farmer field group leaders, and national agriculture information services.

Conclusions: As agricultural production and income increase, households consider a variety of factors when deciding how to use the income they gain, and these factors must be satisfied for households to make pro-nutrition market purchases.

Key words: agriculture and nutrition, food choice, income elasticity.

PO3120

CHANGES IN CAPILLARY DIAMETER, DENSITY AND RBC VELOCITY OF NAIL-FOLD MICROCIRCULATION IN HEALTHY PEOPLE INDUCED BY WARM/HOT AND COOL/COLD FOODS

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Background and objectives: In the traditional Chinese medicine, both personal constitution and food attribute are divided into two major categories, i.e. warm/hot and cool/cold. However, there are less scientific evidences about the connection between food attributes and personal constitutions. In our previous study, we suggested that the capillary RBC velocity of nail fold microcirculation (NFM) may be a promising way available to classify food attributes. The aim of this study was to confirm the relationship between the different attributes of food and the capillary signals of NFM produced in the healthy people with different constitutions.

Methods: Fifty subjects constitutions were diagnosed by two Chinese medical doctors. Watermelon and cantaloupe were selected to be the cool/cold samples, as well as fried peanut and seedless dried longan were chose to be the warm/hot samples. Capillary signals and subjective feelings were then measured with a laser Doppler anemometer and a self-edited questionnaire.

Results: The capillary density, diameter and RBC velocity of all subjects would be significantly increased by the warm/hot samples and decreased by the cool/cold ones. However, the capillary density and RBC velocity of the hot constitution subjects (n=29) after taking longan was raised more significantly compared with taking peanut, but no differences between taking watermelon and cantaloupe. We considered that the hot constitution people would be more sensitive to warm/hot foods than cool/cold foods. On the contrary, the cold constitution subjects (n=21) would be more sensitive to cool/cold foods based on the results of their capillary signals after taking cantaloupe was reduced more significantly compared with taking watermelon.

Conclusions: Accordingly, the capillary signals of NFM should be a suitable methodology to scientifically classify the different degree of food attributes in accordance with the different constitutions of people.

Key words: traditional Chinese medicine, food attribute, personal constitution, capillary RBC velocity.

PO3121

FOOD FREQUENCY DATA OF A SELECTED SRI LANKAN POPULATION

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Background and objectives: There is an epidemic of obesity and type 2 diabetes currently in the world. Main reasons for these health issues are life style changes, lack of physical exercise and diet. Thus, the aim of this study was to analyze the food frequencies of a selected non-diabetic population in Sri Lanka.

Methods: 46 non-diabetics (males-8; females-36) with normal fasting blood sugar levels (<110 mg/dl) were recruited. The study design was descriptive cross section. An interviewer administered questionnaire was used to collect data. Ethical approval was from Ethics committee, Faculty of Medical Sciences, University of Sri Jayewardenepura.

Results: White & red rice consumption (>once/day) were 70% and 35% respectively. However, 80% & 91% of the population respectively had never consumed parboiled rice or brown bread. 13% consumed starchy vegetables and 61% green leafy vegetables daily. 73% had never consumed pulses as a main dish. Daily fruit consumption (>once/day) was 48%. Participants consumed fish (24%) and egg (17%) daily. 13% consumed processed meat once/week. 8% consumed red meat/week and 78% consumed white meat with or without skin. 74% consumed biscuits and cookies as a snack once/week and 54% took snacks daily. Daily usage of oil was 65% with 61% using coconut oil as the main cooking oil. The reuse of oil for cooking purposes among the population was 44% and fried food consumption >2/week was 47%. 78% of participants used full cream milk/powder when drinking tea. Non-fat yoghurt and cheese consumption were 30% and 39% respectively. 24% of the population didn't use butter or margarine.

Conclusions: Parboiled rice, fruits, fish, pulses and non-fat dairy product consumption of the population was lower compared to the usage of oil and other fatty foods in this population.

Key words: food frequencies, food intake, food consumption.

PO3122

INDIVIDUAL AND ENVIRONMENTAL RISK FACTORS FOR ADOLESCENTS' EATING BEHAVIOUR: A STRUCTURAL EQUATION MODELLING ANALYSIS

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Background and objectives: Health promotion interventions targeting dietary habits are a potentially effective way to tackle obesity in low- and middle-income countries. To tailor such interventions to the needs/context of these countries, a detailed understanding of culture-specific factors influencing adolescents' dietary behaviour is essential. A previous study in Ecuadorian adolescents proposed an explanatory model for culture-specific individual and environmental factors influencing adolescents' dietary behaviour. We examined the direct and indirect effects of these factors for adolescents' fruit and vegetable (F&V) and sugary drinks intake.

Methods: We conducted a cross-sectional study in 770 school-going Ecuadorian adolescents in urban and rural Southern Ecuador. Data were collected on factors, dietary behaviour, socio-economic status and anthropometry. Direct and indirect effects of individual (attitudinal beliefs, self-efficacy, habit strength and food safety) and environmental (availability, accessibility, parenting and school practices) factors on F&V and sugary drinks intake were modelled using structural equation modeling. Moderating effects of socio-economic status, financial autonomy and setting were simultaneously examined.

Results: The hypothesized model performed well, indicating acceptable goodness-of-fit for both the measurement and structural model. Within the model, parental permissiveness had a direct positive effect on sugary drink intake. A direct link was found between the attitudinal belief that adolescents have a better body image when they eat healthily, and eating more F&V. At the same time, body image positively mediated the relationship between school support and adolescents' F&V intake. For both F&V and sugary drink intake, parental permissiveness was associated with self-efficacy, barriers to eating healthily and habit strength; and accessibility was associated with food safety and barriers to eating healthily.

Conclusions: Both parents and school play an important role in adolescents' dietary behaviour. These findings highlight potential points of leverage for developing future interventions in an Ecuadorian adolescent population.

Key words: structural equation modelling, Ecuador, healthy eating, adolescents.

PO3123

DEVELOPMENT OF A RECIPE BOOK FOR SRI LANKANS' TRADITIONAL FOODS AND DISHES

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Background and objectives: Sri Lankan foods are unique like its culture. The specialty of our food is that the same food is prepared differently in different regions of the country. In Sri Lanka, though there are many published recipe books, the nutritional composition of foods being prepared by following these recipes is not available. Thus this study was carried out to develop a recipe book including nutrition composition of Sri Lankans' traditional foods and dishes.

Methods: Different food recipes for traditional foods and dishes were collected from adult women in different areas (08) from different districts by home visits, face to face interviews, through telephone calls and reviewing the recipes from recipe books and from the internet. Two women were interviewed to develop one recipe and average was taken for development of the recipe book. Solid and liquid ingredients were measured by home scale and measuring cylinder respectively and by household measures for both solid and liquid foods. The recipes which were taken from telephone calls were prepared in the laboratory and got the measurements. Nutrition composition of recipes was analyzed using Food Base 2000 software and Food composition tables of India and Asia. When analyzing the recipes by database, weight changes during cooking were considered according to the food varieties.

Results: The developed recipe book contains around 50 Sri Lankan traditional foods recipes, the method of preparation as well as the nutritional composition. The recipes in the book are presented under five food categories, ie. cereal based foods, sweets, dishes, mallum and kola kenda / herbal drinks.

Conclusions: Developed recipe book, including nutrition composition of Sri Lankans' traditional foods and dishes can be used as an educational tool for menu planning for normal people as well as patients needing dietary planning.

Key words: recipe book, traditional food, nutritional composition.

PO3124

NUTRITIONAL STATUS, UNHEALTHY EATING HABITS AND PHYSICAL ACTIVITY IN THAI WOMEN

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Background and objectives: Over the past three decades the prevalence of non-communicable diseases (NCDs) in Thailand has increased rapidly. Obesity, unhealthy eating habit and unphysical activity are strongly associated with the development of NCDs. The aim of this study was to investigate the nutritional status, unhealthy eating habits and physical activity in Thai women.

Methods: Nutritional status was assessed by BMI and waist circumference. Unhealthy eating habits and physical activity data were collected by using questionnaire, 4426 Thai women were enrolled.

Results: The Nutritional status revealed that 37.9% of the subjects were 37.9% obese (BMI > 25.0 kg/m^2) and 47.9% had abdominal obesity. There were 30.5 % of the participants have unhealthy eating habits; 46.5% have a very inactive lifestyle. **Conclusions:** This study showed that one third of subjects were obese and also have inappropriate eating habits. Reducing improper diet habits and promotion of physical activity may help preventing NCDs.

Key words: nutritional status, eating habit, physical activity, Thai women.

PO3125

NUTRITION TRANSITION IN LOW-INCOME BRAZILIAN POPULATION

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Background and objectives: The nutrition transition is a worldwide phenomenon characterized by an increase of obesity and chronic non-communicable diseases (diabetes, hypertension and dyslipidemia) as a result of excessive consumption of foods with high energy density and high in sodium, combined with a sedentary lifestyle. This phenomenon was restricted

to populations of middle and upper income; however, it has also been seen in low-income populations. This study aimed to verify nutrition transition in low-income populations in Brazil.

Methods: The methodology used data from the system of records of the Health Ministry, which analyzed the prevalence recorded in the last 5 years (2008-2012). The categories were children 0-5 years old, 5-10 years old and teens 10-18 years old.

Results: The results showed that, considering the population in the last five years, the number of individuals underweight did not change for children from 0 to 5 years old, increased by 0.2% among children from 5 to 10 years old and reduced 2.1% among teenagers. Moreover, the number of overweight individuals has increased by 0.7% among children from 0 to 5 years old, 2.6% among children from 5 to 10 years old, and 3.1% among teens from 10 to 18 years old.

Conclusions: Based on the results, we can see that the nutrition transition has already manifested itself in low-income populations in Brazil, both in children and adolescents, once found to increase rates of greater weight than the rates of reduction of malnutrition. Considering that this population is beneficiary of Social Programs to Transfer Income, it is suggested that this activity should be complemented by other actions, as nutritional education for healthy consumption, for example.

Key words: nutrition transition, low-income populations.

PO3126

WHY SUSTAINABLE AND 'NUTRITIONALLY CORRECT' FOODS ARE NOT ON THE TABLE: WESTERN SYDNEY AND THE MORAL ARTS OF EVERYDAY LIFE

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Background and objectives: Within a context of future food security, the public health principle make healthy choices easy choices has become make healthy and sustainable choices easy choices. Dietary guidelines are being reframed, corporations are replacing unsustainable products, and consumers are being encouraged to become ecological citizens. While there is a growing literature on the sustainability practices of 'alternative' consumers, the food provisioning approaches of 'mainstream' consumers are less well understood.

Methods: This study is based upon in-depth interviews, photo essays and participant observation undertaken in a socio-economically disadvantaged area of Sydney, Australia, which aimed to uncover consumer views towards local, sustainable and healthy diets.

Results: Study participants were found to value cheap and tasty food over local or sustainably grown food; and while they associate nutritious food with fresh food, they will buy processed foods which can be less expensive, appeal to children and are subsequently less prone to waste. Reflecting mainstream Australian political culture, participants were pursuing a socially acceptable standard of living (including high mortgages, car reliance) which compromised household food budgets. They were also incorporating the pleasure and desires of family members as part of 'the moral arts of everyday life'.

Conclusions: Using social theories of consumption and practice sociology we argue that food choices and practices easy or not need to be interpreted as part of the role that consumption plays in political citizenship and moral subjectivity. The food practices of poorer Australian households are essentially household budget and family nourishment practices not nutrition and sustainability practices; a position which challenges proposed government food and nutrition policies.

Key words: moral economy, ecological citizenship, sustainability.

PO3127

PERCEPTION OF BODY IMAGE AND ITS RELATIONSHIP TO DIET IN WOMEN INDIGENOUS MAYAN COMMUNITIES IN YUCATAN, MEXICO

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Background and objectives: Little research dealing with the study of the perception that people have about their body image and its relationship to diet and that are necessary to understand the reason for the excessive increase of this health problem. Our objective was to analyze the perception of body image and its relationship to the regular diet of adult women in two Mayan communities.

Methods: The research was conducted in two indigenous Mayas of Yucatan. The study is qualitative, descriptive and analítico. We selected 10 people in a community, and 12 of the other, were interviewed in depth and to know the perception of body image were selected from among 9 different silhouettes of women and men, and asked the usual diet. They were divided into age groups: 18 to 29 years, 30 to 59, and 60 and over.

Results: People chose silhouttes with images of women and men with overweight and obesity, because it is perceived

also believe that being 'thick (as)' not bad is synonymous with affluence. The power they have is based on foods of the culture, but found a great consumption of rich industrialized simple carbohydrates and saturated fats which shows a change in diet.

Conclusions: Culture plays an important role in the perception of body image, and needs to be addressed in public policy and nutrition programs are implemented, it is important to recognize the dietary change in these populations.

Key words: perception, food, image, culture.

PO3128

FACTORS CONTRIBUTING TO THE ADULT POPULATION DIETARY CHANGE IN INDIGENOUS MAYA

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Background and objectives: The food modernization has led to increased availability of processed foods, this eating pattern has been considered the 'Western diet' has changed the traditional diet of the people of rural and indigenous communities and is associated with the increase in rates of overweight and obesity. The objective of this study was to identify the factors that contribute to the adult population dietary change in indigenous Maya.

Methods: This is a quantitative study correlate transversal. We performed a systematic sampling without replacement, for selection to the 51 families who underwent structured interviews about socioeconomic status, feeding, migration, food production and governmental programs. Was conducted in two indigenous Maya of Yucatan.

Results: Is observed that the consumption of processed foods cutting is leading to modern dietary modification, is in a transitional stage of a more urban food less nutritious, high energy density, high fat, sugar, salt and high content of additives. And that migration and government financial support is contributing to dietary change.

Conclusions: It should recognize the value of the usual diet associated traditional Mayan milpa cultivation and food production in the home, which according to him is threatened but found time to rescue.

Key words: feeding, changing, production, migration, programs.

PO3129

THE USE OF CULINARY BOTANICALS FOR COMMON DISEASES AS WELL AS KILLER DISEASES AMONG THE RESIDENTS OF BOSTON MASSACHUSETTS USA

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Background and objectives: Investigations on traditional healthcare have always offered immense scope for the development of new drugs and opportunities for alternative drug sources. The investigations were conducted in different neighborhoods and even urban areas of Boston within Massachusetts United States of America.

Methods: The data adduced is based on personal interviews, observations, and experiences of elder residents in the Boston Massachusetts. Residents from different castes and immigrants such as Asian, Black/African American, Hispanic/Latino, White, and people from urban areas were carefully interviewed. The culinary botanicals are generally used in the form of staple food, leafy or fruit vegetables, spices or condiments. Voucher specimens were collected and identified by referring standard flora.

Results: Information on 78 culinary botanicals belonging to 65 genera and 51 families are being communicated. Information regarding local remedies related especially to the culinary botanicals used as food and food adjuncts were recorded. The residents of Boston employ them also as local medicines in treating various human ailments. Even they are used raw or sometimes simply warmed. In many cases, they use them as a sole drug or occasionally supplemented by other botanicals or substances. They used these to combat common diseases such as migraines, rheumatic or joint pains, acidity, scabies, wounds, injuries, pimples, jaundice, constipations, amoebic dysentery, coughs, menstrual complaints, stomachaches, toothaches, flatulence, burns, indigestions, eye-burning, fevers etc. as well as killer diseases.

Conclusions: It was found that some of the information has not so far been available in literature. The method of preparation and mode of action is also simple and convenient. The investigations indicated that the knowledge is to be transferred properly by old people to younger generation and should be trained in collection and processing.

Key words: Black/African American, Hispanic/Latino, White.

PO3130

MEDITERRANEAN DIET IN NON-NATIVE ALGARVE RESIDENTS

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Background and objectives: Even if Mediterranean Diet (MD) is associated with a longer lifespan and better quality of life, several barriers can limit the adoption of this food consumption pattern by individuals in non-Mediterranean countries. Analysis of food intake in migrant populations can contribute to the study of the determinants of food choice, specifically of the role of food item availability and of eating behaviour changes with migration. This study aims to assess changes in eating habits after migration in non-native residents of a region with a traditional MD.

Methods: A sample of 41 individuals in a non-urban Municipality was interviewed by a Dietetics and Nutrition professional in order to collect information on socio-demographic characteristics, selected food items intake frequency, reported changes in food behaviour and adherence to the MD according to the 14-point Mediterranean Diet Adherence Screener (MEDAS).

Results: The sample was composed by individuals originating from the United Kingdom, Germany and Eastern Europe, living in Portugal for a mean of 10.4 years (SD=7.55 years). 70.7% of the sample reported significant changes in food intake after moving to Portugal, mainly in the increased intake of vegetables (43.9%), fresh fish (29.3%) and olive oil (26.8%). Mean and median scores for MD adherence were 7 points (SD=1.8 points), implying a modest accordance with MD. No significant correlation ($p>0.05$) was found between MEDAS score and age, origin, marital status or years of residence in Portugal.

Conclusions: Food item availability and offer seems to have contributed to the increase of accordance with the MD in natives from non-Mediterranean countries, independently of age, origin and years of residence in Portugal. Further studies with migrant communities can help assess non-Mediterranean individuals' perception of MD and to tailor health promotion activities in these communities.

Key words: Mediterranean diet, MEDAS, eating behaviour.

PO3131

THE MEDITERRANEAN DIET IN THE ALGARVE (PORTUGAL)

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Background and objectives: Mediterranean Diet (MD) represents a complete food consumption pattern with health benefits associated with longer lifespan, better quality of life and with a decreased risk of hypertension, cardiovascular disease and obesity. The Algarve is a region located in the south of Portugal where traditional eating habits show many similarities with the MD, evident in the intake of fundamental elements such as bread, legumes, vegetables, fruits, olive oil and wine. These similarities contributed to the Algarve having been chosen as a Portuguese representative region for the application of MD to intangible heritage of UNESCO. This work aims to analyze, for the first time in the region, food habits of Algarve households and assess their similarities and adherence with traditional Mediterranean eating habits.

Methods: Data was collected in a sample of 311 households, following the development of a food intake and food habits questionnaire, fulfilled by the responsible for the purchase and/or preparation of food in each household.

Results: Fifty-four percent of respondents grow their own vegetables, fruit or olives, which shows evidence of the rural features of the Algarve traditional food habits, similar to the MD. Regarding traditional cooking practices, 44.8 % of the respondents usually cooked typical recipes of the Algarve. Respondents who reported not cooking typical recipes presented as main reasons the lack of time for cooking and personal or family preferences for other type of recipes, especially by the children. Most respondents (54.4%) considered Algarve recipes as healthy, and a positive correlation with age ($r=0.175$; $p=0.011$) shows that older respondents seem to consider the traditional eating habits healthier than younger ones .

Conclusions: This study revealed the need to promote traditional food habits in the region, especially in the younger population.

Key words: Mediterranean diet; eating habits; cooking habits.

PO3132

A PILOT STUDY OF A NOVEL mHEALTH INTERVENTION TO IMPROVE COMPLEMENTARY FEEDING PRACTICES IN HARYANA STATE, INDIA

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Background and objectives: The spread of mobile phone (MP) technology in India provides new opportunities for delivering health interventions to vulnerable populations. This study aimed to develop and pilot test a MP-based nutrition counselling intervention to improve infant complementary feeding (CF) practices in a rural district in Northern India.

Methods: A MP-based nutrition counselling intervention was developed using formative research (focus groups and consultative workshop) in collaboration with India's Integrated Child Development Services community health workers (AWWs), community members, relevant experts and other stakeholders in Haryana State. A 6-week pilot test was undertaken with AWWs (n=12) and mothers of 9-11 month old infants (n=60). Changes in infant diet, maternal knowledge and attitudes toward CF practices were measured via questionnaires. The feasibility, acceptability, barriers, motivating factors, and suggested modifications to the intervention were assessed via in-depth interviews or focus groups with AWWs, mothers, and paternal grandmothers.

Results: At baseline, all participants reported being comfortable with using a MP, but only 26.7% of mothers (n=16) and 41.7% of AWWs (n=5) reported owning one. Compared to baseline, there was an increase in the median weekly intake of grains, legumes, fruit, added fats and eggs ($p<0.05$), in the proportion of infants meeting the promoted CF recommendations for these foods (37.3% vs. 64.1%, $p<0.05$), and in maternal knowledge regarding food consistency (61.6% vs. 86.4%, $p<0.05$ for porridges, 23.7% vs. 71.7% for milk, $p<0.05$). Overall AWWs, mothers and grandmothers felt that MPs were convenient, saved time and allowed increased contact; however, they also felt MPs were more useful to reinforce messages and should not replace routine face-to-face counselling; and money was a critical barrier to its use.

Conclusions: Using MPs to support CF counselling in Northern India is feasible and acceptable, and shows promise in improving infant diets.

Key words: mobile phones, complementary feeding counselling, India.

PO3133

ASSESMENT OF DIETARY INTAKE OBTAINED BY 24-HOUR RECALL INTERVIEWED IN REPRODUCTIVE AGED WOMEN LIVING IN KAMPOT AND SIEM REAP PROVINCES

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Background and objectives: Based on DHS 2010 more than 5 million Cambodians suffer anemia and are at risk for a host of threats to health and survival as well as performance deficits in school and in the workplace. We conducted 2 years-market trial of iron fortified fish/soy sauce (IFFS/IFSS) in Kampot, Siem Reap, and Phnom Penh. During the market trial, we investigated food sources and intakes of iron, and dietary factors associated with body iron status in reproductive aged women living in Kampot and Siem Reap provinces, Cambodia.

Methods: A cross-sectional survey employing proportionate cluster sampling was conducted during 2007 to 2009. Dietary intakes were assessed using 24-hour recall interview during dry and rainy season, respectively. Hemoglobin, serum ferritin and C-reactive protein were analyzed from non-fasting blood samples and general socio-demographic data were collected. The study was conducted in villages in 2 districts each in Kampot and Siem Reap provinces, Cambodia. We randomly selected healthy reproductive aged women (n=270).

Results: Total iron intakes (± standard deviation (SD)) among reproductive aged women in Kampot and Siem Reap provinces were 14.3 ± 4.8 mg /day and 13.2 ± 4.1 mg /day, respectively. Iron intakes during dry season were 14.4 ± 7.6 mg / day and 12.7 ± 4.0 mg /day, respectively. Iron intakes during rainy season were 15.1 ± 6.2 mg /day and 14.1 ± 5.6 mg /day, respectively.

Conclusions: Iron intakes among reproductive aged women were affected by living area and season in Cambodia.

Key words: anemia, food intakes, 24-hr recall, Cambodia.

PO3134

EVIDENCE OF THE NUTRITION TRANSITION IN AN ADULT MALE PUNJABI POPULATION IN MEDWAY, KENT UNITED KINGDOM

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Background and objectives: Nutrigenomics and epigenetics are fast gaining ground as a major focus of cutting edge nutrition research; however, understanding the demographic, environmental and cultural dynamics of obesity and chronic disease risk remain fundamental to finding the right solutions under pattern five of the nutrition transition. In this study we sought to uncover links between inter-generational differences in lifestyle, shifts in dietary behaviour and physical and physiological markers of the nutrition transition in a homogeneous migrant Punjabi population in the UK.

Methods: Following a focus group study (n=40) of first and second generation migrant Punjabi adult males to obtain demographic and culturally specific information on food culture and trends in dietary behaviour and food choice, we randomly recruited 137 healthy male adults aged 21 - 55 yrs from a similar cohort for a detailed study of dietary behaviour using a prevaricated food frequency questionnaire and 3-repeat 24hr recalls, self-reported physical activity using the validated WHO Global Physical Activity Questionnaire (GPAQ). Anthropometric measurements, blood pressure and fasting serum glucose and lipids were also measured.

Results: Results show a low income group with median income of £19,850 compared to the UK national median of £29,000. Mean (SD) age of first and second generations were 40 (6.1) and 29 (3) years respectively. 91.3% of subjects were overweight or obese with BMI of 28.32 (2.2) and 28.68 (2.36). Similarly, waist circumference (WC), Waist-hip ratio (WHR), diastolic and systolic BP were 87.15 v. 88 cm; 0.87 v. 0.86; 86.65 v. 85.37; and 136.74 v. 133.62 mmHg respectively although these differences were not statistically significant. Mean SBP and DBP for both group indicate a prey pretension state; WC and WHR values were all above WHO cutoffs and in the high risk category for NCDs. Energy, protein, saturated fat, fibre, cholesterol and sodium intake were 3060 v. 3513 kcal/d; 101.88 v. 121.66 g/d; 36.01 v. 40.39 g/d; 386.93 v. 435.86 mg/d and 2550 v. 2631 mg/d in first and second generation respectively. Mean physical activity level (PAL) in both both groups 1.58 indicating a largely sedentary population.

Conclusions: We conclude that adult Punjabi male migrants in Kent, UK carry a very high risk of NCDs and demonstrate evidence of the nutrition transition.

Key words: Punjabi migrants, males, nutrition transition, chronic disease, Kent.

PO3135

BREAKFAST: ASSESSMENT, IMPACT AND PROJECTION IN ADOLESCENT STUDENTS IN THREE CONTINENTS.

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Background and objectives: Breakfast is considered from scientific organizations that define the criteria for healthy eating, one of the most important meals of the day. The objective of this study was to analyze the differences in breakfast compliance in adolescents from different countries and the relationship between having breakfast and nutritional status (BMI).

Methods: The sample consists of three groups of adolescents (n=275), aged 12 and 18, from Madrid (Spain) (n=80), Ouarzazate (Morocco) (n=100) and Rosario (Argentina) (n=95). They were interviewed and measured in schools and colleges. The variables studied were: place of residence, sex, age, weight, height, breakfast compliance and breakfast features. Statistical Analyses were performed using the Statistical Package for Social Sciences (SPSS) 19.0.

Results: The percentage of breakfast compliance in each group was 92.5% in Madrid, 91.6% in Rosario and 40% in Ouarzazate ($p < 0.0001$). The 88.8% of Spanish, the 85.3% of Argentines and 59% of Moroccans included dairy products ($p < 0.0001$), 94% of Moroccans, 60% of the Spanish and the 27.4% of Argentines included cereals ($p < 0.0001$) and the 72.6% of Argentines, 33.8% of Spanish and 29% of Moroccans consumed bakery products at breakfast ($p < 0.0001$). Only statistically significant differences were found between the completion of breakfast and BMI in young Moroccans. The differences found between the Moroccan, and Spanish and Argentinean adolescents could be attributed to socioeconomic and cultural conditions that determine the possibility of having breakfast and could negatively impact the features (time, quality, commensality) of this meal in adolescence.

Conclusions: Although the scientific evidence on the importance of breakfast in childhood and adolescence, other determinants of eating behavior must be considered together to study the development of overweight and obesity from an early age.

Key words: Adolescence, childhood, eating behavior, obesity, overweight.

PO3136

DEMAND AND WILLINGNESS TO PAY FOR DIETARY DIVERSITY: RESULTS FROM AN EXPERIMENTAL APPROACH IN KASUNGU, MALAWI

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Background and objectives: Malnutrition of pre-school children remains a big challenge in Malawi. Promotion of dietary diversity with locally available and culturally acceptable foods might be one way to reduce malnutrition while maintaining economic independence. However, little is known about the willingness to pay for a nutritionally improved diet through dietary diversity in a resource poor setting. This study aims to examine expenditure patterns on dietary diversity and willingness to pay for a variety of local, but nutritious and healthy foods in Kasungu District, Malawi.

Methods: The study was set up as an economic field experiment with an artificial food market simulation. Food items of the experimental market were based on foods available at local markets and items that were potentially incorporated into the diet of farm family households in Kasungu. Participants (n=18) were provided with play money. The amount differed in accordance to different income group simulations. Furthermore, focus group discussions on farm households' expenditure patterns were conducted.

Results: Farm family households were willing to invest in dietary diversity, if income allowed. Participants given the most money had a statistically significantly higher dietary diversity compared to those given the least (p=0.028, n=18). However, statistical significance was not persistent considering a healthy dietary diversity. A higher income was associated with higher amounts of money spent on sweets. Focus group discussions unveiled that most of the products, consumed by a family, originate from own farming activities (50%), whereas 25% of food items are collected from the wild, and only 25% are bought.

Conclusions: A higher income does not necessarily lead to a purchase of local nutritious food. To improve malnutrition among children through a higher dietary diversity, nutrition education should be linked with agricultural production, agrobiodiversity, household production, and existing consumption patterns.

Key words: malnutrition, foods, willingness to pay.

PO3138

THE TRANSTHEORETICAL MODEL APPLIED FOR FRUITS, VEGETABLES AND FAT CONSUMPTION AMONG ADULTS ASSISTED IN A BRAZILIAN OUTPATIENT NUTRITION

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Background and objectives: The high prevalence of overweight and obesity is associated with increased morbidity and mortality due to cardiovascular disease. The Western dietary pattern was established as an important etiologic factor. Thus, nutritional education has been the subject of proposed nutritional interventions, in which those performed using the Transtheoretical Model have proven effective. The purpose of this study was to classify the stages of change for eating food behavior about fruit, vegetable and fat consumption of individuals seeking for nutrition assistance at the Federal University of Sergipe's Hospital.

Methods: In a cross-sectional study, a questionnaire was used to classify the Transtheoretical Model' stages of change for eating food behavior for fruit, vegetable and fat. It was made anthropometric measures (weight, height, body mass index and waist circumference) and the usual fruit, vegetable and fat intakes.

Results: Among the 33 participants, most of them presented overweight (78.8%) and increased abdominal adiposity (93.9%). It was observed that 72.7% presented low fruit consumption, 90.9% for vegetables and 51.5% high fat consumption, the first appointment group had higher inadequate fruit consumption than the return group. Most patients, 54.5%, 48.5% e 51.5% were classified as being in the Action/Maintenance group for fruit, vegetable and fat consumption, respectively. These patients also had a greater frequency of consumption for these food groups. Furthermore, there was inadequacy in the patients' conception relative to healthy consumption of fruits (50.0%), vegetables (81.3%) and fat (35.3%).

Conclusions: Most of the population studied was classified in overweight and obesity and substantially increased risk of developing cardiovascular disease. Patients showed inadequate intake of fruits, vegetables and fat, and according to the transtheoretical theory, were in greater proportion in the stages of Action/Maintenance. The nutritional intervention promoted improvements about the consumption of fruits.

Key words: feeding behavior, food consumption, nutritional status, nutrition assistance.

PO3404

CHANGING HEALTH PARADIGMS – CAN THE CONCEPTS OF WELLNESS AND WELLBEING BUILD BRIDGES IN DIETARY COUNSELLING?

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Background and objectives: Delivering a client or patient-centred counselling approach is a core competency for professional practice for dietitians. This aim of this research was to explore if the concepts of wellness and wellbeing could provide useful adjuncts for this approach by building bridges between biomedical imperatives and client perspectives on health.

Methods: To explore the current professional position, a literature search was conducted using keywords encompassing patient-centred care and competency within professional dietetic journals (2001-2010). To develop a contextual case study, 10 in-depth interviews with dietitians from a dietary weight-loss trial were conducted. Recordings of their perspectives on roles, opportunities/barriers, and counselling strategies were transcribed verbatim and examined using inductive thematic and content analysis.

Results: Eleven relevant articles were incorporated into the narrative review which described issues in practice relating to traditional forms of consultation and the effectiveness of various approaches. The over-riding theme in the interviews (Professional Identity and Competency Dilemma), highlighted the tension for dietitians in their dual role as nutrition expert and counsellor, and thereby the distance between biomedical imperatives (clinical targets) and client defined perspectives on health. The supporting themes (Adherence factors and Constructs of health) exposed details on the barriers to dietary change and the impact of contextual factors on this change respectively. All of these themes related to concepts of wellness and wellbeing.

Conclusion: Appreciating the concepts of wellness and wellbeing adds a useful adjunct to client centred approaches to dietary counselling by building bridges between clinical targets and client perspectives on health.

Key words: Wellness, wellbeing, dietary practice, Patient-Centred Care.

PO3405

CHEMICAL COMPOSITION, FATTY ACIDS CONTENTS AND GLYCEMIC INDEX OF TWO DIFFERENT TYPES OF OMANI HALWA

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Background and objectives: Omani halwa is a traditional sweet dish of Oman that is not only served on special ceremonies/occasions but is also consumed in everyday life in Oman and Gulf region. The present study evaluated the chemical composition, fatty acids contents and glycemic index of two different types (white and black) of Omani halwa.

Methods: Representative samples were collected from the local market. The proximate composition and fatty acids contents were determined according to methods of AOAC (2000). Glycemic index (GI) was determined as described by Wolever et al. (1991) and FAO/WHO (1998).

Results: No significant ($P < 0.05$) differences were observed in proximate composition and energy content of both types of Omani halwa. The percentage moisture, crude protein, total fat, ash, crude fiber, and nitrogen free extract (NFE) in white and black halwa were 11.8 and 12.1, 0.28 and 0.44, 13.8 and 12.4 and, 0.01 and 0.02, 0.15 and 0.05, and 74.0 and 75.0 respectively. The energy values in white and black halwa were 421.3 and 413.4 kcal/100 g respectively. The fatty acids contents of both halwa varied significantly ($P < 0.05$). The percentage of saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA) in white and black halwa were 63.29 and 68.53; 31.0 and 28.5; 5.6 and 2.9% respectively. Trans-fats were 11.7 and 15.01% respectively. The GI values for white and black halwa did not vary ($P < 0.05$) and were 54.8 ± 15.3 and 52.0 ± 16.5 respectively.

Conclusion: Although glycemic index value of these halwa falls in low GI category (< 55), it should be consumed with caution because of its high fat, in particular of SFA and high sugar contents.

Acknowledgements: Financial assistance was provided by SQU (IG/AGR/FOOD/01/11).

Key words: Omani halwa, proximate composition, fatty acids, glycemic index.

PO3406

EMOTIONAL DEPRIVATION, MALNUTRITION AND DEHYDRATION (3D) MODEL OF DETECTION, PREVENTION AND MANAGEMENT OF CHILDHOOD OBESITY

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Background and objectives: Childhood obesity is related to affective deprivation (child abuse) that adversely affects growth and potential development. This social condition creates vulnerability to health and wellness for this stage of life, together with the presence of chronic malnutrition and dehydration. The objective was to recognize the social, environmental and health factors related to development of childhood obesity in vulnerable populations.

Methods: Study descriptive observational, cohort. The study included 49 school children (7-12 years old), 58% male and 42% female. We performed anthropometric assessment (Weight, height, BMI) classified according to the WHO (2006); body composition using multifrequency bioelectrical impedance (team QuadScan 4000) and applied a questionnaire to determine the composition of the household and family ties. Analysis were conducted using SPSS version 17.0.

Results: Sixty percent of the population suffered familial dysfunctions. We found the following conditions: obesity, 31%; malnutrition, 58%; stunning, 47%; malnutrition, low stature, 74%, with body water below normal values for age. Conclusions: The children included in this study showed high vulnerability resulting from family dysfunction. They are at high risk of malnutrition, decreased lean mass and body water. They are at risk of developing obesity with associated comorbidities, such as diabetes and hypertension, given the family history of obesity and hypertension.

Conclusions: Interventions in health promotion to children and parents in the school and yours homeland will be the opportunity to change the lifestyle and the life quality in this vulnerable community.

Key words: Emotional deprivation, malnutrition, dehydration, children.

PO3407

LOW HOUSEHOLD DIETARY DIVERSITY IS A MAJOR PUBLIC HEALTH CONCERN FOR WOMEN IN COASTAL BANGLADESH

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Background and objectives: Research indicated that dietary diversity is a good indicator of food security at household level. Women of reproductive age living in resource-poor setting are at risk of micronutrient deficiency. Present study was designed to evaluate the household dietary diversity and individual diversity for women in 3-impoverished districts (Satkhira, Khulna and Barisal) of southwest coastal Bangladesh (a part of Ganges Delta).

Methods: A total of 1536 households were selected to determine household dietary diversity score (HDDS). One woman (aged 15-49 yrs) per household was selected to ascertain the individual dietary diversity score (IDDS). A cluster sampling design was used and in each cluster, 24 households were selected systematically for interview and anthropometric measurements. Information on food intake was collected for 7-days. Food consumed during 7-days was condensed into 9 food groups. The range of possible HDDS was 0-63. The IDDS was assessed on 12 food groups consumed during last 24-hrs and score ranging 0-12. Other relevant data were also collected.

Results: The overall mean HDDS was very low (mean, SE; 32.4, 0.22). We found households in the district of Khulna most vulnerable ($P<0.0001$) compared with other 2-districts. The overall mean IDDS of women was also predominantly low and significantly lower ($P<0.0001$) in the District of Khulna compared with other 2-districts. Low BMI values (BMI <18.5 kg/m2), and a high prevalence of anaemia were observed. Physical characteristics such as height, weight, MUAC and BMI were not significantly different in three districts.

Conclusions: The results of the study indicated that women in Khulna district might be the most vulnerable to nutritional problems and may be at high risk of micronutrients deficiency. Urgent integrated agriculture interventions are warranted for improved food and nutrition security in this region.

Key words: Anaemia, dietary diversity, micronutrients deficiencies, women.

PO3408

NUTRITIONAL ANALYSIS OF THE 25 MOST FREQUENTLY CONSUMED DISHES IN A SLUM IN IQUITOS, PERUVIAN AMAZON

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Background and objetives: The aim was to determine the nutritional value of the main dishes consumed by the residents of a slum in Peruvian Amazon, to identify the causes of loss of its nutritional status.

Methods: 98 participants completed three 24-h recalls. Based on these data, we selected the 25 most commonly eaten dishes and evaluated their nutritional composition. We took note of the recipes, homemade weights and measures. In addition, we observed the preparation and cooking. The mean nutritional composition of each dish was calculated per 100 g using the software Nutriplato 4.6. We calculated gains or losses resulting from culinary treatments.

Results: Within that include milk, the highest energy density is the 'Mashed rice'. In the group of fish, the most energy is the 'Fish Fry', in the meat-based recipes, the 'Chicken Noodle', 'Roast Beef" and "Fried Pork". As prepared dishes, the 'Juane' is the highest energy density of all recipes. Inside garnish, using bananas as the main ingredient, 'Fried Banana' and "Ripe banana' are the most energetic. Fats are higher in fried dishes and those which contribute most fat ratio. The same thing happens with garnish, where 100 grams of 'Fried Banana' or "Ripe banana' contain more than 70% of the RDA. 'Roast Beef" ' and 'Juane' have the higher sodium level.

Conclusions: It's necessary to change some eating habits, reducing the consumption of fried foods because probably is related to obesity and other chronic cardiovascular diseases. It should also reduce sodium intake. Two foods could be important: "Chicken giblets", rich in B vitamins and low in fat, and "Boiled beans" that are rich in vegetable protein and that, with rice dishes ubiquitous in this area, increases the biological value of the proteins ingested

Key words: Nutritional analysis, recipes, peruvian amazon, SLU.

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T8. Agriculture, Food Science and Safety

PO3139

WASHING THE FOODSTUFFS OF SEEDS, PROMOTING THE HEALTH LEVEL, A PROPOSAL FOR LEGISLATION OF NATIONAL STANDARD OF FOOD SAFETY

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Background and Objectives: As the bad situation of pollution in the foodstuffs of seeds in and outside of China is more and more serious and critical. There is not any concrete regulation or national process standard of food safety to eliminate or reduce the pollution in the foodstuffs of seeds round the world. It is imperative to eliminate the danger pollution factors in the foodstuffs of seeds for promoting people's health around the world before the pollution factors are eat and harm the human-being.

Methods: Summarize the bad situation of pollution in the foodstuffs of seeds around the world.

Results: Washing the foodstuffs of seeds to eliminate the danger pollution factors in the foodstuffs of seeds, promoting the health level, and a proposal for legislation of national standard of food safety was created.

Conclusions: The proposal for washing the foodstuffs of seeds, promoting the health level, a legislation of national standard of food safety was suggested to promote health food and health people around the world.

Key words: Proposal, legislation, National standard of food safety, Foodstuffs of seeds, Health promotion, Washing.

PO3140

FIBER AS A NUTRITIONAL CHARACTERISTICS IN LEAF PROTEIN EXTRACTED FROM POTATO LEAVES

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Background and Objectives: The wide spread prevalence of diet-related health problems, particularly in high industrialized nations, suggests that many humans are not eating in a manner compatible with their biology. Analysis of vegetable leaves routinely consumed by wild primate's shows that many of these foods are good sources of hexoses, cellulose, hemicelluloses, pectic substances, fiber, vitamin C, minerals, essential fatty acids, and protein. Leaf proteins are very recent novelty in human nutrition where the use of vegetable protein is very common.

Methods: Wet fractionation of leaf protein constituent is used for two purposes: i) to obtain fiber and ii) to obtain structural lipoproteins.

Results: Biochemical studies were made to determine nutritional characteristics particularly the fiber in the leaf protein concentrate (LPC) fractionated from potato (Solanum tuberosum L.) Leaves selected for the analysis . Fiber content was found to be maximum in unfractionated fraction followed by fractionated cytoplasmic then fractionated chloroplastic fraction of the LPC. The presence of higher fiber content is an indication of providing more skeletal strength and high degree of tensile strength to support the aerial part of the plant. It appears that due to low fiber content in LPC obtained from fractionated fraction will have better digestibility and higher nutritive value. The quality of feeding stuff is adjudged by lower crude fiber content. Low content in crude fiber and high in carbohydrate feeds are valued as supplements to hay & fodder components of the animal ration.

Conclusions: It promotes a number of positive physiological effects, helping to prevent constipation, lower blood cholesterol levels and control glucose levels.

Key words: Leaf protein, new food supplement, green crop fractination.

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PO3141

SURVEY OF AFLATOXIN M1 CONTAMINATION IN PASTEURISED MILK

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Background and Objectives: Aflatoxins (AF) are mycotoxins produced by certain fungi, especially Aspergillus flavus. Aflatoxin M1 (AFM1) is a hepatocarcinogen found in milk of animals that have consumed feeds contaminated with aflatoxin B1 (AFB1). These metabolites are not destroyed during the pasteurization and heating process. This study was undertaken to determine the presence and levels of aflatoxin M1 (AFM1) in pasteurised milk consumed in the province of Giluan, Iran.

Methods: A total of 40 samples were randomly obtained from retail outlets. Enzyme Linked Immuno Sorbent Assay (ELISA) technique was used to determine the presence and evel of AFM1.

Results: In 35 of the 40 milk samples examined (87.5%), the presence of AFM1 was detected in concentrations between 7.2ng/l and 98.0ng/l. AFM1 concentration in 28 samples (70%) was higher than the maximum tolerance limit (50 ng/l) accepted by some of the European countries.

Conclusion: The results of this study imply that more emphasis should be given to the routine AFM1 inspection of milk and dairy products in the Iran region. Furthermore, both farmers and dairy companies should be informed on the importance of AFM1, and the consequences of the presence of the aflatoxin in dairy products.

Key words: Aflatoxin M1, ELISA, pasteurised milk.

PO3143

PROTEIN DETERMINATION OF AN HYDROLYSED RICE-BASED INFANT FORMULA IN CHILDREN ALLERGIC TO COW'S MILK PROTEINS

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Background and objectives: Infants allergic to cow's milk proteins raise the question of the choice of replacement milk formulas often of hydrolyzed cow's milk may contain residual allergens and there are few options nutrition. In recent years a new form of hydrolysates of rice has been commercialized. These formulas based on hydrolyzed rice, until now used, could therefore be proposed as an alternative to allergy to cow's milk and used as a source of proteins. The aim of our work is to study the biochemical characteristics of an infant formula hydrolysates of rice.

Methods: Our work has enabled us to make an approach to the biochemical characterization of the infant formula hydrolysates of rice by determining the protein content by the Lowry method. We performed a polyacrylamide gel electrophoresis to determine the different proteins that make up the infant formula.

Results: The protein content of infant formula containing partially hydrolyzed rice is close to the protein concentration in breast milk. This concentration is well suited to the needs of infants due to high absorption and a perfect match of the profile its amino acids. The analysis of infant formula protein hydrolysates of rice by electrophoresis allowed us to identify clear protein bands which shows the absence of intact proteins and ensures that the hydrolysis and partial.

Conclusion: The commercial formula based on hydrolyzed rice is adapted to cover the nutritional needs of infants due to its protein content and excellent absorption. This infant formula was treated by technological methods to reduce the antigenic potential and the allergen.

Key words: Infant Formula, Electrophoresis, Allergy cow's milk, Proteins, hydrolysates of rice.

PO3143

PROTEIN DETERMINATION OF AN HYDROLYSED RICE-BASED INFANT FORMULA IN CHILDREN ALLERGIC TO COW'S MILK PROTEINS

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Background and objectives: Infants allergic to cow's milk proteins raise the question of the choice of replacement milk formulas often of hydrolyzed cow's milk may contain residual allergens and there are few options nutrition in children with allergy Cow's milk also react to soy. In recent years a new form of hydrolysates of rice has been commercialized. These formulas based on hydrolyzed rice, until now used in children with allergies to cow, could therefore be proposed as an alternative to allergy to cow's milk and used as a source of proteins. The aim of our work is to study the biochemical characteristics of an infant formula hydrolysates of rice for children with allergies to cow's milk.

Methods: Our work has enabled us to make an approach to the biochemical characterization of the infant formula hydrolysates of rice by determining the protein content by the Lowry method. We performed a polyacrylamide gel electrophoresis to determine the different proteins that make up the infant formula.

Results: The protein content of infant formula containing partially hydrolyzed rice is close to the protein concentration in breast milk. This concentration is well suited to the needs of infants due to high absorption and a perfect match of the profile its amino acids. The analysis of infant formula protein hydrolysates of rice by electrophoresis allowed us to identify clear protein bands which shows the absence of intact proteins and ensures that the hydrolysis and partial.

Conclusion: The commercial formula based on hydrolyzed rice is adapted to cover the nutritional needs of infants due to its protein content and excellent absorption. This infant formula was treated by technological methods to reduce the antigenic potential and the allergen.

Key words: Infant Formula, Electrophoresis, CMPA, Proteins, hydrolysates of rice.

PO3144

CHEMICAL COMPOSITION AND NUTRITIONAL EVALUATION OF SOME FAST FOODS

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Background and Objectives: The availability of foods high in fat and energy dense through fast foods (FF) or taking away restaurants was associated with poor quality diet. The present investigation aimed to assess the nutritive values of some FF meals.

Methods: Eleven FF meals, from four brands of local worldwide chains, were evaluated for proximate composition. Meals included beef and chicken burgers or nuggets.

Results: The obtained results proved that moisture contents of FF meals fluctuated between 36.70 and 51.30 %. The contents of protein were 13.61- 26.31%, fat 33.42- 43.67%, carbohydrates 25.38- 42.32%, fibers 4.26- 7.05 % and ash 1- 1.89 % on dry weight basis. The highest protein content was found in chicken nuggets. Beef burgers obtained from different places had close protein contents that were higher than those of chicken burgers. Chicken burgers also had close protein contents regardless, the kind of FF outlets. No appreciable differences in ash contents but slight variation in fiber contents were observed among FF meals. All FF meals were high energy dense that very high in fats and calories. Burgers showed close fat contents regardless the kind of FF meals, fat contents represented more than one third of its composition. The estimated energy of FF meals reached 545.65 - 598.77 calories/100g meal. However, mineral contents of different FF were low. Slight differences were noticed among the percentages of fiber and ash contents of FF meals.

Conclusions: Despite the relatively high percent of protein content of FF meals, there is a broader impact that they might have on overall diet. FF with high fat and low mineral contents indicated poor nutritional quality that increase risk health.

Key words: Fast foods, Chemical evaluation, energy dense.

PO3145

RAPID ASSESSMENT OF THE VALIDITY AND QUALITY OF CHICKEN MEAT BASED ON SENSORY AND PHYISCAL METHODS

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Background and Objectives: Chicken meat is highly desirable food which contains high biological value proteins, vitamins, and minerals, beside its relatively economical price in comparison to other red meat. The first consumer right is to have a meat of good quality and entirely not hazardous to the public health.

Methods: A total of 96 samples of chilled chickens were used to evaluate their sensory and physical quality. The samples were randomly subdivided into equal 6 subgroup maintained at 3 ±1°C where evaluated daily based on the parameter of color, odor, cooking loss and moisture content until the end of their shelf-life.

Results: There were significant variation ($p<0.05$) in all color coordinates (L*, a* and b*) among the examined chicken meat samples. The odor of chicken meat samples of chicken meat remains acceptable for days 0, 1, and 2, whereas after 3, 4, and 5 days of storage had more noticeable off-odors. The examined samples recorded loss of 24.5% of its original weight at day 0, whereas at day 5 had, an average, 37.0%.

Conclusion: Several deteriorative changes occurred in sensory and physical parameters of the chicken meat along the chilling storage period. The update sensory and physical methods could be useful as a rapid method for evaluation the shelf-life of chicken meat.

Key words: Chicken meat, color, odor, cooking loss, moisture content, shelf-life.

PO3147

EFFECTS OF DIETARY ALUMINOSILICATES ON BIOCHEMICAL CHANGES IN BROILER CHICKENS DURING OCHRATOXICOSIS

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Background and Objectives: Ochratoxicosis in animals and humans causes biochemical and histopathological changes in major organs. Producers and researchers desire to develop an effective decontamination technology dealing with this feed-borne toxin. The non-nutritive aluminosilicates such as clays and zeolites possess high binding capacities against several toxins from the gastrointestinal tract. The purpose of the present study was to evaluate the toxic effects of ochratoxin A (OTA) by biochemical examination of liver, spleen and pancreas of broilers, and to determine the possible preventive role of dietary aluminosilicates (mixture of clay bentonite and zeolite clinoptilolite) on investigated values.

Methods: In total 84 broiler chicks were divided into two treatment groups: control-basal diet and basal diet plus 5 g aluminosilicate kg-1 diet. After 21 day, twelve hours prior to sacrifice, 21 chicks from each group received one dose of OTA orally.

Results: The activity of catalase in pancreas and superoxid dismutase, catalase, guaiacol peroxidase and pyrogallol peroxidase in spleen increased after oral administration of single dose of OTA to broilers. Lipid peroxidation was significantly increased only in spleen. The supplementation of the aluminosilicates partially decreased these negative effects. No significant effects due to OTA were observed in enzymes activity of liver.

Conclusions: This data suggest that single dose of OTA could provide a toxic alleviating effect on antioxidant indices of spleen of broilers. Therefore, aluminosilicates partially protects animals against the harmful effects of OTA.

Key words: Aluminosilicate, broilers, clay, ochratoxin A, zeolite.

PO3148

LEVEL OF HEAVY METALS IN AFRICAN RED SNAPPER (LUTJANUS AGENNES) CAUGHT OF THE COAST OF ACCRA

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Background and Objectives: Fishery sector in Ghana serve as a source of protein for most Ghanaians but one issue of public health concern is the accumulation of heavy metals. Domestic and industrial waste all find their way into the sea.The sea has now become a hub of waste instead of reservoir for fish. In the present study, levels of Cu, Fe, Mn, Pb and Zn in African red snapper fish was monitored from Nov. 2011 to March 2012. Method: Four fish samples were collected monthly from Jamestown in Accra along the coast. 5g muscle, 4g gills and 4g bones was dry ashed and absorbance reading of sample solutions read using Flame Atomic Absorption Spectrophotometer. The content of metals determined from calibration curve made of not less than three standards.

Results: The order of heavy metal accumulation was Fe>Pb>Zn>Mn>Cu for bones, Fe>Zn>Pb>Mn>Cu for gills and Fe>Pb>Zn>Mn>Cu for muscle. The mean concentration of Cu, Fe, Pb, Mn, and Zn in the muscle, the part of fish normally eating, was 0.70, 8.98, 7.30, 0.77 and 4.36 mg/kg respectively.

Conclusion: The mean concentration of metals analysed during the five months period were mostly above the WHO limit and this posed risk to human health. There were variations in the level of heavy metals during the five months study period.

Key words: Fish, Accumulation, Heavy metals, African red snapper.

PO3149

CONCENTRATION OF SERUM ENZYMES IN MALE ALBINO WISTAR RATS FED RAW BENISEED AND BENISEED SOUP DIETS

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Background and Objectives: There had been an age long complaints by men, in some communities in Nigeria, of painful urination after a beniseed (Sesamum indicum) soup meal that is not "properly cooked". This has led to the prolong cooking of the soup in order to reduce the cause of the pain. This

study was thus conducted to find out the effect of consuming beniseed soup cooked for longer times on the concentration of prostate specific antigen (PSA) and some serum enzymes in albino Wistar rats.

Methods: Beniseed soups were cooked, using the same recipe, for 15, 30, 45 and 60 minutes respectively yielding four batches of soup samples (BSS-15, BSS-30, BSS-45 and BSS-60 respectively). Forty two male albino Wistar rats, (six groups of seven rats each), were used in this study. Group I was fed reference (casein) diet, group II (BS-R) raw beniseed, groups III, IV, V and VI diets BSS-15, BSS-30, BSS-45 and BSS-60 respectively. At the end of the 21 days feeding period, enzyme assays were done using standard methods.

Results: There was no significant ($p>0.05$) difference in the PSA concentration between the test and reference groups except groups BSS-45 and BSS-60 whose values (0.39±0.17 and 0.36±0.28ng/ml respectively) were low. There was no particular trend in the values of the other metabolic enzymes (ALP, ALT, GGT, AST, TACP and PP) with respect to the length of cooking time.

Conclusions: The assessment of AST, ALT, ALP and GGT activities, being indicators of liver tissue integrity, showed that consumption of either raw beniseed or beniseed soup is not hepatotoxic. The low values of PSA, compared to values of the reference, provides evidence that there was no pathology of the prostate tissue hence prostate function is not affected by consumption of beniseed.

Key words: Beniseed soup, enzymes, painful urination, prolong cooking.

PO3150

BIOLOGICAL CONTROL OF GRAY MOLD OF APPLE BY HANSENIASPORA OCCIDENTALIS IN COMBINATION WITH SODIUM CARBONATE

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Background and objectives: Gray mould caused by Botrytis cinerea results in major losses of apple and can be controlled effectively by fungicides , but the development of fungicide resistance by pathogens and increasing environmental concern over fungicidal residues in fruits stimulated a search for alternative measures for disease control. In this study the effect of Hanseniaspora occidentalis strain M46 alone and in combination with sodium carbonate (SC) in storage condition at temperature of 20 and 5˚C was evaluated.

Methods: The Golden delicious apples were disinfected and wounded by sterile nail. Each wound was treated with 40 µL of antagonistic yeast suspension, SC solution in different concentrations (0, 0.3, 0.5 and 1% wt / vol), antagonist suspension amended by SC and sterile distilled water as the control. After 24 h, 20 µL of spore suspension of pathogen were applied. At 4˚C after 31 days and in room temperature after 15 days, the lesion diameter was measured. The completely randomized design was used for experiments.

Results: The results indicated that when the apples treated with H. occidentalis or SC at concentration of 1%, the lesion diameter was significantly less than pathogen control.

Conclusions: The results indicate that H. occidentalis in combination with sodium carbonate affects apple responses to B. cinerea and could be an important method for control of apple gray mould.

Key words: Apple, Botrytis cinerea, sodium carbonate , biological control.

PO3151

METHYL JASMONATE IN COMBINATION WITH METSCHNIKOWIA PULCHERRIMA AND HOT WATER ON CONTROL OF APPLE BLUE MOLD CAUSED BY PENICILLIUM EXPANSUM

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Background and objectives: Blue mould caused by Penicillium expansum is the most important postharvest disease of apple and produces the carcinogenic mycotoxin patulin in decayed fruits. Blue mold is controlled by the application of fungicides, but fungicide toxicity caused the public concern requiring the development of alternative to synthetic fungicides. It has been reported that methyl jasmonate (MeJA) treatment can reduce postharvest diseases of grapefruit and peach. In this study the effect of MeJA alone and in combination with Metschnikowia pulcherrima or hot water in storage at temperature of 20 and 4 ˚C was evaluated for control of apple blue mould.

Methods: Golden delicious apples were disinfected and wounded by sterile nail. Each wound was treated with 30 µL of M. pulcherrima suspension, MeJA solution in different concentrations, antagonist suspension amended by MeJA and sterile distilled water as the control. After 24 h, 20 µL of spore suspension of pathogen was applied. At 4˚C after 50 days and at 20˚C after 15 days, the lesion diameter was measured. In the other experiment the apples were immersed in hot water at 40

and 50 ˚C for 1, 2 or 3 min and then 20 µL of each concentration of MeJA was dispensed in each wound. Twenty four hours later, the apples were inoculated with pathogen.

Results: Results indicated that combination of MeJA with yeast reduced the disease better than MeJA and yeast alone and also the lesion diameter in the apples which were immersed in hot water at 40 ˚C for 1 min and then treated with 500 µmol/L MeJA was significantly less than pathogen control.

Conclusions: In conclusion the results indicate that MeJA especially combination with M. pulcherrima or hot water could be an important method for control of apple blue mold.

Key words: Apple, Penicilliun expansum, methyl jasmonate.

PO3152

EFFECTS OF ESSENTIAL OIL FORMULATIONS ON THE ADULT INSECTS TRIBOLIUM CASTANEUM (COL. TENEBRIONIDAE) AND SITOPHILUS ORYZAE (COL. CURCULIONIDAE)

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Background and Objectives: Management of stored product pests, using essential oils as the substances of natural origin, is nowadays the subject of much research. Stored product pests such as Tribolium castaneum (Herbst, 1979) and Sitophilus oryzae (Linnaeus, 1763) are a major problem.

Methods: Adult insects were obtained from laboratory cultures maintained in the dark in incubators at 25 C and 70–80% r.h., reared on wheat flour and on grain wheat. Both insects species were fed with flour disks containing a known concentration of essential oil taken from 7 plants. The chemical components of essential oil taken from 3 plants (Calamintha glandulosa L., Satureja montana L., Teucrium polium L.) were identified using GC-MS analysis. Insecticidal effect of essential oils, that is, mortality rate of adult insects was tested after 24h, 48h, 72h.

Results: In our research, the essential oil taken from C. glandulosa which were rich in monoterpene alcohols carvacrol and contained ketonic component showed strong insecticidal activity against adults of T. castaneum and S. oryzae. Therefore, it was observed that essential oil from C. glandulosa at concentration of 1.14% showed powerful toxic and repellent effect on T. castaneum insects, with very high mortality rate after 24h (56,67%). Also, mortality of Sitophilus oryze was strong and it was 85%, after 24h at concentration of 1,5% essential oil. After 48h, the most effective formulation was, again, C. glandulosa with 83.33% mortality on the T. castaneum and with 100% on the S. oryzae. Less toxic effect showed essential oils of Satureja montana and Teucrium polium which had a lower carvacrol and ketonic content.

Conclusions: Taking into account our results and other references it could be concluded that carvacrol has very broad insecticidal and fumigant activity.

Key words: essential oils, mortality rate, Tribolium castaneum, Sitophilus oryzae

PO3153

HAZARDOUS SUBSTANCES IN DICALCIUM PHOSPHATE, LIMESTONE AND BOVINE BONE MEAL USED IN BRAZILIAN LIVESTOCK: DIOXINS, FURANS, BIPHENYLS, ARSENIC, THORIUM, URANIUM

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Background and Objetives: Phosphorus (P) deficiency in crops is an important constraining factor in plant and animal yields, especially in hot humid tropics where soils are predominantly acidic and often extremely P deficient with high P fixation capacities. Phosphates are used as P source (and calcium in some cases) in agricultural activities. About 90% of world production is utilized by the fertilizer industry to manufacture fertilizers and soil amendments, with the remainder being used to manufacture of animal feeds, detergents and chemicals. We aimed to obtain data on several contaminants (persistent organic pollutants like dioxins, furans, and biphenyls, assessing their main congeners, as well as, arsenic, thorium and uranium) in dicalcium phosphate, limestone and calcinated bovine bone meal - mineral feed additives.

Methods: Two different approaches were undertaken: High-Resolution Gas Chromatography coupled to High-Resolution Mass Spectrometry (HRGC-HRMS) to monitor feed materials that could be considered sources of contamination of the food chain, and Instrumental Neutron Activation Analysis (INAA) to assess the toxic elements in these feed products.

Results: All of the selected contaminants were detected in the studied products. In particular, PCB 126 in the dicalcium phosphate was four times higher than in the limestone and the bovine bone meal. Arsenic in the limestone was three times higher than the concentration observed in earth's crust.

Conclusions: Since no one of the substances studied herein are considered essential in man and animal lives, precautionary measures should be taken to eliminate or at least, to minimize the presence of these contaminants in any product used in the human food chain.

Key words: arsenic; biphenyls; dioxins; furans; uranium; thorium. Acknowledgements: This project is supported by FAPEMIG, CNPq (Brazil) and CSIC (Spain).

PO3154

CONTAMINATION BY INDUSTRIAL EFFLUENTS ON SOIL WATER & PLANT & SYSTEMS IN UTTAR PRADESH INDIA

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Background and Objetives: The study was conducted in the Moradabad District of the State of Uttar Pradesh (India) to assess the effect of Industrial effluents that flow into the Karulla Drain that irrigates the farmer's fields, with the objectives to: 1. Characterise the quality of effluents for irrigation; 2. Study the long term effect on buildup of heavy metals in soil –water – plant systems of the area.

Methods: Sites using effluents as a source of irrigation were selected. Contamination level by industrial effluents on soil, plant & water systems was analysed. Season wise effluent, soil, plant and hand pump water samples were collected and analysed for different relevant chemical parameters.

Results: The magnesium content exceeded the tolerance limits for drinking water. The manganese and iron levels were above the maximum desirable limits for drinking water, so were lead, cadmium and chromium limits. Chloride content was high and pH of some samples ranged beyond the range prescribed for drinking water. The potassium and phosphorous levels were also high. In cereals zinc, manganese and iron were highest. In fruits lower concentration of toxic heavy metals were observed.

Conclusions: Metals rich effluents being discharged from various industries of Moradabad are not suitable for irrigation. There should be reconsideration as frequent use of effluents for irrigation leads to accumulation of heavy metals in soil beyond permissible limits. Ground water contaminants by trace metals may cause health problems. Effluent irrigation leads to bio accumulation of toxic metals which may prove hazardous for animal and human health.

Key words: Industrial effluents, heavy metals, health hazard.

PO3155

PHYSICOCHEMICAL AND SENSORY ANALYSIS OF SWEET BREADS MADE WITH BUCKWHEAT AND FRUIT FLOURS

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Background and Objectives: Each day more people become aware of coeliac disease, it is important to increase gluten free products. This work aimed to evaluate the physicochemical and sensory characteristics of sweet breads.

Methods: The sweet breads were made using buckwheat flour with passion fruit, apple or banana flour, instead of wheat flour, resulting in three different samples. It was also analyzed a traded sweet bread as standard. The physical analyses were made by weighting raw and baked samples and measuring the breads depth. The chemical analysis included moisture, ash, fat and protein content. The sensory analysis was taken with 36 non-trained, non-coeliac people who evaluated global acceptance, appearance, color, taste and texture, using both the hedonic scale (9 points) and the purchase intention scale (5 points).

Results: The raw and baked samples with buckwheat and passion fruit flour were the heaviest ($p<0.05$). The depth analysis of the raw sample suggests that the passion fruit flour also obtained more volume (3.0 cm) and the baked analysis still shows the passion fruit flour sample in front (4.5 cm). The baking time also showed significant statistic difference among the breads ($p<0.05$): 72 minutes for passion fruit, 64 minutes for the apple and 60 minutes for the banana. It was noticed that the passion fruit bread had more moisture (46.5%), with significant difference among the other samples ($p<0.05$). The highest ash percentage was found in the banana bread (1.1%), as well as fat content (11.3%). The standard sweet bread had the highest protein value (2.18%). The apple bread had the best score in appearance (7.5) and color (7.3). Taste result suggested that the standard sweet bread would have better acceptance (7.5) while texture test pointed the banana bread as the best (7.1).

Conclusions: The breads showed good batter growth, good taste, and overall acceptability.

Key words: Buckwheat, gluten, coeliac disease.

PO3156

PHYSICOCHEMICAL AND SENSORY EVALUATION OF GLUTEN-FREE COOKIES MADE WITH RICE FLOUR, RICE BRAN AND SOY FLOUR

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Background and objectives: Coeliac disease, also called gluten-sensitive enteropathy, is characterized by chronic inflammation with abdominal pain and diarrhea, malabsorption, and nutrient deficiencies. The treatment consists of permanent withdrawal of gluten from the diet. As variety in the diet is important to avoid monotony, the objective of this work was to evaluate the physical, chemical and sensory properties of gluten-free cookies, made with rice flour, rice bran and soy flour.

Methods: Four formulations were made: TP- standard (wheat); T1- rice flour (50%) and soybean (50%); T2- rice bran (50%) and soy flour (50%); T3- rice flour (33%) and soybean (33%) and rice bran (33%). The following physical parameters were evaluated: weight loss after cooking, diameter and thickness after cooking, and expansion factor. The chemical composition was evaluated analyzing the moisture, protein, fat, ash, dietary fiber and carbohydrates content. In the sensory analysis, it was evaluated the acceptability through the attributes of appearance, color, texture, flavor and overall acceptance and purchase intent.

Results: Regarding the physical parameters, T3 had statistically significant results in the increase of diameter and expansion factor. For chemical analysis, T2 values were statistically significant in the protein content and dietary fiber. Regarding acceptability, the alternative treatments did not differ from standard. T3 had a higher percentage of intent to purchase.

Conclusions: Therefore, one can infer that the rice flour associated to soybean and rice bran is presented as a good alternative to make cookies for patients with coeliac disease.

PO3157

SELECTED ASPECTS OF FOOD SAFETY EVALUATION IN HOSPITAL CATERING IN POLAND

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Background and Objectives: Ensuring safety of meals served in hospitals is a priority regarding ilness-prone patients with compromised immune systems. The aim of the study was to evaluate the compliance with hygiene rules of hospital food production and processing areas.

Methods: The study was performed in 4 hospital food production areas located in central Poland. The assessment of compliance with hygiene rules was conducted in a food handling areas using audit technique in accordance with the international standard ISO 19011:2003. Additionally, a microbiological assessment of food-contact surfaces and employees' hands for hygiene indicator micro-organisms known as Total Viable Count (TVC) was done in accordance with ISO standards: ISO 18593:2004 and EN ISO 4833:2003.

Results: 8 audits including 114 interviews were done and 193 microbiological samples were collected and examined. The study has revealed that although the companies had a well-prepared hygienic documentation including plans of hygiene, they did not put them into practice. A microbiological study revealed that processes of cleaning and disinfection of food contact surfaces as well as employees' hands were often ineffective (31.1% of samples disqualified). The employees of the companies in question were knowledgeable in the field of food and personal hygiene but did not respect the procedures. The study confirmed the results obtained in a recently published Polish national monitoring survey on microbial contamination of hospital food-contact surfaces, where 25.5% of microbiological samples were disqualified.

Conclusions: The food hygiene in surveyed hospitals was not satisfactory. Motivating food handling trainings for stuff are essential for a better understanding of hygiene procedures and their implementation methods. Strict internal controls, and frequent official food controls are highly recommended.

Key words: Hospital, food hygiene, food handling area.

PO3158

EVALUATION OF QUALITY OF NUTRITION IN POLISH HOSPITALS

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Background and Objectives: A rational, balanced nutrition of hospitalized patients is a very important element supporting the treatment. It influences the recovery of patients, increases the effectiveness of treatment and reduces the risk of complications. Proper nutrition reduces time of hospitalization and the costs of treatment. The aim of the study was to analyse, interpret and evaluate the data on nutrition provided to patients in hospitals in Poland.

Methods: The official food control unpublished results, presented in statistical forms, referring to quality of nutrition in Polish hospitals in 2011 were used, converted, analysed and interpreted according to the Polish dietary reference intakes.

Results: Out of 222 samples taken for theoretical (qualitative, quantitative) testing, 37.8% were inconsistent with the Polish standards. Analysis revealed inconsistency both in single (33.2%) and decade menus (63.8%) in respect of energy content (20.0%), proportion of energy from protein (22.2%), as well as from fats (37.8%), unbalanced diet in terms of calcium (63.2%), iron (71.1%) and vitamin C (63.2%). Out of 27 samples of meals taken for laboratory testing, 55.6% were disqualified in respect of energy content (51.2%), proportion of energy from protein (7.4%) and from fats (29.6%). The analysis confirm results of a previous study conducted by the Polish Supreme Chamber of Control in 2008.

Conclusions: The study shows that quality of nutrition in respect of balanced diet provided to patients in hospitals in Poland is unsatisfactory. It might result in malnutrition, especially among patients staying in hospitals for a long time and not being supplied with outside foodstuffs by visitors. The educational activity for hospital caterers should be conducted. There is a need to continue a monitoring study on this subject.

Key words: Hospital, quality of nutrition, dietary reference intakes.

PO3159

KITCHEN STAFF'S KNOWLEDGE OF HAND HYGIENE IN ANKARA/TURKEY

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Background and Objectives: Washing hands, which is the first step of personal hygiene, is considered as the primer method to control the spreading of infectious diseases. This study aims to identify the knowledge about hand hygiene of the staff who works in an industrial kitchen.

Methods: The study was conducted with 300 subjects who work in the cafeterias and kitchens of 4 different govermental institutions in Ankara. A questionnaire containing 38 statements has used to determine the knowledge of hand hygiene (Alpha =0.947). Total hand hygiene scores were calculated giving "1" point for each correct answer and "0" point for each incorrect answer. Subjects who scored >23 points were classified as having "sufficient knowledge", and subjects who scored <23 points classified as having "insufficient knowledge". Data evaluation was made using SPSS program.

Results: 92.0% of the participants were male, 52.0% of them were high school graduates. 41.0% of them had been performing their business for 20-31 years and 42.0% of them had been performing their business for 1-10 years. 57.0% of the participants had sufficient knowledge and the mean score of knowledge was 23.08+10.63. The mean score was not found statistically significant according to age, gender and working years.

Conclusions: One of the easiest ways of spreading the bacteria starts with food processer's hands. Therefore staff should be educated about hygiene procedures, education about hand hygiene should be considered important and the staff must have hygienic hand washing habits.

Key words: Hand hygiene, Hygiene Knowledge, Kitchen staff, food safey, Turkey.

PO3160

THE RESULTS OF SENSUALITY EXAMINATION OF THE COMMERCIAL DISASTER FOOD

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Background and purpose: Development of the disaster food which can store for a long term is urgent business. However, we have to think about the mental for the people, first. Delicious disaster food is very important for the people to keep their appetite. We have to think about not only nutrition but also taste in the disaster food. Therefore in this study, we examined sensuality of the commercially food which can keep for a long term. And based on the result, we thought about the taste and smell in future disaster foods.

Methods: Thirty eight female college students (20-21 years old), they eat some commercially available rice things (eight kinds) which can store for five years.And we performed to do sensuality examination for them. Students carried out the sensory examination and scoring (Perfect score is 10) of food. The marketing products are cooked with cold water in 60 minutes. "vegetable rice", "shrimp pilaff", "perilla and seaweed rice", "chirashi-sushi", "white rice" "fried rice", " beef rice" and "dry curry ", of the magic rice (product made in Satake Corporation) .

Results: An evaluation was high in the taste in order of "chirashi-sushi", "vegetable rice", "shrimp pilaff", "dry curry", "fried rice", "perill and,seaweed rice", "beef rice" and "white rice". As for the highest score was 8.8±1.2, the low lowest score was 7.0±1.5.

Conclusion: As for both the taste and the smell, "chirashi-sushi" " dry curry " "beef rice" occupied the high rank. It is affected that this subject was a student in its twenties. We need to do this sensuality examination for many different kind of peoples. We would like to make delicious universal disaster food to use different kind of spices for help the victim.

Key words: Universal disaster food, delicious, sensuality examination, water cooking.

PO3161

MAPPING PRIORITIES FOR PROMOTING FOOD SAFETY IN INDIAN HOUSEHOLDS THROUGH DEVELOPMENT AND VALIDATION OF INTEGRATED SCORES BASED ON KEY DETERMINANTS

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Background and Objetives: Mortality and morbidity are high among children (< 5yr) in India and 20% of them are attributable to diarrhoea. Therefore, food safety assumes national priority. Promoting food safety at household level, especially among food preparers (mothers) needs thorough understanding of three basic indicators - awareness, practices and enabling assets (like potable water, clean fuel). There is a need to assess the current scenario on these indicators to set goals and monitor progress in measurable terms at national and regional levels. We aim to develop weighted scores for awareness, practices and enabling assets and an integrated food safety index combining these.

Methods: Data on food safety awareness, practices and enabling assets were collected from a stratified random sample of 20,719 mothers from 28 states, 5 regions of India, by administering pre-tested questionnaire. Responses to 48 questions -awareness (19), practices (10) and enabling assets (19)- were given weightages. These were combined to arrive at integrated foodsafety scores, which were validated with prevalence rates of diarrhoea in different states. The states were grouped into tertiles -high, medium and low performers- based on these scores. Multiple logistic regression was applied to identify relative risks.

Results: Maximum possible scores on enabling assets, awareness and practices were 45, 14 and 47, respectively, and integrated-score was 106. Mean integrated-score at national level was 36.3, with minimum (30.3) in Eastern India and maximum (43.0) in Northeast. Food safety practices were better compared to awareness at national level. The relative risk of getting foodborne illness if stored food was consumed the next day was 2.3 times, while the odds for type of fuel were 1.6 times.

Conclusion: The integrated-scores developed in this study could be useful to assess, monitor and develop appropriate strategies to promote food safety at household level.

Key words: Food-safety, Knowledge, Practice, Integrated-score.

PO3162

DEVELOPMENT AND EVALUATION OF AMARANTH GRAIN BASED COMPLEMENTARY FOODS SUPPLEMENTED WITH EDIBLE TERMITES AND DAGAA FISH

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Background and Objectives: Availability of low-cost, nutrient dense complementary foods is a major challenge to child nutrition in developing countries. The aim of this research was to optimize a process for production of nutrient dense, acceptable, safe and low cost cereal based complementary foods supplemented with animal source foods.

Methods: Processes to reduce phytic acid in amaranth grain and microbial contamination in termites and fish were optimized. Four extruded complementary foods (CF4, CF5, CF6 and CFC) composed of germinated amaranth grain, maize, edible termites, dagaa fish were then formulated and processed to pre-cooked flour.

Results: CF4 contained 429.42 kcal/100g energy, 17.86 g/100g protein, 9.27 g/100g fat, 20.71 mg/100g iron, 5.96 mg/100g zinc; CF5 contained 436.02 kcal/100g energy, 17.55 g/100g protein, 9.75 g/100g fat, 23.94 mg/100g iron, 4.87 mg/100g zinc; CF6 contained 442.40 kcal/100g energy, 19.00 g/100g protein, 9.10.42 g/100g fat, 27.41 mg/100g iron, 4.22 mg/100g zinc; CFC contained 396.00 kcal/100g energy, 13.72 g/100g protein, 7.07 g/100g fat, 2.63 mg/100g iron, 4.19 mg/100g zinc. CF5 was the most preferred by consumers and none of the foods showed signs of microbial or aflatoxin contamination. Estimated costs of the foods were within affordable rates from a Kenyan perspective (USD 1.82 – 3.76).

Conclusions: Therefore, the ingredients can be effectively used to develop low cost complementary foods with adequate nutrient density and consumer acceptance.

Key words: Child nutrition, Nutrient density, Consumer acceptance, Low-cost.

PO3163

SWEETPOTATO-MANGO LEATHER – AN ALTERNATIVE HEALTHY SNACK

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Background and Objectives: The highly perishable nature of mangoes and sweetpotatoes due to high moisture content, results in high postharvest losses; thus there is a need to process them into more stable products. Dextrinized sweetpotato was therefore added to mangoes to produce fruit leathers. The effect of dextrinized sweetpotatoes on physicochemical and sensory quality of sweetpotato-mango leather was studied.

Methods: Sweetpotatoes were dextrinized in an oven at different temperatures (150-200 oC) and time (2, 2.5 and 3.0 h) for optimization using completely randomized design. The amount of dextrins formed and dextrose equivalents were determined. The physico-chemical parameters (pH, acidity, water activity and vitamin C) of the pulp and leathers are reported in this study. Consumer acceptability test was also conducted.

Results: The optimal temperature for maximum dextrin of 19.41 was 190-200 oC. Water activity and pH ranged from 0.61-0.63 and 4.2-4.33, respectively, and vitamin C increased with the addition of sweetpotato. The overall acceptability was high (1.58-1.63) but non- significant ($p < 0.05$) with the amount of sweetpotato added. The mouthfeel was disliked slightly (4.06-4.40) by panellists but colour, smell and taste were rated high (1.00-1.97) due to product aesthetic appeal, fruitiness and sweetness.

Conclusions: The physico-chemical and sensory values obtained for infra-red dried sweetpotato-mango leather indicate that sweetpotatoes could be a good source binding and 'sweetening' agent in fruit leather production without deteriorating quality parameters. Dextrinization of sweetpotatoes could be considered as an excellent alternative in food applications like fruit leathers production; thus providing alternative products for health conscious consumers.

Key words: Dextrinization, mango, physico-chemical, sensory, sweetpotatoes.

PO3164

A CROSS-SECTIONAL STUDY ON THE ASSOCIATION BETWEEN FOOD CONSUMPTION AND URINARY AFLATOXIN M1

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Background and Objectives: Aflatoxin B1 (AFB1) is a potent hepatocarcinogenic mycotoxin, found ubiquitously in the foodstuffs. Human exposure to aflatoxin led to the CYP450-mediated biotransformation of AFB1 into different metabolites, where some are excreted in the urine. Aflatoxin M1 (AFM1) is a metabolite of AFB1 and detection in the urine is associated with the dietary AFB1 exposure. This study aimed to detect the levels of urinary AFM1 and to find its association with food consumptions.

Methods: Morning urine samples were collected from one hundred-sixty adults (n=160) for the analysis of AFM1 using ELISA. Additionally, respondents' food consumptions from 4 groups, namely cereals and legumes, nuts and nutty products, milk and dairy products and spices and herbs were assessed through a semi-quantitative food frequency questionnaire. The urinary AFM1 levels were expressed as pg/g Cr (Creatinine) to correct variation in urine dilution.

Results: 67.3% (n=66) of 98 positive samples had AFM1 level above limit of detection [Mean ± SEM=2.065 ± 0.209 pg/g Cr, Median=1.53 pg/g Cr]. The median total intakes of cereals and legumes, nuts and nutty products, milk and dairy products and spices and herb were 759, 11.68, 67.79 and 9.16 g/day respectively. A significant association was only found between the intake of milk and dairy products and urinary AFM1 levels. Indeed, the chi-square test showed relationship among respondents with urinary AFM1 level greater than 1.53 pg/g Cr and consumed milk and dairy products more than 67.79 g/day (R^2=8.030, p=0.005), with the odd ratio (OR) of 3.275 (95% CI=1.422-7.459).

Conclusion: The causal effect on the occurrence of AFM1 in the urine due to consumption of milk and dairy products could not be postulated. Nevertheless, the findings provide valuable reference for further investigations to find potential causes and consequences of food-borne aflatoxin exposure in Malaysia.

Key words: Aflatoxin, aflatoxin M1, food consumptions, Malaysia.

PO3165

RESULTS OF MONITORING FOR THE GLYPHOSATE TOLERANCE GENE IN SOYBEAN CURDS DISTRIBUTED AT MATSUMOTO-CITY

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Background and Objectives: In Japan, many consumers' fear gene modified organisms (GMOs) although they don't know the advantages and disadvantage of GMOs, nor understand the technology involved. In addition, many Japanese don't know that within 5 % of contamination of GMOs in agricultural products is considered "unintended contamination" which allows such products to be labeled "Non-GMO" if they had been treated under identity preserved (IP) handling. Soy bean curds not exceeding 5% contamination of the glyphosate tolerance (RRS) gene were in fact observed in some areas around Japan. However no evidence of RRS contamination in Soybean curds distributed at Nagano Prefecture was found. In light of this evidence, RRS content rates were examined mostly Kinugoshi-tofu (soft and smooth soybean curds) sold in the Matsumoto area between May of 2011 and April of 2012.

Methods: Genome DNA and RRS genes were extracted from tofu using the silica-based membrane methods, and were arranged for the isolation DNA from it. RRS and internal control gene Le1 were measured by realtime PCR-system, using standard curve methods. The content rate were calculated on the official methods.

Results: 102 samples of soybean curds were examined for RRS content rates. The data showed the content rate was varied between 0.00 to 0.31 %, and 44 samples (43.1% out of 102 samples) contained RRS. All of RRS contents were trace amount, however, it was lower than 5% of the Consumer Affairs Agency's guideline.

Conclusion: These and other data from around Japan suggested that the limitation of the GMOs mix determining the "Non-GMO" label may possibly be decreased to the EU level of around 0.9 %.

Key words: GMOs, RRS, Soybean curds.

PO3166

OXIDATIVE MODIFICATION OF PROTEINS-DIET INDUCED GUT OXIDATIVE STRESS AND MICROBIOTA DYSBIOSIS IN MICE

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Background and Objectives: Oxidized protein had lowed digestibility and might enter colon in great amount and induce adverse effect on gut bacteria flora. In this study, we prove the hypothesis that oxidative modification of proteins-diet may influence gut microbiota directly and/or indirectly by carbonyl content and changing the redox state.

Methods: After long-term feeding of casein oxidized by HClO or MDA, oxidative damage indicators of colon and colonic content, including reactive oxygen species (ROS), total antioxidant capacity (T-AOC), malondialdehyde (MDA), and carbonyl content were analyzed. Plate count was employed for the quantitative analysis of Escherichia coli, lactobacilli, and enterococcus.

Results: ROS, MDA and carbonyl content significantly increased in both HClO and MDA oxidized casein fed mice ($p<0.05$), while T-AOC significantly decreased compared with control ($p<0.05$). HClO and MDA oxidized casein led to a 1.3-fold and 1.1-fold increase in E. coli quantity, a 1.5-fold and 1.3-fold increase in enterococcus, whereas lactobacilli were reduced by 1.3-fold and 1.1-fold, respectively. Carbonyl content of modified protein showed a strong positive association with E. coli and enterococcus ($p<0.05$), and a negative association with lactobacilli ($p<0.05$). The T-AOC of colon showed a high positive association with lactobacilli ($p<0.05$) and a negative correlation with E. coli and enterococcus.

Conclusions: Oxidative modification of protein has a dominating role in shaping gut microbiota and changes of some key populations, at least in part, through an effect on the level of oxidative stress.

Key words: Gut microbiota, Oxidative stress, oxidative modification of proteins.

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PO3167

CONSUMPTION PATTERN, NUTRIENT COMPOSITION AND POTENTIAL HEALTH RISKS ASSOCIATED WITH ENERGY DRINKS CONSUMPTION BY UNIVERSITY OF IBADAN STUDENTS

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Background and Objectives: Fluids are vital requirement for humans and can be obtained from sources other than water. Selection of appropriate fluids and timing of intake are important for optimal health, especially in young people. Although energy drinks are mainly targeted to young adult consumers, little is known about the reasons for and consumption pattern, nutrient composition, and potential health risks of energy drinks in Nigeria. This study was carried out to determine the nutrient composition and assess pattern, frequency, reasons for and prevalence of adverse effects on consuming energy drinks among University of Ibadan students.

Methods: A cross-sectional survey of energy drink consumption was conducted among 307 Undergraduate and Postgraduate students living within the residence halls at the University, using a validated semi-structured questionnaire. Nutrient composition and physico-chemical properties of four commonly consumed energy drinks among students were determined using AOAC methods.

Results: Mean age of respondents was 23.05±4.57years, 79.2% were undergraduates and 51.1% were females. Majority (74.6%) have ever taken energy drinks prior to the study and 42.4% reported consuming at least one can in a week. About half (48.2%) indicated taking the drinks for increasing energy. Only 12.6% of respondents experienced side effects, of which 14% reported insomnia over short term consumption, and 12.2% frequent urination over long term consumption. Significant association was found between gender and frequency of consumption. Results of analyses showed that 100ml of energy drinks contained between 7.77-7.89g glucose, 22.61-23.74g fructose, 0.11-0.28g ash, 1.59-2.50mg vitamin B5, 1.57-2.64mg B6, 1.71-2.02µg B12, 24.19-28.76mg caffeine, 7.57-8.28 total acidity, 7.57-11.42g total solid, 3.36-3.81 pH, and yielded 43.59-48.89kcal gross energy.

Conclusion: Few respondents know about the potential health risks of energy drinks consumption. There is need for nutrition education on the risk potential of energy drinks consumption over time.

Key words: Energy drinks, Consumption pattern, Health risks, Nutrient composition.

PO3168

BIOACCESSIBILITY OF POLYPHENOLS AND ANTIOXIDANT CAPACITY IN FRUITS AND VEGETABLES: IN VITRO ENZYMATIC EVALUATION

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Background and Objective: Polyphenols are the most abundant dietary antioxidants and it has been demonstrated that they have numerous biological activities associated with decreased risk of chronic noncommunicable diseases (NCD). Food considered has a good source of polyphenols must have a high concentration of this compounds and also a high bioavailability, being bioaccessibility one of the most important factor to regulate it. The objective of this study was to evaluate total bioaccessible polyphenols and antioxidant capacity using an enzymatic extraction and then comparing these results with those obtained using a methanolic extract.

Methods: Concentration of polyphenols and antioxidant capacity were determined through the methods of Folin - Ciocalteu and FRAP respectively.

Results: It was observed that concentration of polyphenols from matrix food was significantly different (p 0.05) between enzimatic treatment (mean: 310.3 mg EAG/100g fresh sample) and methanolic extract (mean: 231.8 mg EAG/100g fresh sample). Antioxidant capacity showed significant difference (p 0.05) between both methods (mean: 1.91 mmol Fe/100g fresh sample and 1.46 mmol Fe/100g fresh sample, respectively). It was also demonstrated a significant correlation ($R^2 > 0.7$) between polyphenols concentration and antioxidant capacity in both extracts.

Conclusions: The research demonstrated that in vegetables the release of polyphenols and antioxidant capacity from matrix food was significantly higher in enzymatic method than that observed by methanol extraction. Our findings contribute to the understanding of the extraction of polyphenols using enzymatic extraction and then to obtain an approximation to bioaccessible compounds released from a food matrix.

Key words: Polyphenols, Antioxidant capacity, Enzimatic extraction, Bioaccessibility, Food matrix.

PO3169

ECO-NUTRITION – HOW ORGANIC PRODUCTION CONTRIBUTES TO HUMAN HEALTH DETERMINANTS

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Background and Objectives: Recently growing attention has been given to the question of the link between organic production methods and health effects in humans. However, these studies use an implicit model of health that is limited to an individual's physiological health. Indicators for human health or disease and/or dietary content of nutrients such as vitamins, minerals and fatty acids, as well as non-native compounds such as pesticide residues, heavy metals and other contaminants in foodstuffs have mainly been analysed. This poster introduces a multi-layered model of other, more social factors determining health status. It analyses and presents findings linking organic agriculture with further evidence-based health determinants.

Methods: Review of existing literature focusing on organic agricultural production, covering each of the determinants: education, work environment, unemployment, water and sanitation, health care services, housing.

Results: We found substantiation for one aspect of living and working conditions: organic farming practices reduce pesticide exposure to farm workers and their families. There is weak evidence linking gainful employment and organic production. Data could be found in support of the organic sector creating employment and also supporting local economies. Furthermore, research shows that it offers opportunities for self-employment and with it self-determination, offers reintegration into the job market, as well as identification and contentment. More rigorous research is needed here. A health determinant for which we found plentiful scientific evidence is water (not sanitation). Some governments actively promote organic agriculture as a means to improve local water quality.

Conclusions: The health determinants model allows exploring a bridge between organic agricultural production and health. There is some first evidence for a contribution of organic production to general socio-economic, cultural and environmental conditions influencing health.

Key words: Healthy living, health determinants, eco-nutrition, agro-ecological production.

PO3170

IDENTIFICATION OF A SILICON–OXIDE LEACHATE FROM A BAKEWARE SURFACE COMPRISING OF A TEREPHTHALATE POLYMERIC MATERIAL

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Background and Objectives: The low surface energy properties of poly-tetra-fluoroethylene compounds (PTFEs), also known as Teflon, gave rise to its widespread and popular use as an anti-stick passivating coating on cooking utensils. Several questions have been raised regarding health issues related to the use of these materials. PFTE and other organic based coatings have been found unsuitable for commercial applications, because of their inability to withstand degradation at high temperatures. There are many unanswered questions related to leaching from these coatings during the cooking process. Coating materials exhibit complex chemistries which include, but are not limited to silicone based products, metal based surfaces and coatings, ceramic based coatings and a family of polymer and composites based on poly-terephthalates. This study utilized a surface characterization approach in the analysis of a commercially available bakeware in order to identify the composition of the coating material and also to investigate its leaching potential.

Methods: Cakes were baked at the regular temperature of 350 degree F for 25 minutes in a paper lined coated bakeware. The paper was analyzed prior to and after baking. Cutting edge characterization techniques (X-ray Photoelectron spectroscopy, ATR-Infrared spectroscopy, and X-ray fluorescence spectroscopy) were utilized in the analysis of the paper liner and bakeware coating material, in an effort to determine the composition of the coating and identify the presence of any leached material from the bakeware surface.

Results: The coating material was identified as a polyethylene terephthalate/silicon composite. It was also found that a silicon oxide (Si-O) compound leached from the coating into the baking paper under normal baking conditions.

Conclusions: This study indicated that chemical composition, leach potential and stability of cookware surfaces can be effectively delineated by a combination of modern surface characterization techniques.

Key words: Bakeware Silicon Surface Characterization Coating.

PO3171

THE QUALITY OF HIGH-PRESSURE-INDUCED AND HEAT-INDUCED LEMON MARMALADE

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Background and Objectives: The objectives of this study are to establish a process for pressure-induced lemon marmalade, compare it with heat-induced marmalade, and investigate the softening of peel during soaking in citric acid, heating or pressurization.

Methods: The peel was sliced and soaked in citric acid solutions (pH 2.0, 2.2, 2.5 or 2.7) for 24 hrs, then changes in firmness were measured. Sliced flavedo was soaked at pH 2.0. The albedo, segment wall and juice sacs were homogenized with citric acid solution (pH 2.5). They were then mixed after soaking for 24 hrs. Sucrose was added (final sugar 55%), vacuum packed, then pressurized for 30 min at 500 MPa or boiled for 10 min, respectively. The firmness of flavedo and the rheology of marmalade were then measured and sensory evaluation was compared using a five point scale. Also, the amounts of pectin and naringin in four parts of lemon were measured. Changes in the texture and structures when soaked, pressurized or boiled were also measured.

Results: As the pH values were lower, the firmness of the peel decreased. Firmness of flavedo was (greatest to least); pressurized > heated > soaked at pH 2.0, respectively. The cell walls of flavedo and albedo did not loosen after pressurization. However, after soaking or heating, the middle lamella of albedo separated. The amount of pectin was greatest in albedo > flavedo > endocarp > juice sacs, respectively, while the amount of naringin was greatest in flavedo and albedo > endocarp > juice sacs. The peel of high-pressure-induced marmalade maintained a natural color and flavor. However, there is no great difference in viscosity between high-pressure-induced and heat-induced marmalade.

Conclusions: High-pressure-induced marmalade was evaluated as better than heat-induced marmalade when a sensory test was given.

Key words: Lemon, high pressure, marmalade, pectin, rheology.

PO3172

THE RELATIONSHIP BETWEEN PECTIC COMPOSITIONS OF DRIED STEM-LETTUCE (YAMA-KURAGE) AND DIFFICULTY IN COOKING

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Background and Objectives: The dried stem-lettuce is called Yama-kurage (mountain-jelly fish), because its texture is similar to salted jelly fish. When it is reconstituted by soaking in water then cooked, it maintains a crisp texture. Thus, the objective of this study is to investigate difficulty in cooking.

Methods: The stalks of stem-lettuce were pealed and divided lengthwise for both raw and dried samples. Both samples were cut into three segments (top, middle and bottom). The dried sample was soaked in water for 2 hrs. Changes in texture and structures when reconstituted or cooked for 20 min were measured. Also, pectin in these three segments was successively extracted as follows: water, 0.01N HCl, 0.1M sodium acetate buffer, 2% sodium hexametaphosphate and 0.05N HCl solutions. These extracts were designated as WSP, PA, PB, PC and PD, respectively.

Results: The firmness of raw and cooked segments was (greatest to least); bottom > middle > top segment, respectively. Dried segments were more difficult to soften during cooking than raw segments. When cooked, the middle lamella (rich in pectic substances) of parenchyma cells separated and the primary cell walls were looser in the top > middle > bottom segment, respectively. The amount of Water-Soluble-Pectin and PD was slight in all raw and reconstituted segments, but WSP increased when the raw stalk was cooked. The amount of PA (high-methoxyl-pectin) was greatest in both top and middle raw segments. Therefore, when cooked, pectin degraded by transelimination and dissolved in cooking water; consequently, they softened. However, in the bottom segment, PC (low-methoxyl-pectin) was greatest; therefore, it was difficult to soften. During drying and reconstitution, PA decreased while PB (low-methoxyl-pectin) increased.

Conclusions: The demethoxylation of pectin during drying inhibited the degradation of pectin during cooking. Thus, dried stem-lettuce was difficult to cook.

Key words: Stem-lettuce, pectin, drying, texture, structure.

PO3173

INFLUENCE OF SPICES ON THE FOOD INTAKE BY IMPROVING FLAVOR

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Background and Objectives: Spices have been used for medical purposes and recently are considered as functional food because of their contribution to food science, such as taste and aroma. Japan is an aging society and there are a lot of undernourished people due to inadequate food intake either due to lack of appetite or other reasons. It is necessary to improve food taste to increase food intake and spices could play an important role in the improvement of food taste to enhance appetite. This study aimed to investigate the influence of spices on dishes, focusing on interaction between the flavor of spices and taste of dishes.

Methods: Eleven kinds of commercial spices obtained in local Japanese market were used. Aroma extract was prepared by steam distillation. Chicken broth made of chicken bones was prepared in the laboratory. Flavor extracts of spices were added to broth and subjected to sensory evaluation. Eighteen statements were used to determine how spices influenced the taste of broth. Flavor was objectively analyzed using GC-MS-Olfactometry.

Results: Results indicated that all spices used in this study had its specific characteristic flavor which improved umami taste of soup and decreased unpleasant meaty and undesirable flavor, focusing on lemongrass and basil because they enhanced more the umami and savory taste. Addition of aroma extract of lemongrass and basil to chicken broth, scores for •thickness, mellowness, and •satisfaction• significantly increased . Moreover, addition of basil also increased scores for •clarity•, mildness, and •sweet taste• . Results of instrumental analyses suggested that some specific key compounds contributed to the enrichment of taste of the soup.

Conclusions: Some spices were effective in improving taste which helped improve appetite and prevented undernourishment in the elderly which could raise the quality of life.

Key words: Spices, aroma, flavor improvement.

PO3174

ASSESSMENT OF GREEN AND MONTMORILLONITE CLAYS AS POTENTIAL MYCOTOXIN ADSORBENTS IN HUMAN INTESTINAL CACO-2 CELLS

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Background and Objectives: High incidence rates of contamination by mycotoxins of cereal grains and animal feed have been reported worldwide. In order to avoid mycotoxicosis, several strategies have been investigated such as the use of adsorbents. The chemical affinity of some molecules for mycotoxins could allow a reduction of their bioavailability, decreasing intestinal absorption, blood concentration and distribution to target organs. The aim of the present research work is to evaluate a possible protector role of the Green and Montmorillonite clays as adsorbent against mycotoxins-induced cytotoxicity on Caco-2 cells.

Methods: Cytotoxicity was investigated by using seven different mycotoxins, deoxynivalenol, ochratoxin A, T2 toxin, fumonisin B1 and B2, aflatoxin B1 and B2 at increasing concentrations (1-100 μM). MTT assay was used to test cell viability in presence or not of Green and Montmorillonite clays (0.1 mg/ml).

Results: Following 24 h incubation with the seven mycotoxins tested, a statistically significant decrease of cell viability in a concentration dependent-manner was observed. Both clays at the concentration range of 1-0.01 mg/ml did not produce any statistically significant decrease on cell viability. After a 24 h co-incubation period with mycotoxins and both clays, Green clay at 0.1 mg/ml was more effective than Montmorillonite clay reducing the toxicity induced by mycotoxins in Caco-2 cells.

Conclusions: The present study allowed identifying the differential adsorption capacity of Green and Montmorillonite clays against the most important mycotoxins commonly found in cereals, related products and cereal components constituting an important part of human and animal food.

Key words: Mycotoxins adsorption, Cytotoxicity, Green clay, Montmorillonite clay, Caco-2 cells.

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PO3175

OPINION POLL OF USERS WITH RESTRICTIVE DIETS AND FOOD SERVICE PROFESSIONALS. DESIGN OF TRAINING PROPOSALS FOR COMMERCIAL CATERING

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Background and Objectives: Multidisciplinary project aimed at commercial catering so as to facilitate the adaptation of their menus targeting the population with some type of food restriction, intolerance and allergy. The main objective is to understand the needs of these users when eating away from home and thus provide adequate tools to commercial catering establishments who wish to offer food products adapted to different diets.

Methods: After obtaining information on the current state of the issue, the pathologies to be considered were defined: celiac disease, lactose intolerance, food allergies and diabetes. Then an online web survey designed for each pathology was distributed to individuals having pathologies as well a food service professionals. In addition international contacts were made with universities in Argentina and Lebanon.

Results: 2583 individuals have participated in the survey. From the responses obtained, of those affected by food allergies, 92.9% believed that food service professionals responsible for customer service have little or no information on this topic. For those affected by diabetes, 53.2% believed that the information provided on menus was insufficient and 52.4% would like to have them include nutritional information. 81.5% of individuals having gluten intolerance found that dishes offered in food establishments lacked variety. 50.9% of those with lactose intolerance estimated that not one eating establishment within their usual environment offered options for their condition. 60% of food service professionals participating in the survey considered that it would be interesting to receive training on this topic and expressed that the main difficulty they encounter in implementing such diets is the lack of information.

Conclusions: The results observed show a clear need to provide specific training for food service professionals, thus facilitating their ability to respond to the social demand of population groups having food related medical conditions.

Key words: Commercial catering, food intolerance, training.

PO3176

HEAVY METAL ANALYSIS OF FRUIT JUICE AND SOFT DRINKS BOUGHT FROM RETAIL MARKET IN ACCRA, GHANA

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Background and Objectives: Fruit juice and soft drinks are the usual beverages used in most festivities and celebrations in Ghana. As a result of the soil, atmosphere, underground and surface water pollution, our foods and beverages are contaminated with heavy metals. Heavy metals contamination has become a matter of public health concern but this has not received much research attention in Ghana with regards to fruit juice and soft drinks contamination. In the present study, levels of Cu, Fe, Pb, and Zn in fruit juice bought from retail market in Accra, Ghana, were determined and values compared with WHO standards. Method: Twenty bottles comprising of fruit juice and soft drinks were bought from retail market in Accra between June-December 2012. The dry ash method was used in the analysis. Flame Atomic Absorption Spectrophotometer was used to determine the concentrations of the various metals in the samples.

Results: In the fruit juice sample analysed, the mean concentrations of trace metals determined were Cu, 0.83 mg/l; Fe, 9.07 mg/l; Pb, 1.59; Zn, 3.33 mg/l, whiles in soft drinks the mean concentration were Cu, 0.34 mg/l; Fe, 7.72; Pb, 0.72 mg/l; Zn, 1.07 mg/l. In fruit juice, concentration of metals were in the range Cu, 0.40-1.65 mg/l; Fe, 2.94-13.70 mg/l; Pb, 0.25-3.19 mg/l and Zn, 1.45-4.59 mg/l, whiles in soft drinks concentrations were in the range Cu, 0.29-0.46; Fe, 5.39-13.41 mg/l; Pb, 0.00-2.78 and Zn, 0.39-2.09.

Conclusion: Fruit juice and soft drinks bought from retail markets in Accra posed a health risk based on the concentration of heavy metals obtained. Lead posed the greatest risk as the level exceeded WHO safe limit.

Key words: Heavy metals, fruit juice, soft drinks.

PO3177

THE STUDY OF SPROUTS CULTIVATION USING THE SLIGHTLY ACIDIC ELECTROLYZED WATER PREPARED WITH HYDROCHLORIC ACID AS MATERIALS

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Considering the stable supply and the safety of vegetables, soilless growth is desirable. It is required to prevent contamination by the microbe in soilless growth. Therefore, we thought it effective to grow up using slightly acidic electrolyzed water equipped with strong sterilizing properties. Furthermore, it inspected whether it was what can be filled in the taste. Seeds were sterilized when seeds of lettuce were attached to slightly acidic electrolyzed water. The bactericidal effect was very high. There was no influence in a germination rate. The bean sprouts of the alfalfa cultivated with slightly acidic electrolyzed water had few bacteria. Furthermore, it was a taste equivalent to a commercial item. The sprouts of the Japanese radish cultivated with slightly acidic electrolyzed water did not grow. When we used having mixed tap water and slightly acidic electrolyzed water, the radish grew. Moreover, there were also few bacteria currently attached to radish sprouts. Furthermore, it was a taste equivalent to tap water cultivation radish sprouts. It is very useful to use slightly acidic electrolyzed water for hydroponic cultivation. 179 Research on the effect which used slightly acidic electrolyzed water for bean-sprouts cultivation.

PO3178

IDENTIFICATION OF FRESH PLANT FOODS TO SUPPORT THE DEVELOPMENT OF A TOOL TO ASSESS FOOD BIODIVERSITY IN DIETARY SURVEYS

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Background and Objectives: Biodiversity for food and agriculture includes the variety and variability of ecosystems, animals, plants and micro-organisms, at the genetic, species and ecosystem levels. The Food and Agriculture Organization

of the United Nations (FAO) states that understanding and enhancing the role of biodiversity is essential for food security and sustainable development. As a first step to develop a tool for accessing the food biodiversity in a health and dietary survey in the city of São Paulo (Brazil), we aimed to identify the fresh plant foods that most contributed for the intake of beta carotene, vitamin C and natural folate.

Methods: Data from a population-based survey included 2691 adolescents and adults. Food intake was measured using the Automated Multiple-Pass Method 24-h dietary recall and the nutrient contends using the USDA food table. Foods that contributed to beta carotene, vitamin C and natural folate intake were identified using the weighed-proportions formula developed by Block et al., (1985) which takes into account the number of respondents reporting the consumption of each food item, portion sizes, and nutrient content.

Results: After listing all food items that contributed for 100% of beta carotene, vitamin C and natural folate intake, the foods were separated into industrially processed foods and fresh food items. Next, fresh plant foods that contributed to the intake of each nutrient were identified. We found that: 96, 104 and 112 different fresh plant foods accounted for 24%, 19% and 17% of the total beta carotene, vitamin C and natural folate intake, respectively.

Conclusion: Few fresh plant food items contributed most to the intake of key nutrients. This work describes the process of reducing the list of foods to be detailed into varieties and to estimate the centesimal composition.

Key words: Biodiversity, plant foods, survey, sustainability

PO3179

CHEMICAL COMPOSITION OF SIX MEXICAN CULTIVARS OF MANGO INDOSTANO (MANGUIFERA INDICA L.)

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Background and Objectives: Mexico is the third largest producer of mango in the world and two groups are the mainly produces: Mulgova and Indostano. It has been widely reported that Mulgova group is a good source of nutrients and polysaccharides, but there are not enough studies about the Indostano group (Tommy Atkins, Haden, Kent, Keitt, Irwin and Gold varieties) that indicates the nutritional importance of their fractions (peel, pulp and kernel). The aim of the present work was to study some physical and chemical characteristics of Indostano varieties, as morphometric measurements, nutritional composition and pectin content.

Methods: The fruits were purchased at commercial maturity; they were analyzed by AOAC methods for the proximate chemical analysis of the peel, pulp and kernel. Pectin was extracted by acid hydrolysis and ethanol precipitation. Purity of pectin was tested by quantifications of galacturonic acid. Mean difference of Tukey ($p = 0.05$) was used to analyze the experimental data.

Results: Morphometric analysis showed that Tommy A. has highest volume and sphericity of the group. The peel was more abundant in Keitt variety, the largest volume of pulp has been obtained in Tommy and Irwin variety had the biggest seeds. The seed kernel had the highest amount of: protein in Keitt (8%), for lipids was Tommy (13%) and starch also was also Tommy variety (44%). Crude fiber was more abundant in peel of Gold, but carbohydrate fraction was the most abundant component in peel and pulp of all cultivars. The yield of pectin was lower in the pulp than peel (5% and 20%, respectively). Kent, Gold and Tommy were the cultivars with good quality pectin.

Conclusions: This research provides important information for use integrally of different cultivars of the Indostano mango. These fruits are an excellent source of complex carbohydrates and nutrients.

Key words: Mango, Indostan cultivars, pectin, galacturonic acid.

PO3180

PLANT EXTRACT IN REDUCING NEGATIVE EFFECTS OF AFLATOXIN B1 ON OXIDATIVE STRESS AND INFLAMMATION IN SWINE PERIPHERAL BLOOD MONONUCLEAR CELLS

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Background and Objectives: Aflatoxin B1 is a very potent carcinogen in humans, birds, swine, fish and rodents. In this study we have investigated the capacity of an extract of Curcuma longa (TR) in reducing the negative effects of AFB1 on gene expression of several markers of the oxidative stress (catalase-CAT, superoxide dismutase-SOD, glutathione peroxidase-GPx) and inflammation (cytokines: IL-8, TNF-α, IL-1β and other markers of inflammation: cyclooxygenase (Cox2) and inducible nitric oxide synthase 2 (iNOS).

Methods: TR powder was extracted with buthanol and methanol, and the dry extract was resuspended in water. Blood samples aseptically collected from healthy pigs, were diluted 1/5 in complete RPMI media, treated with 100 μM AFB1 and

150ng/mL TR and cultivated for 4h at 370C. After incubation, blood samples were centrifuged and cell pellets were resuspended in 1 mL TriReagent and total RNA was extracted. cDNA were synthesized using 1 µg of purified RNA and the evaluation of the effects of AF and TR on genes expression of above mentioned markers was realised through real-time PCR assay. The relative product levels were quantified using the 2(-Î”Î” CT) method. Results. AFB1 induced a decrease of the expression of genes involved in the oxidative stress and an increase of the genes coding for inflammatory cytokines. TR extract was able to restore the AFB1 altered expression of GPx and SOD. The effect of TR on the expression of genes involved in inflammation is under evaluation.

Conclusion: Our study shows that TR extract was efficient in restoring the expression of some genes affected in AFB1 intoxication. Supplementation of TR in diets can prevent or reduce the effects of aflatoxin in swine fed aflatoxin-contaminated diets.

Key words: Aflatoxin B1, oxidative stress, inflammation, turmeric, marker gene expression.

PO3181

DIETARY ZEARALENONE INDUCES ALTERATION IN SPLEEN INFLAMMATORY RESPONSE BY MODULATION OF METALLOPROTEINASE, NUCLEAR RECEPTORS AND MAPKS GENE EXPRESSION

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Background and Objectives: Zearalenone (ZEA) is an estrogenic mycotoxin produced by Fusarium graminearum and by other Fusarium species. ZEA is commonly found as contaminant of stored grain and has chronic estrogenic effects on mammals, being a risk factor from both public health and agricultural perspectives. Also, ZEA and its derivatives may have divergent effects on important parameters of swine innate immunity. For ZEA and other Fusarium contaminants the tolerance limits are regulated by the European Commission only by recommendation CE/576/2006, which means that new experimental evidences (in-depth investigation at the cellular level) are required.

Methods: Starting from these evidences, a feeding trial was conducted to evaluate the effect of a ZEA-contaminated diet on spleen inflammatory response in weaned pigs. A natural contaminated corn, containing ZEA (316 ppb) was included in the diet, and given to 5 weaned piglets for a period of 18 days. A group of 5 piglets which received uncontaminated diet was used as control group. The effects of ZEA on several spleen immune responses were evaluated by Real-Time PCR for MMPs, TIMPs, nuclear receptors and MAPKs gene expression analysis.

Results: Our results showed that a concentration of 316 ppb ZEA decreased MMPs (MMP-X and MMP-9) gene expression, correlated with an increase in TIMPs (TIMP-1 and TIMP-2) mRNA. Dietary ZEA leads to an increase in the expression of PPAR-γ and JNK1. Expression of mRNA for JNK2 was unmodified in comparison with control. In contrast, the expression of the genes coding for p38 MAPK and NFkB1 were decreased in experimentally intoxicated animals.

Conclusions: our study shows that ZEA altered several parameters of the inflammatory response in spleen. Therefore, our results represent additional data that could be taken into account in the determination of the regulation limit of the tolerance to ZEA.

Key words: Zearalenone, pig, spleen, inflammatory response.

PO3182

EFFECT OF PARBOILING ON AND SEASONAL VARIATIONS THE ARSENIC CONTENT IN THE MARINE BROWN ALGA 'SARGASSUM HORNERI'.

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Background and Objectives: The seaweed Akamoku, 'Sargassum horneri' (Turner) C. Agardh, has been reported to have high levels functionaltity. Therefore, its demand as a source of foods and biochemicals is likely to increase. We have shown that the intake of 'S. horneri' may have a positive influence on the intestinal environment in rats. Further, we reported that 'S. horneri' is rich in dietary fiber and minerals and can be used for human consumption. The optimal season for harvesting the alga for human consumption may be early spring, when its growth and maturity are complete and its dietary fiber and mineral contents have reached their maximum values. However, brown algae typically contain higher concentrations of arsenic (As) than other seaweed. In this study, we assessed the effect of parboiling on and seasonal variations in the As content in 'S. horneri'.

Methods: Samples of 'S. horneri' were collected once per month from December 2005 to April 2006. The harvested plants were cleaned and washed with distilled water to remove epiphytes and encrusting materials. Their lengths and weights were then measured after blotting out the excess water. The edible portions of the seaweed (the upper 2/3 of the full leng-

th) was then washed with extra-pure water and parboiled for 1 min with 5 volumes of 2.2% NaCl solution. The As contents were then determined using atomic absorption spectrophotometry.

Results: Seasonal changes in the As contents in male plants was higher than those found in immature or female plants. The maximum As content in the plants was observed in February. Parboiling reduced the As level in 'S. horneri' by about 85%.

Conclusions: This study shows that parboiling effectively reduces the As content in 'S. horneri'.

Key words: 'Sargassum horneri', seasonal variation, arsenic, parboil.

PO3183

TRENDS IN ACRYLAMIDE LEVEL IN FOOD OVER THE LAST TEN YEARS IN POLAND

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Background and Objectives: The International Agency for Research on Cancer (IARC) in 1994 labeled acrylamide a probable human carcinogen. Acrylamide is mainly formed in food through the Maillard reaction between free amino acids and carbonyl sources during the heating of carbohydrate-rich foods and also in the process of roasted coffee beans. Our results present acrylamide content in 601 food samples randomly selected all over Poland between 2004-2012 and trends of changes in the acrylamide level in 16 groups of food over the last ten years.

Methods: Acrylamide content was determined using GCQ-MS/MS and LC-MS/MS methods. Deuterium-labeled acrylamide (d3-AA) was used as an internal standard. The acrylamide content in food was presented as mean ± SD.

Results: The highest level of acrylamide was found in crackers, potato crisps and coffee substitutes (> 800 μg/kg). The lowest level (< 60 μg/kg) was found in various types of soft bread, rusks, oat flakes and infant food. During the last ten years in Poland we found beneficial reduction of acrylamide content in certain foods, such as potato chips (29% decrease), French fries (22% decrease), soft bread (73% decrease), biscuits and pastries (50% decrease) and roasted coffee (80% decrease). We did not observe significant positive trend of decreasing the acrylamide level in case of other tested products during these ten years.

Conclusions: Reducing acrylamide content in food is a result of the implementation of recommendations of the toolbox approach to improve industrial process in relation to acrylamide formation (CIAA) through the application of appropriate raw material and food processing methods. Due to the fact that activity did not bring expected results in all groups of food products measures to reduce acrylamide content in food should be continued.

Key words: Acrylamide, food, trends.

PO3184

ASSESSMENT OF THE QUALITY OF SALT IODISATION IN POLAND

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Background and Objectives: In 1997 a national iodine fortification programme was introduced in Poland. Household salt should contain potassium iodide (30 ± 10 mg KI/kg of salt) or potassium iodate (39 ± 13 mg KIO3/kg of salt) which corresponds to 2,3 ± 0,77 mg/100g of salt. The aim of the study was to assess the quality of household salt iodisation in Poland between 2008–2012.

Methods: Tested material comprised 180 samples of iodized household salt taken in the studied period at randomly selected stores all over Poland. The tested samples comprised: 106 samples of vacuum salt (58.9%), 31 samples of rock salt (17.2%), 14 samples of sea salt (7.8%) and 29 samples of other kind of household salt (16.1%). The iodine content in salt was determined using iodometric method (PN-80/C-84081.34.). As a result of study the average iodine of two parallel samples was assumed. The statistical calculations were carried out using t-Student test.

Results: The iodine content in household salt was on an average 2,49 mg/100 g of salt. There were no significant differences in iodine content in different types of salt. The percentage of adequately iodised salt samples (2,3 ± 0,77 mg/100g of salt) were 83.3% in 2008, 90.6% in 2009, 96.9% in 2010, 93.8% in 2011 and 91.7% in 2012.

Conclusions: During last five years the most of tested samples of salt met Polish requirement regarding iodine content. The analysis of iodine level in household salt should be continued.

Key words: Iodine, household salt, iodometric method.

PO3185

REVALUATION OF MULBERRY TREE FROM A NUTRITIONAL POINT OF VIEW

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Backgrounds and Objectives: Mulberry trees are usually grown in Oriental countries like China and Korea, and also in very specific regions of the south of Europe such as the Murcia Region. Several studies have shown that the mulberry fruit is a good source of vitamins and antioxidant compounds. However, there is very little information about leaves, which could be used as bioactive compounds-rich by-product that could be natural sources of antioxidant to be employed as ingredients in food industries. Therefore, the aim of this study was to determine the nutritional potential value (folate and antioxidant activity) of fruits and leaves of mulberry tree.

Methods: Folate (Vitamin B9) and antioxidant capacity were studied in six different varieties of mulberry tree ("kokuso", "péndula", "valenciana rizada", "valenciana temprana", "filipina", "cristiana" and "italiana"). Folate was extracted from leaves and fruits and its content was analysed by HPLC and microbiological assay. Folin-Ciocalteau and ORAC methods were used to measure the total phenolic compounds and antioxidant capacity of samples, respectively.

Results: The six varieties of mulberry tree showed differences in the level of folate. Leaves, as expected, have the highest amount of vitamin B9, reaching similar values than spinach or other folate-rich vegetables, depending on the mulberry variant. Regarding antioxidant capacity, fruits showed higher content of phenolic compounds than the leaves (38.17±7.32 vs 29.62±8.87 mg GAE/g DW). However, the total antioxidant capacity was higher in leaves (213.11±39.35 vs 136.19±14.60 μM TE/g DW).

Conclusion: Mulberry tree seems to be an interesting source of bioactive compounds. Both, fruits and leaves have been shown a high potential as source of antioxidant compounds. More studies are needed to evaluate the effect of processing on these products from mulberry to use them as antioxidant ingredients in the food industry.

Key words: Mulberry, leaves, folate, antioxidant capacity.

PO3186

ADOLESCENTS OVERESTIMATE EFFECT ENERGY DRINKS

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Background and Objectives: Main questions: 1) Which effects do adolescents experience after consuming energy drinks? 2) Do they expect a bigger effect from energy drinks than other cafeine containing drinks?

Methods: A representative sample of 755 Dutch adolescents aged 11- 18 was sent an online questionnaire. Results are described using percentages.

Results: 58% had consumed energy drinks in the past. On average adolescents consume them on 1.8 days a week and when they do, they consume 1.2 drinks. Mostly (83%), they are bought in the supermarket or drugstore. 38% drank them at school; 55% during free time. 63% expects 'energy drinks' to give the highest energy boost compared to 12% 'coffee' and 10% 'sport drinks'. Reasons to consume them are flavour (75%), energy boost (21%), becoming less tired (14%), staying awake (14%) and being able to 'keep on going' (14%). 15% consumes energy drinks because peers consume them. 47% doesn't experience effects, 28% doesn't feel tired anymore, 15% feels more alert, 14% is more able 'to keep on going'. 75% experiences side effects like hyperactivity (32%), insomnia (22%), jolt and crash (18%). Other side effects are headache (9%), palpitations (7%), irritability (6%) and shakiness (4%).

Conclusions: Adolescents overestimate the effects of energy drinks while caffeine content of coffee is similar. Reported side effects can be partly attributed to caffeine and behavioral changes based on overestimating the effects. We suggest children younger than 12 y should be advised against consuming energy drinks. Adolescents aged 13-18 y should limit consumption to a maximum of 1 caffeine containing drink a day.

Key words: Energy drinks, adolescents, expectations, side effects.

PO3187

ESTIMATION OF TARTRAZINE (E 102) INTAKE BY POLISH POPULATION

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Background and Objectives: Tartrazine is one of the six synthetic colours, for which the labelling of food shall include

additional information 'tartrazine or E 102 may have an adverse effect on activity and attention in children", according to the European Union legislation. Acceptable Daily Intake (ADI) set for tartrazine amounts to 7.5 mg/kg bw/day. The aim of the study was to estimate the intake of tartrazine as food additive by Polish population and the assessment of risk for human health resulting from the intake of that substance through diet.

Methods: Data on food consumption (24-hour recalls) was collected in 2000 under the FAO project "Household Food Consumption and Anthropometric Survey'. The survey covered 4134 individuals from all over Poland, aged 1-96 years. Maximum permitted levels of usage of tartrazine were taken into consideration according to the European Union regulation.

Results: The average intake of tartrazine by Polish population amounted to 28.2 mg/person/day (7.4% ADI). Taking into account P95 the intake of that colour was 24.8% ADI. The highest exposure to that substance was found in the group of youngest children (aged 1-3); mean – 18.7% ADI, P95 - 45.5% ADI. Tartrazine may be added to various products, including fine bakery wares, flavoured drinks, which can become the significant source of that colour in Polish diets.

Conclusions: Taking into account the food market development with increasing usage of additives, including colours, it is necessary to educate population on the selection of foodstuffs in the daily diet. Adherence to the principles of proper nutrition and where possible the use of unprocessed foodstuffs can support lower intake of food additives from diet.

Key words: tartrazine, colour, diet, intake

PO3188

ASSESSMENT OF FOOD WASTE IN NUTRITION AND FOOD SERVICE BEFORE, DURING AND AFTER CONCERNING CAMPAIGN

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Background and Objectives: The food waste occurs in the whole production chain, since the production, storage, transport, processing, retail, until home and restaurants kitchens. In this context, is the Food and Nutrition Service, where the waste is a commonly problem. This way, it can be noticed managers' preoccupation about food waste are on the rise and different solutions to reduce food waste have been taken, that can also be performed in collaboration with the diners, who can be included in actions aimed to waste reduction, such as concerning campaign. This way, the current research evaluated the effectiveness of a concerning campaign to reduce food waste by diners in a food service and analyze food waste before, during and after the concerning campaign.

Methods: The data's collection occurred in 21 days. For the first 8 days, it was collected the required data to calculate the plate waste and leftover rates, the following 5 days the concerning campaign to diners was performed through posters fixed on the refectory' wall and kept the same data collection. After the campaign, during 8 days more, the data were collected.

Results: The results appointed high leftover rates, averaging 19,5%, 17,5% and 13,6% before, during and after the campaign, respectively. The plate waste rate decreased significantly during and after the campaign to diners. Before the campaign the average of plate waste rate was 9%, decreasing to 6,5% during the campaign and 6% after the intervention.

Conclusions: Therefore, it was confirmed that the concerning focused on diners to reduce the food waste was effective.

Key words: Food waste, food service, plate waste rate, leftovers, concerning campaing.

PO3189

VALIDATION OF A NUTRIENT PROFILE MODEL FOR SOUTH AFRICA TO ASSESS THE ELIGIBILITY OF FOOD STUFFS FOR HEALTH CLAIMS

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Background and Objectives: The use of a nutrient profiling model (NPM) as a criterion for making nutrient and/or health claims aim to avoid a situation where claims mask the overall nutritional status of food products, which could mislead consumers when trying to make healthy food choices. The aim was to validate the NPM of FSANZ and to provide a scientific basis to assess the eligibility of food stuffs to carry health claims in South Africa. The "Guiding principles and framework manual for the development or adaptation of nutrient profile models" of the WHO was used as the guide.

Methods: Five methods were applied including construct validity (using FBDG, Diet Quality Index, linear programming) and convergent validity (based on dietitians).

Results: The agreement between the way the model and the FBDGs categorises food products was substantial. There was good correlation between the classification of food products by the NPM and the views of dietitians. The consumption of foods categorised as 'being eligible to carry a health claim' by the NPM are higher in people who have 'healthy' diets than

people who have 'unhealthy' diets. A plausible theoretical 'healthy' diet can be constructed from only foods eligible to carry a health claim and no such plausible theoretical diet can be constructed from only foods that would be ineligible to carry a claim. The quality of the diet can be improved when foods not eligible to carry a health claim are replaced by foods that would be eligible to carry a health claim. Challenges included incomplete food composition tables and the limited number of food items consumed by the participants in the database used for validation.

Conclusions: The results of all the validation studies taken together suggested that the FSANZ NPM is a valid instrument for use in the South African food and nutrition environment.

Key words: Nutrient profiling, health claims.

PO3190

MICROBIAL METABOLISM AND INTESTINAL ABSORPTION OF THE MYCOTOXIN DEOXYNIVALENOL AND ITS METABOLITES IN HUMANS

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Background and Objectives: Deoxynivalenol (DON) is a potent mycotoxin produced by Fusarium moulds and affects nutrient absorption and intestinal barrier function. Free DON and the plant metabolite DON-3-glucoside (D3G) are frequently found in cereals including wheat and maize. Aim of this work is to assess the metabolism of DON and D3G by human faecal microbiota and to study the intestinal absorption of DON metabolites in humans using urinary exposure biomarkers. Method: Fresh faecal samples from ten volunteers were prepared into faecal slurries using M2 culture medium, spiked with DON or D3G and incubated anaerobically for up to 7 days. Mycotoxins were extracted into acetonitrile and detected using LC-MS/MS. Spot urine samples were collected from the same volunteers, cleaned through immunoaffinity columns and mycotoxins were detected using LC-MS/MS.

Results: We found that faecal microbiota from all ten volunteers efficiently cleaved D3G and released free DON, with hydrolysis peaking after 4-6 hours of incubation. Faecal microbiota of two out of ten volunteers detoxified DON to DOM-1. This is the first evidence of DON detoxification by human faecal microbiota. DON was detectable in all urine samples tested. Additionally, DOM-1 was detectable in urine samples of the same two volunteers who harbour the detoxifying microbiota at ratios of 1.5 - 16% of urinary DON. D3G was not detectable in urine.

Conclusion: Our results indicated that DON is readily absorbed in the intestinal tract of humans. D3G is not absorbed but hydrolysed by colonic microbiota hence exposing the colon to free DON and increasing the toxic burden to exposed individuals. Some individuals also harbour microbiota capable of detoxifying DON to DOM-1, which could lead to a modest protection against potential DON toxicities in the large intestine. Future dietary intervention studies will assess DON exposure from different cereal products.

Key words: Mycotoxin, deoxynivalenol, metabolism, microbiota, human.

PO3191

OBTAINMENT OF CHEESE WHEY PROTEINS HYDROLYSATES BY IMMOBILIZED ALCALASE

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Background and Objectives: Proteins are widely used for supplementation and dietary replacement. However, the enzymatic hydrolysis of these proteins has improved their functional and nutritional properties generating high-quality products. Alcalase has been widely used for the production of proteic hydrolyzates and its immobilization can bring important economic and processing benefits. This work shows the partial hydrolysis of cheese whey proteins by free and immobilized alcalase on corncob powder (CP).

Methods: The cheese whey (CW) was dialyzed and treated with kaolin and subsequently analyzed in relation to total proteins (7.96mg.mL-1), lactose (97.5% removal) and fat (not detected). Immobilization of the enzyme on glyoxyl-CP used NaHCO3/Na2CO3 0.1 mol.L-1 buffer pH 10. The activity of the enzyme and the derivative (alcalase-CP) was monitored by the hydrolysis of Z-Gly-Gly-pNP at 405 nm (ε = 4,741.3 $M^{-1}.cm^{-1}$). The hydrolysis of 5 mL of the CW was carried out during 120 min, 50°C, pH 9 using different concentrations of free enzyme and derivative. Hydrolyzates were analyzed by SDS-PAGE.

Results: The activity of free and immobilized alcalase were 149.35 $U.mL^{-1}$ and 11.05 $U.g derivative^{-1}$, respectively. Optimal pH and temperature were 50°C and 9.0, respectively, for both free and immobilized enzyme. Electrophoresis analysis indicate that alcalase-CP hydrolyzed CW proteins efficiently by the formation of smaller peptides in the range of 14.4kDa, featuring partial hydrolysis.

Conclusions: Many of the cheese whey peptides have important bioactive properties and alcalase-CP was efficient in generate peptides by a clean process and with low production

cost, ensuring this methodology as an important tool for obtaining protein hydrolyzates.

Key words: Cheese whey proteins, protein hydrolysis, alcalase. Acknowledgements: CNPq, FAPESP, CAPES, PNPD/CAPES.

PO3192

MEALS PRODUCTION AND SUSTAINABILITY: ASSESSMENT OF WASTE GENERATION IN AN UNIVERSITY RESTAURANT

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Background and Objectives: The growing number of people who have meals outside the home, favored an increase in the number of Food Services in the country. The advancement of the production segment of collective meals, resulted in the increase of solid waste generation. Thus, the objective was to take actions that promote the reduction of solid waste generation and evaluate the cost of food waste in a university restaurant located in Natal/RN - Brazil.

Methods: This was a cross sectional study, quantitative and descriptive. Initially it was accomplished a sensitization to the restaurant employees, in order to raise awareness them on the subject of current research, in a second step, we quantifyed the inorganic and organic solid waste for 32 days by direct weighing, from area of pre-preparation of meat, juice processing area, an area for pre-preparation of cold foods, area of pre-preparation of vegetables and cooking area. Besides the direct weighing of leftovers and plate waste from the washing area of cookware and utensils, respectively, as well as inorganic wastes from the warehouse. From the data obtained, we evaluated the cost of wasted food in the restaurant.

Results: We obtained a total of 14,934.56 Kg of organic waste and 2.030,35 Kg of inorganic waste. Regarding plate waste, we obtained an average of 13.4%, representing a total of 6047 meals wasted, generating a cost of approximately $ 9.070,00 per month.

Conclusions: Based on the results of this study, as well as highlighting the importance and necessity to complete the production of food and sustainability is possible to propose strategies aimed at reducing and/or minimizing the amount of solid waste generated in the restaurants.

Key words: Foodservice, Solid waste, Sustainability.

PO3193

A CASE STUDY: NUTRITIONAL STATUS OF WORKERS FROM A INSTITUTIONAL FOODSERVICE

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Background and Objective: Food offered in the foodservices can provide health to their users or increase the likelihood of Chronic Non-Communicable Diseases (CNCD), mainly in the case of foodservices that serve a captive clientele. These diseases are reflected in the large number of deaths and expenses involved in healthcare in Brazil, as well as the impact on sustainability, given that the economic factor related to health costs and the health of the population represents the three pillars of sustainability. The objective of the study was to determine the nutritional profile of clientele served at an institutional foodservice, discussing the findings in terms of sustainable meal preparation.

Methods: the methodology was based on the assessment of Body Mass Index (BMI) and height in a sample of clientele served by the foodservice. Next, their nutritional status was determined. The results were compared with other studies and their impact on health was discussed according to the literature. From the nutritional assessment of clientele served at the foodservice, it was possible to diagnose 'overweight' in both genders.

Results: A total of 328 individuals (164 women and 164 men) were evaluated and the data demonstrated that the population under study exhibited above-normal body weight. 50% of the women and 28.4% of the men had eutrofic BMI; 38.4% (women) and 54.7% (men) had overweight BMI, corroborating other studies, which indicate that excess weight is an important public health problem worldwide, since it is associated with mortality and the development of CNCD.

Conclusion: Foodservices should have a qualified nutritionist in order to provide food that avoids or prevents CNCD, thereby reducing future health burdens and contributing to sustainable meal preparation, by ensuring the well-being and health of individuals.

Key words: Foodservice, Chronic Diseases, Overweight and Sustainability.

PO3194

EFFECT OF LYOPHILIZATION PROCESS ON PROFILE OF FAT ACIDS IN AVOCADO PULP

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Background and Objective: Mexico is the world's largest producer of avocado (Persea americana). During the last 20 years its volumes of production, trade and industrialization have grown spectacularly. Lyophilization is an alternative for food preservation. The aim was to determine the effect of lyopilization process on the profile of fat acids in fresh and lyophilized pulp of avocado. Method: Twelve samples of 3 kg of fruit at physiological mature of the Hass variety, in Jalisco (Mexico) were obtained. Samples were divided in two equal parts and one portion was lyophilized. After the two samples were divided three sub-samples . Fat acid analysis by gas chromatography was performed. Data was analyzed using ANOVA and Tukey test ($p < 0.05$).

Results: The groups were significantly different in variables for monounsaturated fat, oleic acid and linoleic acid. The monounsaturated fat showed 48.00 y 48.83 % in fresh and lyophilized pulp respectively. The lyophilization process significantly decreased the concentration of oleic acid of 43.54 to 40.64% and linoleic acid of 8.70 to 7.31%. In contrast, no significant differences were presented for saturated fat with values 12.85 % ± 1.67 and 13.67 ± 0.56; in polyunsaturated with 8.84 ± 1.73 and 7.45 ± 1.22; in palmitic acid, with 13.61 ± 1.80 and 12.67 ± 0.56; in palmitoleic, with 4.54 ± 1.11 and 5.17 ± 0.44 in fresh and lyophilized pulp, respectively.

Conclusions: The lyophilization process significantly decreased the concentration of two fat acids.

Key words: Avocado, lyopilization, fat acids.

PO3195

STRATEGIES FOR THE IMPROVEMENT OF THE NUTRITIVE QUALITY AND ENERGY VALUE OF THE TRADITIONAL" MURCIA'S MEAT PIE"

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Background and Objectives: The Murcia's meat pie (MMP) is a traditional food of the Murcia's gastronomy, with the following average composition per 100g of product: 29 g of carbohydrates, 17 g of fat, 11 g of proteins and 320 kcal. The objective of the research is to develop different strategies to improve the MMP nutritional quality and reduce its energy value.

Methods: The MMPs analyzed were elaborated with a traditional process by bakers of the bakery enterprises association in the Murcia Region (AREPA). Different types of beef meat were selected (normal, semi-lean and lean) for the elaboration of the pie filling. In the samples several parameters were determined (water content, minerals, carbohydrates, proteins, fat and energy).

Results: Among the different types of meat used in the study, the protein content varies in the range 14-19%, and the amount of fat between 8 and 30%. When the average values of energy, carbohydrates, proteins and fat in the traditional MMP are compared with those elaborated with the semi-lean meat (carbohydrates 11g, proteins 11g, fat 18g and 249 kcal) and lean meat (carbohydrates 17g, proteins, 11g, fat 12g and 222 kcal), the results show that protein content is not modified by the different meat used, however the percentages of fat and energy are significantly reduced.

Conclusion: Owing to the use of different type of meat, the fat content in the MMP has been reduced in a 29.4% and therefore its energy in a 31%, without modifying the content of a high biological value protein of the meat pie.

Key words: Meat pie, nutritive quality, beef meat, energy. Acknowledgments: This research was supported by the Project 18575/PAE/11 and the fellowship 187579/BPC/12 granted by the "Fundación Séneca" of the Science and Technology Agency of the "Region de Murcia".

PO3196

ESSENTIAL MINERAL COMPOSITION OF CASHEW APPLE POWDER FROM VENEZUELA

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Background and Objectives: Anacardium occidentale L. (cashew) is a crop of great interest because the biological properties derived from its chemical composition. Rural people from Zulia region in Venezuela, has focused mostly on the artisanal use of cashew nut, while the pseudofruit or cashew apple is discarded. It is therefore desirable to assess future in-

gredients which may be obtained from pseudofruits, in order to formulate healthy foods for human consumption. Of great importance for the health are the essential minerals, because they play a key role in the body functions. An alternative to the use of cashew is making cashew apple powder. The aim of the study was to determine the content of sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), iron (Fe), zinc (Zn), copper (Cu), selenium (Se), manganese (Mn) and cobalt (Co) in cashew apple powder.

Methods: The cashew apple powder was produced experimentally by drying and grinding of pseudofruits creole type (red) which were harvested in growing areas located in the Villa del Rosario de Perija, Zulia State, Venezuela. The pseudofruits were squeezed and dried in an oven for 48 hours at 65°C. Subsequently, the material obtained was ground, sieved and packed in bags for characterization. The concentration of the elements was determined by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Results: Minerals were found in the following decreasing order of abundance in the cashew apple powder: K>Mg>Ca>Na>Fe>Cu>Zn. Se and Co were not detectable. The mean concentration of the elements was (mg/100g): Na 18.82, 503.64 K, Ca 23.61, Mg 56.66, Fe 3.58, Zn 1.56, Cu 1.67 and Mn 0.66.

Conclusions: The cashew apple powder may represent an alternative source of essential minerals for the development and formulation of new products through simple technological processes.

Key words: Essential minerals, cashew apple powder, ICP-MS, food development.

PO3197

QUANTITATIVE ANALYSIS OF SODIUM IN BREADS AND BISCUITS CONSUMED BY THE POPULATION OF RIO DE JANEIRO, BRAZIL

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Background and Objectives: Eating habits have changed among Brazilians, the majority of industrialized food has a high amount of salt. A high salt diet during childhood could increase the risk of diseases including hypertension, osteoporosis, kidney disease and obesity. Based on substantial evidence about the association between elevated salt intake and diseases, researches about the amount of sodium present in food have a great importance to the Public Health aiming to reduce this problem. The main objective of this study is describe the level of sodium found in breads and biscuits consumed by children.

Methods: Were collected 5 samples of sliced bread and 20 samples of biscuit corresponding to the most consumed brands among children, identified through dietary recall from 30 children attended by the ambulatory of Pediatric Nutrition at the University Hospital. The determination of sodium was carried out by adapted Mohr's method. The analysis of biscuits and bread were made by Departament of Food Technology at the Federal University of the State of Rio de Janeiro.

Results: The results of biscuits analyses revealed a high sodium content with values of 192,04 mg of sodium per serving, equivalent to an average of 9,6% of the Recommended Daily Intake (RDI). In addition to this 55% of the samples had sodium values higher than those declared on the label. The analysis of sliced bread found results ranging from 435.32mg/50 g to 499.73 mg/50 g of sodium between the five most consumed brands by the population.

Conclusions: Results indicated that consumers do not receive accurate information about the sodium content of packaged foods from label. The values found through analysis were higher than the labeling.

Key words: Eating Habits, sodium, labelling and disease.

PO3198

FORTIFICATION OF RICE WITH MICRO-NUTRIENTS USING HIGH PRESSURE PROCESSING

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Background and Objectives: Deficiency diseases due to insufficient micronutrients in the diet especially vitamin A, iron, and folic acid is a worldwide scenario especially in the developing countries. Therefore, fortification of rice which is a staple food in many developing countries with these micronutrients could be an effective way to reduce under-nutrition (Bierlen et al. 1997). Previously fortification of rice has been successful using genetic engineering, extrusion technique and parboiling, the latter two being heat treatments. A non-thermal novel food processing technology namely High Pressure Processing (HPP) was explored to assess the feasibility and extent of retention of added vitamins.

Methods: About 25 grams of milled rice was soaked in 40 ml of distilled water along with β-carotene (4.2 mg), folic acid (10 mg) and iron (1.7 mg) and was treated using HPP at 200 and 400 MPa for 1h, 2h and 3h. Following HPP treatment the

rice was air dried for 48 hours. The retention of β-carotene and folic acid and iron were analysed using HPLC and ICP-OES.

Results: The highest retention for folic acid was observed at 200 MPa treatment for 1 hour (30%). For β-carotene the highest retention was observed at 200 MPa treatment for 3 hours (5%). For Iron, the high retention was observed under 200 MPa treatment for 1 hour (50%).

Conclusion: It seems that High Pressure Processing can be an effective and innovative method for fortification of rice with more than one vitamin simultaneously at the same time thereby making it another feasible approach for rice fortification and enabling further exploration in this area.

Key Words: High Pressure Processing, Folic Acid, Iron, β-carotene.

PO3199

CONSUMERS WITH THE INFORMATION ON THE GENETICALLY MODIFIED FOOD LABELING: EVIDENCE STUDY

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Background and objectives: It is clear that the use and consumption of genetically modified foods (GM) is a known fact. To know the opinion that consumers of different countries and cultures have about GM and the information through labeling.

Methods: A systematic review of the scientific literature on GM labeling was conducted from the consultation of bibliographic databases (MEDLINE -via Pubmed-, EMBASE, ISI-Web of Knowledge, The Cochrane Library, Food Science and Technology Abstracts, LILACS, CINAHL and AGRICOLA) using the descriptors (Medical Subject Headings) "organisms, genetically modified" and "food labeling". The search was limited to human's adults. The resulting search equation was defined with the Boolean connectors. The final equation was adapted to each of the bibliographical databases consulted. Additionally, as a secondary search, the bibliographies given in the selected articles were reviewed in order to identify studies not found by the primary search (in order to reduce potential publication bias).

Results: Forty articles were selected after applying the inclusion and exclusion criteria. All of them should have conducted a population-based intervention focused on consumer awareness of GM foods and their need or not, to report on the labeling.

Conclusions: Label should be homogeneous, clarify the degree of tolerance of GM in non-GM products and the content or not of GM, and how these commodities are produced. Label should also be accompanied by the certifying entity and the contact information. Anyway, consumers express their preference for non-GM product and they even notice that they are willing to pay more for it, but eventually they buy the item with the best price, on a market that welcomes new technologies.

Key words: Food labeling; Organism, genetically modified; Food security; Health promotion; Health policy.

PO3200

DEVELOPMENT OF MULTIPLEX PCR ASSAY TO FRAUD IDENTIFICATION IN SAUSAGES

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Background and Objectives: Detection of species fraud in meat products is very important to protect consumers from undesirable adulteration as well as economic, religious and health aspects. The most important reason for verification of the labeling statements is the fraudulent substitution of expensive meat components with other cheaper animals or mislabeled. Multiplex PCR is a modified PCR to rapidly detect the fraud identification in meat products. The aim of this study was to develop a Multiple Template PCR Reaction for simultaneous identification of multiple meat species.

Methods: In this study, 10 sausages with minimum content of 55% beef from 10 different manufacturing companies were collected from food markets of Tehran-Iran and 5 samples of raw meats of beef, hen, goat, camel and donkey for the purpose of positive control. Total DNA was extracted from 30 mg of each sausage and raw meats as well according to Sambrook method with some modifications. Primers were designed in different regions of mitochondrial DNA (12S rRNA, cytochrome b and NADH dehydrogenase subunits 2.

Results: 12S rRNA and NADH dehydrogenase subunits 2 primers generated specific fragments of 183 and 145 bp leng-

th, for poultry and donkey, respectively. Three different specific primers were used for amplification of cytochrome b gene in goat, camel and beef species and amplified species-specific DNA fragments of 157, 200 and 274bp, respectively. The results proved that half of the specimens had contaminated with poultry residuals, more than the share of beef, unlike their labeling. The other half only had poultry residuals, no beef content. No contamination with goat, donkey and camel residuals was observed.

Conclusions: These findings showed that molecular methods such as Multiplex PCR is potentially reliable, sensitive and accurate assay for detection of adulteration meat species in mix meat products.

Key words: Meat species, Multiplex PCR, Mitochondrial DNA, Sausage.

PO3201

THE SOME LIVER PROTECTION CHARACTERISTICS OF ARTICHOKE "CYNARA SCOLYMUS" ACCLIMATED IN MONGOLIA

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Background and Objetive: Nowadays, most studies shows that many healthy problems are strictly related to our diet behaviors and weight surplus. Mongolia locates in central Asia, and Mongolian soil is rich by many kinds of minerals. Therefore all of acclimatized and grown plants in Mongolian soil, especially, vegetables and medicinal herbs contain nutrients very high. Since 2007, we wanted to try to acclimatize Artichoke, which is very famous by beneficial characteristics plant in the world in Mongolian condition. In this study, we investigated the effect of artichoke leaf extract pretreatment on carbon tetrachloride (CCl4)-induced acute liver dysfunction.

Methods: Animals were divided into 2 groups. Group 1: control rats. Group 2: study rats. Rats were given artichoke leaf extract (20 mg/kg/day) by gavage for 3 weeks and after then CCl4 (0.1ml/kg during the 5 day; Skakun NP, 1990) was applied. Group 2 were continued artichoke gavages for 4 weeks after injection. At the end of the experimental period, all animals were killed for biochemical and histological parameter measurements.

Results: In vivo, controlled clinical trial of rats with acute liver dysfunction has demonstrated the effectiveness of artichoke leaf extract for lowering SGPT/SGOT level. Total transferase (SGPT/SGOT) in the group that received the artichoke extract was decreased 1.13-1.3 times compared to the control group. GGT level was also significantly decreased in study group. In addition, one of major indicator of liver dysfunction, alkaline phosphatase which is an enzyme in the cells lining the biliary ducts level, was lower than the control group.

Conclusion: In rats pretreated with artichoke extract, significant decreases in plasma transaminase activities were found. The research findings indicate that in vivo artichoke leaf extract may be useful for the prevention of liver dysfunction and hepato toxicity.

Key words: Acclimated artichoke, acute hepatitis, liver protection, enzyme.

PO3202

SEASONAL DIFFERENCES IN DIETARY DIVERSITY AND FOOD SECURITY AMONG WOMEN HORTICULTURALISTS: A STUDY IN EASTERN MALI

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Background and Objectives: The study was part of the "Millenium Development Goals UN programme: Improving child nutrition and food security in the most vulnerable municipalities in Mali", implemented in the Bandiagara district. Support was provided to women horticulturalists to increase their dietary diversity. The intervention consisted in training and tools for the production of shallots and other vegetables. A control group of women horticulturalists not benefiting from the intervention was selected in the same area. At the start of the programme, baseline surveys were conducted in 2011 during the dry season of shallot production (April) and at the end of the rainy season (October).

Methods: Individual dietary diversity, a proxy of micronutrient adequacy, was assessed following FAO guidelines (2011). Questions on household food insecurity were adapted from FANTA (Coates et al, 2007).

Results: The groups of women did not differ for the variables of interest, therefore data were pooled (n=398). Women's mean dietary diversity scores were higher during the dry season than at the end of the rains (3.7 ± 1.4 out of 9 food groups, and 2.1 ± 1.1, respectively) ($p<0.001$). For all food groups except cereals, there was a large decline in consumption between seasons: the percentage of women consuming vitamin A-rich foods and iron-rich foods fell from 89 to 45%, and 49 to 18% respectively ($p<0.001$). Food insecurity was more prevalent at

the end of the rains. The decline in dietary diversity between seasons, was more marked in women of food insecure households.

Conclusion: There are large seasonal differences in horticulturalist women's dietary diversity: at the end of the rainy season dietary diversity is very low, implying that the women are at high risk of micronutrient deficiencies. Food insecurity is a major determinant of low dietary diversity.

Key words: Women's dietary diversity, food insecurity, horticulture, West-Africa.

PO3203

ECONUTRITION WITHIN REACH: A FRAMEWORK TO ASSIST DECISION-MAKING IN LARGE-SCALE NUTRITION INTERVENTIONS

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Background and Objectives: Econutrition, a transdiciplinary approach that links ecological processes, agricultural systems, and human health has the potential to improve nutritional outcomes and create more sustainable environments. Yet, principles from this hybrid field are not well understood or integrated into nutrition programming. This presentation identifies ecosystems concepts relevant for nutritional improvement and promotes their integration into the planning of large-scale interventions through enhancement of current monitoring and evaluation tools.

Methods: An extensive literature review from the fields of agriculture, ecology, economics, health and nutrition was conducted by an interdisciplinary team of scientists to develop a conceptual framework linking sustainable food systems to nutrition outcomes. Expert opinion on the framework and how it could be integrated into nutrition programming was obtained by interviewing key stakeholders from United Nations food and nutrition agencies and applied to the UN REACH (Renewed Efforts Against Child Hunger and Undernutrition) program. REACH seeks to scale-up effective nutrition interventions by coordinating multi-sectoral efforts, strengthening nutrition governance and developing national capacity.

Results: A new conceptual framework was developed that builds upon the 1990 UNICEF model. The framework delineates immediate and long-term determinants of child undernutrition, and highlights ecological factors in the causal pathways. Modifications to a key decision-making tool used by REACH, known as the 'REACH Dashboard,' were developed to facilitate use of the framework by multiple stakeholders.

Conclusion: Ecosystems can support human nutrition both directly through the provision of diverse and sufficient foods and indirectly through expanded and sustainable livelihoods. The framework developed here illustrates these linkages as well as the contributions that other sectors, such as agriculture, education, and social protection, can make to improved nutrition. Incorporating an ecological systems perspective into large initiatives like REACH can facilitate multi-sectoral coordination in the scale up of nutrition actions.

Key words: Ecosystem, undernutrition, policy, programming.

PO3204

WHOLE GRAINS: SCIENTIFIC RATIONALE FOR DIETARY GUIDANCE, WHOLE GRAIN FOOD DEFINITION AND PRODUCT INNOVATION

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Background and Objetives: Much of the science about whole grains and their associated benefits are widely accepted. Whole grains have three key components, the bran, germ and endosperm, and each component contains different nutrients and phytonutrients. Whole grain consumption is associated with reduced risk of heart disease, diabetes, and certain cancers, as well as lower BMI, yet many consumers are not meeting the recommendations. Methods and

Results: Despite the many known benefits of whole grain, some challenges exist. Globally, the whole grain dietary guidance and definitions of whole grain foods are inconsistent. Specifically, a need for the development of universally accepted criteria and definition for a whole grain food was identified by the 2010 US Dietary Guidelines Advisory Committee. Whole grain foods are not consistently defined in research and, in the global market place, whole grain qualification standards vary among government and private entities. Without a uniform definition, confusion in the marketplace prevails: whole grain food package labeling lacks standardization, benefits of whole grain and fiber are often intertwined in communication, and consumers may be confused in their pursuit for whole grain foods.

Conclusions: Developing consistencies in whole grain dietary guidance and agreeing on a global whole grain food definition would enable the advancement of whole grain research and market presence of whole grain foods. Consistent labeling of whole grain foods would help consumers identify whole grains in foods and enable them to meet dietary recommen-

dations. This presentation will provide an overview of global whole grain dietary recommendations and regulations, whole grain food product development, and opportunities for consumer education. All of these factors can help enable not only establishing a whole grain food definition, but also identify a path toward achieving global whole grain dietary recommendations.

Key Words: Whole grains, health benefits, food definition, product innovation.

PO3206

EFFECT OF MICROWAVE IRRADIATION VS HEATING BY CONVENTIONAL METHOD ON THE IN VITRO DIGESTIBILITY OF BOVINE WHEY

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Background and Objectives: Thermal processing of milk, is a common practice. Heating induces several chemical and physical changes in whey proteins. Microwave irradiation (MWI) is an alternative method to a conventional heating. Although MWI effects on bovine milk proteins were studied, there is a lack of information about its effect on digestibility. The purpose of this study was to determine MWI effects on the in vitro digestibility of bovine whey proteins compared to conventional heating effects.

Methods: The bovine whey, reconstituted in phosphate buffer, was submitted to microwave irradiation or heated by conventional method. The study of the in vitro protein digestibility was carried out by hydrolysis using pepsin, trypsin and chymotrypsin enzymes. Whey protein alteration was assessed with sodium dodecylsulfate-polyacrylamide gel electrophoresis (SDS).

Results: MWI did not alter whey protein susceptibility to pepsin. Whereas it led to their partial hydrolysis by either trypsin and chymotrypsin enzymes. This hydrolysis was more pronounced when microwaves were applied at high power but for a shorter duration. Heated whey by conventional method were resistant to pepsic hydrolysis but was observed to be susceptible to chymotrypsic and trypsic hydrolysis. This improvement of enzymatic hydrolysis was more pronounced when heating takes only shorter duration.

Conclusions: MWI or heating by conventional method accelerates whey proteins hydrolysis. This effect was more pronounced with heating using conventional method.

Key words: Whey, Microwaves, Enzymatic hydrolysis, dodecylsulfate, polyacrylamide gel electrophoresis.

PO3207

STORAGE OF THE PACKED FOOD AND FOOD QUALITY

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Background and Objetives: storage conditions and influential transport on the quality of foodstuffs and favor the interaction between the contents and its packaging. The objective of our work is to know in which conditions are stored food packed to Batna (Algeria).

Methods: a survey was realized to Batna from May 15th till September 15th, 2011, on the storage conditions of the packed food, at wholesalers at the level of the deposits of storage. Photos were taken in various places for the plastic, metal packagings, the cardboard and the glass. 40 descriptive index cards were prepared according to the various packagings and informed for every food. We compared every case with the Algerian legislation and proposed the improvements according to the type of packaging, the food and storage conditions.

Results: the report is the following 1) Most of the wholesalers do not respect the conditions of the storages and transport of the packed foodstuffs; 2) The plastic bottles are exposed to sunbeams; 3) There is no respect for the chaine of the cold of dairy products; 4) The deposits of carbonated drinks are not clean.

Conclusion: The failure to respect the storage conditions of the packed food can pull a change of the role of the packaging: of protector with the risk factor. The contents can deteriorate on the organoleptic plan and/or can become toxic. Conditions of storage and transport of foodstuffs have to be the object of information to be spread (broadcasted) with all the concerned. The Algerian legislation on the subject exists, it remains to make her known and especially to make her apply.

Key words: Packaging, storage, quality, Algerian legislation, Batna.

PO3208

AN UNDERUTILISED FRUIT OF MANGIFERA PAJANG KOSTERMANS INCREASES ANTIOXIDANT STATUS IN PLASMA OF NORMOCHOLESTEROLEMIC SUBJECTS

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Background and Objectives: Bambangan (Mangifera pajang) is a type of wild mango from family of Anacardiaceae, an under-utilised fruit that can be found in their native area such as East Kalimantan (Indonesia) and Borneo Island (Malaysia-Sabah and Sarawak; Brunei). The fruit is three times larger than commercial mango (Mangifera indica). The fruit is edible and constitutes one of the common dishes within the local community. The aim of this study was to determine the effect of bambangan juice powder (BJP) drink on plasma vitamins, antioxidant enzymes and together with the liver and kidney function tests.

Methods: A 4-week single-blinded, cross over supplementation trial was conducted. Subjects were randomly assigned to consume daily 250 mL of the study beverage, either flavoured mango juice (placebo group, n=16) or BJP juice (n=16). Thirty two healthy participants aged 24 – 28 years were recruited. Blood samples were drawn at the baseline (weeks 0, 4, 5 and 9) for enzymes and vitamin antioxidant determinations. For statistical analysis, general linear model were used to examine differences in post-intervention values compared to baseline values using Tukey's procedure for comparison of means.

Results: Compared with placebo, consumption of BJP drink increased the concentration of plasma β-carotene and ascorbic acid significantly at the end of the study. Plasma total antioxidant status tended to be greater after consumption of BJP drink than placebo drink. Plasma liver and kidney function tests were unaffected.

Conclusion: Consumption with BJP drink in healthy human volunteers improved non-enzymatic antioxidants. Total antioxidant status significantly increased due to the consumption of the test drink. Therefore, the consumption of BJP drink high in antioxidant may provide benefits in improving the antioxidant status in healthy volunteers.

Key words: Mangifera pajang; total antioxidant status; enzymes; function test.

PO3209

IDENTIFYING SUSTAINABLE FOODS COMBINING LOW ENVIRONMENTAL IMPACT, HIGH NUTRITIONAL QUALITY, AND MODERATE PRICE

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Background and Objetive: To help consumers achieve 'sustainable diets', i.e. environmental-friendly and healthy at a moderate cost, "sustainable foods" need to be identified. Yet, no guidance is given by official recommendations. We aimed to assess the associations between environmental impact, nutritional quality, and price of individual foods, and to identify foods with compatible sustainability constraints.

Methods: For 363 foods selected among those most consumed by French INCA2 dietary survey participants, environmental impact indicators (greenhouse gases emissions—GHGE—, acidification, eutrophication) and prices were collected. The British Ofcom nutrient profiling model was used to assess foods' nutritional quality. "Sustainable foods" were identified by selecting Ofcom model "healthier" foods which also had their GHGE and price under the overall median.

Results: All environmental indicators were highly correlated together. Meat, fish, eggs (MFE) and dairy products were the least environmental-friendly foods; starchy foods, legumes, and fruit and vegetables (F&V) were the most environmental-friendly. GHGE were inversely correlated to Ofcom score (r=-0.45) and positively to price/kg (r=0.60), correlation was null with price/kcal. Most within-food groups correlations followed these trends, showing that environmental friendly foods tended to have a higher nutritional quality and a lower price/kg, but not a lower price/kcal. Trends were strongest among starchy foods (including legumes) and dairy products. Healthier MFE products did not have higher GHGE. Using price/kg, 90 foods were identified as sustainable, of which most F&V and no MFE. Using price/kcal restricted the list to 39 foods, of which 54% of all starchy foods, 80% of legumes, but only 15% of F&V (mainly 100% fruit juices and processed fruit with added sugars).

Conclusions: The sustainability dimensions were suggested to be compatible when considering price/kg, but not when considering price/kcal. Integrating the present data at diet level could help to design sustainable diets.

Key words: Sustainable diets; greenhouse gas emissions; food price; nutrient profiling.

PO3210

EVALUATION OF THE QUALITY OF BREAD SAMPLES PRODUCED FROM WHEAT (TRITICUM AESTIVUM) AND UNRIPE PLANTAIN (MUSA PRADISIACA) COMPOSITE FLOURS

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Background and Objectives: The Nigerian climate does not favour wheat farming. Thus Nigeria depends wholly on wheat importation for bread making which is an economic burden on the government necessitating the search for substitutes such as plantain flour. This study was designed to evaluate the nutritional, sensory and microbiological qualities of wheat and plantain composite flour bread.

Methods: Plantain was substituted in wheat flour at 3 levels (20%, 30%, 50%). Other ingredients were added to produce bread. Proximate composition, minerals and vitamins in the baked bread were determined by standard AOAC methods. Acceptability was assessed using an experienced taste panel. Storage stability was monitored through 7 days at ambient conditions.

Results: The 20/80 blend gave 10.47±0.05% protein compared to 30/70 and 50/50 blends which gave 8.99±0.02% and 8.25±0.06% protein contents, respectively. Whole wheat bread gave 11.96±0.02% protein which was significantly higher ($p<0.05$) than the blends. Fat content in 20/80 and 30/70 blends (1.26±0.02 and 1.32±0.05) compared favourably with whole wheat bread (1.39±0.02%). Significant increase ($p<0.05$) in ash contents of 20%, 30% and 50% substitutions were 1.62±0.01, 1.55±0.02 and 1.42±0.06% respectively, compared to the value in whole wheat bread (0.61±0.02%). Crude fibre contents of substituted samples were within the same range (1.88±0.12 – 2.02±0.15%) and were significantly lower than that of whole wheat (2.55±0.05%). Vitamin C in unripe plantain flour (2.50±0.05 mg/100g) contributed to the significantly ($p<0.05$) higher values in the blends as it was not detected in the whole wheat bread. Wheat/plantain blends showed better stability. Taste panelists accepted 30/70 and 20/80 blend ratios, but disliked whole plantain and 50/50 blend bread on account of colour and taste.

Conclusions: 20 – 30% plantain flour can be substituted in wheat flour for bread making to promote food security and sustainability.

Key words: Wheat, plantain, flour, evaluation, sustainability.

PO3211

ASSESSMENT AND COMPARISON OF FLAVONOIDS CONTENT OF CALENDULA OFFICIANIALIS CULTIVATED BY DIFFERENT LEVELS OF COMPOST AND NITROGEN FERTILIZERS

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Background and Objectives: Calendula (C. officinalis) extracts have shown anti-inflammatory, anti-viral, anti-genotoxic, anti anti-tumor and hemolytic effects. The therapeutic effects of Calendula is mainly attributed to it`s flavonoids including carotinoids, triterpene, saponins, and several associated compounds. The aim of this study is to define and compare the flavonoid content of calendula flowers cultivated by different levels of compost and nitrogen fertilizers in north farms of Iran.

Methods: This study was conducted in research farms of Islamic Azad University of Mazandaran, Chalous branch in 2011-2012. Factorial experiment was used in a randomized complete block design with three replications. These factors include the level of compost (not used: C0, C1: 6 and C2: 12 ton/hectare) and the levels of nitrogen fertilizer(not used: N0, N1; 50 and N2: 100 ton/hectare). Flavonoids content of Calendula was determined by HPLC–UV–MS method.

Results: Flavonoid content was affected by the impact of simple and interactive treatment. The maximum amount of flavonoid extract was obtained by the N0C2 (with maximum amount of compost used) treatment (0.66 µg/ml); and, the lowest content of flavonoids was extracted in the control (N0C0) blocks (0.53 µg/ml). The difference was significant ($p<0.05$). Also, the trend of change in flavonoid content was significantly decreasing along with increasing amount of nitrogen fertilizer from 0 to 100 tons/hectare and it was significantly increasing along with increasing amounts of compost from 0 to 6 tons/hectare ($p<0.001$).

Conclusions: Our findings suggest that flavonoids content of Calendula was increased by N0C2 treatment, indicating that using compost led to higher flavonoid levels than nitrogen fertilizer. Therefore, using compost fertilizer should be advised for industrial cultivation of Calendula.

Key Words: Calendula officinalis, Flavonoid, Compost, Nitrogen, Iran.

PO3212

ASSESSMENT OF THE NITROGEN AND COMPOST DIFFERENT LEVELS EFFECTS ON QUALITATIVE PERFORMANCE OF CALENDULA OFFICIANIALIS

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Background and Objective: Calendula (C. officinalis) has various health benefits and it is wildly used in different health related products. Due to the lucrative nature of this plant, increasing extraction of Calendula per hectare was emphasized by authorities. So, the aim of this study is to investigate the effects of nitrogen and compost different levels on quantitative performance of Calendula officinalis L. herb.

Methods: an experiment was carried out in the research field of Chalous Azad University in 2011-2012. The experiment was done in factorial form as a randomized complete block design, in three replicates. Treatments consisted of nitrogen and compost. Considered nitrogen levels consisted of N0= 0, N1=50, N2=100 kg/ha and compost levels were including C0=0, C1=6, C2=12 ton/ha. Investigated characteristics consisted of flower dry weight, number of flowers in plant, and flower diameter.

Results: Compost treatments had statistically significant influence ($p \leq 0.01$) on studied characteristics. Flower dry weight, flower diameter and number of flower in plant characteristics has been studied in eight harvest; as, the performance of these characteristics had increasing procedure from the first harvest up to the forth harvest; and, in the forth harvest, it has reached to its` maximum level and from fifth harvest, it had decreasing procedure. As, up to the forth harvest, the maximum flower dry weight, flower diameter and number of flower in plant obtained by C1XN2 (C1=6 ton/ha compost and N2=100 kg/ha nitrogen) treatment and from fifth up to the eighth harvest, it was obtained by C2XN2 (C2=12 ton/ha compost and N2=100 kg/ha nitrogen) treatment.

Conclusions: application of compost as a biological fertilizer plays an effective role in enhancement of quantitative performance of the plant.

Key words: Calendula officinalis, Compost, Nitrogen, Quantitative Performance.

PO3213

ASSESSMENT OF DIFFERENT PLANT DENSITY AND ARRANGEMENTS ON QUANTITATIVE AND QUALITATIVE PERFORMANCE OF CALENDULA OFFICIANIALIS

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Background and Objectives: Calendula (C. officinalis) has various health benefits and it is wildly used in different health related products. Due to the lucrative nature of this plant, increasing extraction of Calendula per hectare was emphasized by authorities. The aim of this study was to determine convenient plant density and arrangement on quantitative and qualitative performance of calendula officinalis L. herb.

Methods: The experiment was carried out in research field of Soha Jisa agro-industry corporation in 2011-2012. Applied experimental design, was factorial design in the form of randomized complete block design with three replicates. Experimental treatments have been consisted of the distance between the row in two levels of R1=30 cm, R2=40 cm and the distance on the row in three levels of I1=10 cm, I2=20 cm, I3=30 cm and the cultivation method in two levels of P1=rectangular and P2=zigzag. Studied characteristics consisted of the number of flowers in plant, flower dry weight, flower diameter size and flavonoid content.

Results: the plant density and arrangement had significant effect at 1% ($p \leq 0.01$) and 5% ($p < 0.05$) level on the number of flowers in plant, flower dry weight, flower diameter size and flavonoid content. Also the maximum number of flowers in plant and maximum flower dry weight obtained in 30 cm distance between the row and 20 cm distance on the row treatment and zigzag cultivation method (R1XI2XP2). As, maximum flower diameter size and flavonoid content obtained in 30 cm distance between the row and 30 cm distance on the row treatment and zigzag cultivation method (R1_I3_P2).

Conclusions: findings revealed that plant density and arrangement method had significant effect on quantitative and qualitative performance of calendula officinalis L. herb.

Key words: Calendula officinalis, Plant density, Arrangement, Quantitative and Qualitative, Performance.

PO3214

THE POINT ON THE HEALTH CLAIM FOR OLIVE OIL: A MODEL SYSTEM TESTED TO MEASURE THE POLYPHENOLS CONTENT

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Background and Objectives: For olive oils, the EU Reg. 432/2012 introduced the possibility to report the health claim "Olive oil polyphenols contribute to the protection of blood lipids from oxidative stress" in the label, if the product contains at least 5 mg of hydroxytyrosol and its derivatives (e.g. oleuropein complex and tyrosol) per 20 g of product. As reported in previous investigations, such a claim is rather confusing because of the method for the quantification of secoiridoid aglycons. The aim of this work was to find a method for improving the estimation of the hydroxytyrosol and its derivatives content in olive oil, also taking in consideration previous experiences, as requested by the EU regulation.

Methods: Several basic and acid hydrolytic tests were performed both on the phenolic exctracts obtained from olive oils and on modelled reference standards (oleuropein), in order to have a complete lysis of the ester bond of the secoiridoids with a liberation of hydroxytyrosol and tyrosol, confirmed by HPLC-UV/MS analysis. A fast specific spectrophotometric method was also carried out for the quantification of such compounds.

Results: Since the basic treatment lead to the formation of congeners, acid hydrolysis of the phenolic extracts was the best compromise. On a model system, containing standard phenols, good correlation and linearity (r2= 0.999) between the concentrations of reagent and products were obtained. Encouraging results were also found by spectrophotometric assay.

Conclusions: The quantification of hydroxytyrosol and tyrosol obtained by hydrolysis of the phenolic compounds is a way for establishing the compliance with the health claim. A validation of the method will be essential and all the tests have to be confirmed by using olive oils characterized by a wide range of phenols amount.

Key words: Olive oil, phenols, health claim.

PO3215

THE PRESENCE OF AFLATOXINS IN PLANTS FOR INFUSION BEVERAGES

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Background and Objectives: The plants used to prepare infusion beverages are sold in Brazilian street markets. It is important to research the presence of mycotoxins in plants to verify their sanitary quality, because of the Brazilian climate. The high temperature and humidity could favor the growth of fungi and the production of mycotoxins. Aflatoxins (B1, B2, G1 and G2) represent a major class of mycotoxins and are produced mainly by Aspergillus flavus and Aspergillus parasiticus. The toxic effects of aflatoxins are related to immunosuppressive, mutagenic, teratogenic and hepatocarcinogenic activities. The objective of this work was to investigate the occurrence of aflatoxins in plants commercialized in street markets of the city of São Paulo, Brazil.

Methods: It was purchased 100g of each plant: Matricaria chamomilla, Cymbopogon citratus, Peumus boldus, Achyrocline satureioides, and Mentha pulegium. About 50g of each crushed herbs were prepared and analyzed according to the method proposed by the American Pharmacopoeia (USP 32). This method was based on liquid-liquid extraction with organic solvents associated with subsequent purification of the extracts. The residues were obtained from the extracts and analyzed by thin layer chromatography with aflatoxin standard solution and developed for a distance of 15cm. The mobile phase used was chloroform-acetone-isopropanol (85:10:5, v/v/v). The toxins were visualized in ultraviolet light (UV) at 365nm. Aflatoxins B1, B2, G1 and G2 showed, respectively, RF 79, 75, 71 and 70 and the characteristic fluorescence was observed in UV.

Results: The analysis of samples from Matricaria chamomilla, Cymbopogon citratus, Achyrocline satureioides suggested the presence of aflatoxin B. Peumus boldus and Mentha pulegium extracts showed no typical aflatoxins stain under the analytical conditions used in this research.

Conclusions: Considering that was found aflatoxins in 60% of the plants analyzed, these products frequently should be submitted to the sanitary surveillance to avoid problem health in Brazilian consumers.

Key words: Toxicology, Aflatoxin, Plants, Beverage.

PO3216

SOY-BASED PROCESSED FOOD: A HEALTH RISK?

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Background and Objectives: Soybean is a source of isoflavones phytoestrogens and their biological effects and relevance to human health were related to the alternative hormone replacement therapy, serum cholesterol concentration control and breast cancer prevention. However, the phytoestrogens could play as endocrine disrupters (ED), triggering off sexual precocity in children. The objective of this work was to evaluate the label information of soy-based processed foods about the risks and benefits of their consumption.

Methods: It was analyzed 41 labels of different processed foods containing soybean marketed in Brazil such as: cereal bars, cookies, hamburgers, margarines, cakes, green tea with soy, fruit juice with soy, soymilk powder, soy-based beverages.

Results: All labels evaluated had information about the benefits of these foods. But there was no warning about the possible health injury, if children, pregnant and lactating women had high consumption of isoflavones. Although the scientific literature indicated the correlation between consumption of foods with phytoestrogens and endocrine disruption in children, there was no legislation in Brazil to regulate this warning on food labels.

Conclusions: Therefore, the issues of soy-based processed foods should be considered by the food safety to ensure the health of consumers, especially the pediatric population and pregnant women.

Key words: Isoflavone. Endocrine disrupter. Precocity sexual. Food labeling.

PO3217

DEVELOPMENT OF HEALTHIER MUFFINS BY REDUCING THE CONTENT OF FAT AND SUGAR AND INCRESING FIBRE

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Background and Objectives: Bakery products are widely consumed in the mediterranean diet, especially by children and adolescents. However, products such as muffins have also been associated with high consumption of simple sugars, saturated fat and a higher intake of energy. The aim of this study was to modify the nutritional profile of muffins by reduction and replacement of fat, reduction of simple sugars and addition of inulin as source of fibre in order to make them healthier, without decreasing the sensory quality.

Methods: The nutritional composition of muffins elaborated with wheat flour, sunflower oil, sugar, eggs and water was analyzed. Sunflower oil was replaced by "high oleic sunflower oil" (HOSO) and reduced its content by 54%. Simple sugars content was reduced by 68%. Chicory inulin, due to its textural properties and partial sweetness, was added in order to increase fiber content and as an alternative to fat and sugar. Proximate analysis was determined by AOAC methods, fatty acid profile by GC and simple sugars by HPLC. Sensorial studies were developed with 71 consumers.

Results: After recipe modification, total fat was reduced from 12.7% to 5.8%; saturated fats were reduced from 1.9% to 0.9%; monounsaturated fats increased from 3.7% to 4.1%; simple sugars were reduced from 23,3% to 7,5%, meanwhile fibre content increased from 2,5% to 8.2%. Total energy decreased from 352.5 to 258.7 Kcal/100g and cholesterol-saturated fat index was also reduced from 4.3 to 3.3. Sensorial test showed a good preference (35% of consumers) for modified muffins while purchase interest showed 62% vs 70% for modified and original muffins respectively.

Conclusion: Replacement of sunflower oil by HOSO, reduction of fat and sugar and addition of inulin are an adequate strategy to develop healthier muffins without affecting sensorial quality.

Key words: Healthy, muffins, inulin, fat, sugar.

PO3218

EVALUATION OF PLASMA TRIGLYCERIDE LEVELS IN RATS AFTER INGESTION OF BAKERY PRODUCTS WITH REDUCED-FAT CONTENT

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Background and Objectives: Fat oral test (FOT) has been described as a good technique to assess how different diets could affect plasma triglyceride (TAG) levels on rat as biomodel. The aim of this study was to determine changes in plasma TAG levels in rats after ingestion of bakery products which had been modified reducing fat levels in order to develop healthier products.

Methods: Four bakery products (cookies, sponge cake, croissant and muffins) before and after reducing the fat content were analyzed using the FOT. 48 Wistar rats were used in the study. Fat content was reduced in cookies from 16.5% to 14.8%; in sponge cake from 8.4% to 4.3%; in croissant from 23.8% to 20.6%, and in muffins from 12.7% to 5.8%. Blood samples were collected at 60, 120, 165 and 210 minutes. Statistical analysis was performed by Student's unpaired t-test. A p-value of <0.05 was considered statistically significant.

Results: In all cases, modified products showed plasma TAG levels lower than original products. Statistical differences were observed after ingestion of cookies at 60, 165 and 210 minutes; in sponge cake at all times; in croissant at 120, 165 and 210 minutes, and in muffins at 60 and 165 minutes.

Conclusion: FOT is a good technique to determine plasma TAG levels after consumption of bakery products. It is also useful to evaluate effects in plasma TAG levels after reduction of total fat content of ingested products.

Key words: Bakery products, healthy, fat oral test, triglycerides.

PO3219

PACKAGE INSERTS HERBAL DRUGS CONTAINING SOYBEAN ISOFLAVONES: TOXICOLOGICAL INFORMATIONS

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Background and Objectives: Herbal medicines, in Brazil, are regulated as conventional drugs that should provide similar criteria of quality, safety and efficacy required by the National Sanitary Surveillance Agency (ANVISA), included the correct package inserts information. In recent years, the evidence of the beneficial of isoflavones as alternative hormone replacement therapy without risks has favoured the increase of the consumption of this natural phytoestrogen. However, its abuse as a natural product could produce health injury. The objective of this work was to evaluate the package inserts information of soy-based herbal medicines about the risks and toxic effects described in scientific literature.

Methods: The package inserts were obtained from the isoflavone herbal medicines marketed in Brazil. The following information was analyzed based on the current package inserts legislation: drug name, manufacturer, composition, dosage, indication, contraindications and adverse reactions. It was included in this study the herbal medicines officially registered in Brazil, during the period of 2011-2012.

Results: A total of seven package inserts soy-based herbal medicines were analysed. All package inserts informed that the product could not be consumed by pregnant women, nursing mothers, and children or in cases of hypersensitivity to soya. Only 5 of 7 package inserts (71.4%) had the information about contraindications and/or adverse effects. About 28.6% mentioned the possibility of adverse effects on the reproductive system and 42.9% indicated the possibility of allergic reactions.

Conclusion: The lack of toxicological information in package inserts of herbal medicines evaluated in this work could damage the health consumers.

Key words: Herbal Medicines. Soy isoflavone. Package Inserts.

PO3220

DETERMINATION OF TOTAL NITROGEN IN PARENTERAL NUTRITION SOLUTIONS FOR MICRO-KJELDAHL METHOD

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Background and Objectives: Parenteral nutrition is indicated to meet the nutritional and metabolic needs of patients who can not be fed by mouth or enteral feeding. They are composed of macronutrients (carbohydrates, lipids, proteins), micronutrients (vitamins, electrolytes, trace elements) and water. According to the macronutrients in its composition, parenteral nutrition is classified as: 2 in 1 (carbohydrates and proteins) and 3 in 1 (carbohydrates, lipids and proteins). The protein nitrogen sources are essential to all living cells and responsible for many body physiological functions. The objective of this study was to determine the nitrogen content by micro-Kjeldahl method, based on the amino acids present in samples of different formulations of parenteral nutrition manipulated in a public hospital of São Paulo, Brazil. The micro-Kjeldahl method consisted in displacing nitrogen present in the sample, using sulfuric acid and hot digestion. The nitrogen presented, after the digestion, as ammonium sulfate was displaced using sodium hydroxide; and the ammonia obtained was received in boric acid solution. The titration with hydrochloric acid determined the amount of nitrogen in the samples. It was analyzed four different parenteral nutrition formulations 2 in 1, in quatriplicate: two samples of 500mL of parenteral nutrition with 20 amino acid and two samples of 500mL parenteral nutrition without amino acids. The 10% amino acid solution was used as standard. The precision and accuracy parameters were used to evaluate the reliability of the results. The levels of accuracy were 92.24% for parenteral nutrition without amino acid, 95.79% for parenteral nutrition with 20 amino acids and 91.55% for stander amino acid solution. It could be concluded that the micro-Kjeldahl method is simple, fast, accurate and reliable to the determinate nitrogen in parenteral nutrition solutions.

Key words: Parenteral. Solution Nitrogen. Reproducibility of results.

PO3221

EFFECT OF SPROUTING AND TEMPERATURE ON CRUDIVORISM DIET

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Background and Objective: The objective of the present study was to verify the nutritional adequacy of a crudivorism diet consisting of sprouted grains and submit at three distinct temperatures.

Methods: The preparation of diets and chemical analyses were carried out in the Department of Agro-industry, Foods and Nutrition of the Higher School of Agriculture "Luiz de Queiroz" – University of São Paulo, Piracicaba, São Paulo, Brazil. A basic diet was prepared for the study consisting of unpeeled potato, raw red tomato, raw kale and lime bought in a local grocery store. Sprouted lentils or lentils were added to this basic diet in addition to sprouted peanuts or olive oil, totaling 4 experimental diets. The centesimal composition analyses which: moisture, ashes, protein, fat, insoluble fiber, soluble fiber were done according to the methodology described by the Association of Official Analytical Chemists (AOAC, 1995). Carbohydrate and calorie values were determined by calculations obtained from other analyses.

Results: The compounds foods in the diet crudivora are consumed essencial in natura or subjected to 40°C. Analyzing the effect of temperature on the composition of the diets crudívoras can check lower content of nutrients in diets subjected to 100°C, except for insoluble fiber that the highest content were observed at this temperature. Regarding the interference of sprouted grains, nutrient content did not differ between diets. What can be seen was a small decrease in the content of protein, carbohydrates and calories when added sprouted lentils. And small increase in ash content, fat, insoluble fiber and soluble fiber after the process of grain germination.

Conclusion: The temperature and grain germination can interfere with contents of nutrients analyzed. This must be taken into account in the diet to ensure proper nutritional support to these adepts.

Key words: Crudivorism, temperature and germination.

PO3222

THE INCREASING ROLE OF AQUACULTURE IN PROTEIN SUPPLY: CAN WE MAKE IT ENVIRONMENTALLY SUSTAINABLE?

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Background and Objective: Fish are a valuable source of nutrients and globally, it provides about three billion people with almost 20 percent of their average per capita intake of animal protein. By 2050 the world's population is predicted to rise to 9.3 billion. Animal production and agriculture require arable land and fresh water, both of which are in short supply. Increased fishing doesn't seem to be a viable option as wild fish populations are close to their maximum fishing yields.

Methods and Results: Aquaculture has been the fastest growing animal food production globally for the last 3 decades, with production (excluding aquatic plants) growing at an average rate of 8.1% per year since 1981 (compared with 3.0% for terrestrial farmed meat production). Aquaculture now accounts for nearly half of the world's food fish. By FAO's estimate, in 2050 the demand for seafood products could only be satisfied if aquaculture doubled its current production. Commercial aquaculture development invariably involves the expansion of cultivated areas, higher density of aquaculture installations and the use of biologic and feed resources produced outside the immediate area. All these practices can have an aggregated effect at the ecosystem level and compromise its overall integrity. Fuel such a tremendous growth of the aquaculture sector without compromising the environment is a major sustainability challenge.

Conclusion: Research can play a pivotal role in defining the future trends governing the sustainable growth of aquaculture. Knowledge on the implementation of new production systems and technologies (e.g. water recirculation, integrated multitrophic, aquaponics, off-shore); the farming of new species positioned at lower levels of the food web; enhancing the use of alternative feed resources; the integration of high welfare status as a health management tool; and the use of biotechnology advances is generating valid solutions to enhance aquaculture productivity at lower environmental costs.

Key words: Aquaculture, sustainability, environment.

PO3223

BEST PRACTICES IN BENEFIT-RISK ANALYSIS IN FOOD, NUTRITION AND OTHER AREAS

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Background and Objectives: An integrated benefit–risk analysis (BRA) gives guidance in decision situations where benefits do not clearly prevail over risks. The BEPRARIBEAN project (Best Practices in Risk Benefit Analysis; http://en.opasnet.org/w/Bepraribean) investigated how BRA in food and nutrition could benefit from looking across its borders.

Methods: Commonalities and differences in BRA were identified between the Food and Nutrition field and other fields: Medicines, Food Microbiology, Environmental Health, Economics & Marketing–Finance, and Consumer Perception. Six state of the art papers in all these areas were produced, followed by an integration paper.

Results: Integrated BRA in Food and Nutrition may advance in the following ways: increased engagement and communication between assessors, managers, and stakeholders; more pragmatic problem-oriented framing of assessment; accepting some risk; pre- and post-market analysis; explicit communication of the assessment purpose, input and output; more human (dose–response) data and more efficient use of human data; segmenting populations based on physiology; explicit consideration of value judgments in assessment; integration of multiple benefits and risks from multiple domains; explicit recognition of the impact of consumer beliefs, opinions, views, perceptions, and attitudes on behaviour; and segmenting populations based on behaviour.

Conclusions: The opportunities proposed here do not provide ultimate solutions; rather, they define a collection of issues to be taken account of in developing methods, tools, practices and policies, as well as refining the regulatory context, for BRA in Food and Nutrition and other fields. These opportunities now need to be explored further and incorporated into benefit–risk practice and policy, thereby involving a paradigm shift in Food and Nutrition BRA towards conceiving the analysis as a process of creating shared knowledge among all stakeholders.

Key Words: Benefit-risk, Risk-benefit, Best practice, Bepraribean. Food and Chemical Toxicology, vol 50 (1), 2012.

PO3224

CAN FUNCTIONAL FOOD AND ORGANIC FOOD BE SUPPORTING CONCEPTS IN EUROPE?

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Background and Objective: Functional as well as organic food belong to fast growing segments of the European food market. Both are food according to the European food regulations. The question is whether organic food can also be a functional food?

Method: A review of recent literature regarding organic and functional food was conducted.

Results: Both organic and functional foods are regulated by the European food regulations, but organic food is further regulated by the European regulation for organic agriculture and food production. This regulation restricts the number of food additives and limits substantial changes in the food. This may cause problems in changing the food based on single constituents or attributes when applying the concept of functional food to organic food production. Claims of food related to positive health effects can only be accepted as true, when the claims have been tested and then validated by the EU-Commission. Whereas functional food focuses on product comparison based on specific constituents or attributes, organic food as a whole has no placebo for comparison, and effects on environment and society are not part of the health claim regulation. Therefore it seems rather difficult to establish health claims of organic foods. Consumers buy organic food out of an emotional attitude and associate the food with naturalness. In contrast, the decision for buying functional food is related to rationality, and consumer's associate functional food with a more technological approach.

Conclusion: In conclusion, the concept of functional food seems not to support organic food production in Europe.

Key words: Organic, functional, food, consumer, quality.

PO3225

IMPACTS OF THE WORLD GRAIN PRICE SPIKES IN 2008 ON THE UK HOUSEHOLDS

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Background and Objetives: The global food price surges in 2008 not only expanded the world poverty population, but also degraded the living standard of the low-income class in developed nations. It was also reported that livestock sector struggled against expensive grain feed, and the increased oil price could push up grain production cost and its price, especially through fertiliser and transport. This paper examined the effects of the international grain price hikes on the UK households with different income levels, the degree of impacts of the grain price rises on meat and dairy prices in the UK, and the influence of the world oil price spike on UK grain prices and the consumption behaviour of the UK households. We also analysed national data on the actual change in household consumption of foods and nutrients at the time of the price spike. The implications of the food price spike for nutritional status by income group are discussed.

Methods: To answer these questions, we constructed a UK food computable general equilibrium (CGE) model incorporating five income level households. The data used are a social accounting matrix (SAM) built by the Global Trade Analysis Project (GTAP), elasticity information for food cited from Tiffin and Tiffin (1999), and nutrition information from the Department for Environment, Food and Rural Affairs (DEFRA). Results and

Conclusions: It is found that the lowest income household most suffered from the grain price increase, while other households were not negatively impacted in economic welfare, the prices of meat and dairy products marginally increased by the global grain price rises, and the oil price spike little lifted up the UK grain prices in nominal term, but pushed down in real term, since the change in oil price caused a larger price inflation than that in nominal grain price, which led most consumers to reducing grain consumption.

Key words: Food Security, International Trade, Energy Price, Public Health.

PO3226

ENVIRONMENTAL PREDICTORS OF FRUIT, VEGETABLE AND ANIMAL SOURCE FOOD CONSUMPTION IN THE EAST USAMBARA MOUNTAINS, TANZANIA

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Background and Objetive: There is increasing evidence that biodiversity is essential for human nutrition. The relationships between environmental variables linked to agriculture (acres farmed, number of fields, fallow, hours spent farming, crop diversity) and forests (forest cover and use) and consumption of nutrient-dense foods (fruits, vegetables and animal source foods (ASF)) was tested in a rural African community.

Methods: Data for 274 children approximately 2 - 5 years old was collected by 24 hour recall (quantity in grams) and modified 7 day food frequency questionnaire (diversity of fruits, vegetables and ASF). Multivariate regressions, controlling for child's age, sex, breastfeeding status and household wealth, were used to determine which environmental variables were predictors of each dependant variable (conditional stepwise addition).

Results: The quantity of vegetables consumed was positively associated with acres of fallow land, while higher vegetable diversity was associated with greater crop diversity. Diversity of fruits was higher in higher elevations and both higher diversity and higher quantity of fruit was predicted by a greater diversity of crops. Higher diversity of ASF was also associated with agricultural diversity. Greater intake of ASF (in grams) was predicted by having a higher amount of unprotected forest around home and the household having not visited a reserved forest in the past week (possibly an indication of participation in conservation and thus not hunting). Analyses for households found in the lowlands only (n=185), showed higher forest cover to be associated with great quantity of vegetables and ASF consumed by children.

Conclusions: In this setting, environmental factors associated with agriculture predict quantity and diversity of some nutritionally important foods, while factors associated with forests predict consumption of others. This suggests that local people draw on biodiversity from both farm and forest to enhance the nutrient-density of their diets.

Key Words: Farm, forest, nutrient-dense, micronutrient, Africa.

PO3227

MEAL TRANPORTATION: HOT CHAIN EVALUATION IN A BRASILIAN UNIVERSITARY RESTAURANT

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Background and Objectives: The transportation system of meals characterized by the distance between the place of production and distribution of meals a facility to another. Meals transported require a strict quality control at all stages of the production process, to guarantee food safety. The risk of foodborne disease is further enhanced in that the preparations are distinguished by a production process where heavy handling process occurs and subsequently the preparation is consumed without reheating, with the aggravating the fact that the distance between the locations production and distribution of the same.

Methods: This study was in the Restaurant of the Federal University of Rio de Janeiro and aimed to verify the quality of supply of main course meals transported as standards on packaging and temperature on arrival at the distribution site for 4 months in the maximum time of 4 hours after production.

Results: The average temperature in filling the place of production was 85 °C and receiving the point of supply of 69 °C with a reduction in average temperature of 17 °C.

Conclusions: Even with loss during transport, the average temperature was kept still within acceptable values. Reviews in constant process transported meals need to be made, because the temperature is very important criterion in the assessment of food quality control.

Key words: Hot chain, temperature, meal transportation, catering.

PO3228

EFFECTS OF A HIGH-PROTEIN SOY DIET ON BRAIN OXIDATIVE STRESS IN RATS

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Background and Objective: The use of high-protein (HP) diets is gaining in popularity in the general population, especially among people interested in weight loss. Recent studies

have showed beneficial effects of a HP diet on brain rodent. Therefore, we aimed to examine the effects of a HP diet based on soy protein on brain oxidative stress.

Methods: Eighty Wistar rats were randomly distributed in 2 experimental groups (n=40): normal-protein (NP) or HP diets based on soy-protein (SP), for an experimental period of 12 weeks. Brain total superoxide dismutase (SOD), manganese superoxide dismutase (Mn-SOD), cooper and zinc superoxide dismutase (CuZn-SOD) and catalase (CAT) activities were measured. Body weight was measured weekly for all animals at the same time and the amount of food consumed by each rat was registered daily.

Results: The experimental group fed with HP diet showed higher brain weight, total SOD, CuZn-SOD and CAT compared to the NP diet group (0.61±0.01 vs. 0.57±0.02 g/100 g body weight, respectively, $p<0.05$ for brain weight, 193.41 ± 5.81 vs. 178.07 ± 2.81 U/mg protein, respectively, $p<0.05$ for total SOD, 109.95 ± 5.02 vs. 94.13 ± 1.80 U/mg protein, respectively, $p<0.01$ for CuZn-SOD and 5.01 ± 0.20 vs. 4.35 ± 0.16 μmol H2O2 /min/mg protein, respectively, $p<0.05$ for CAT). On the other hand, the group fed the HP diet displayed lower food intake when compared to the NP group (15.39 ± 0.21 vs. 17.81 ± 0.36 g, respectively, $p<0.001$). No differences between groups were observed on final body weight, carcass weight, brain weight (g) and Mn-SOD (all, $p>0.05$).

Conclusions: A HP soy diet appears to induce antioxidant capacity when compared to a NP diet. Overall, a HP diet base on soy sources may benefit brain oxidative stress response. More studies are needed to confirm or contrast the present findings.

Key words: High-protein, soy-protein, superoxide dismutase, catalase, brain.

PO3229

NA, K, CA, MG, FE, MN, CU, ZN, CR AND MO IN ENERGY DRINKS: NUTRITIONAL EVALUATION

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Background and Objectives: Energy drinks are those with a high caffeine concentration (Â± 32 mg/ 100mL). The market for energy drinks grows exponentially, with young adults being the main consumers (19-25 years old). The aim of this study was to determine the concentrations of Na, K, Ca, Mg, Fe, Mn, Cu, Zn, Cr and Mo in these types of drinks and also to evaluate its contribution to the RDI established for the main consumer of the Spanish population.

Methods: A total of 50 energy drinks samples purchased in shops in Tenerife were analyzed. During the pretreatment the samples were degasified with ultrasounds (1-2 minutes). After having measured 25 mL of the degasified sample in porcelain porous crucibles, they were put in a heater (80ÂºC / 48h) then in a muffle oven (450 ÂºC / 48 h). The obtained ashes were diluted in HNO3 at 1.5 %, gauging in flasks of 50 mL. The metal determination was performed using the ICP-AES technique (Inductively coupled plasma atomic emission spectroscopy).

Results: Mean concentrations were: 370.42 mg/L of Na, 133.74 mg/L of K, 40.43 mg/L of Ca, 39.80 mg/L of Mg, 0.259 mg/L of Fe, 0.045 mg/L of Mn, 0.158 mg/L of Cu, 0.138 mg/L of Zn, 1.434 Âμg/L of Cr and 0.769 Âμg/L of Mo. Estimation and evaluation of a moderate consumption (1 can per day = 250 mL per day) of energy drinks leads to a contribution to the RDI for young male adults of: Na (6.17 %), Mg (2.84 %), Ca (1.12%) and K (1.08 %), Cu (3.59 %), Cr (1.02 %), Fe (0.72 %), Mn (0.49%), Mo (0.43%) and Zn (0.36 %).

Conclusions: Moderate consumption of energy drinks contribute in an important way to the ingestion of Na, Cu and Mg.

Key words: Energy drinks, Metals, RDI, ICP-AES.

PO3230

INFLUENCE OF CONDITIONS OF DAIRY BOVINE BREEDING ON THE QUALITY OF MILK

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Background and Objetive: In the present study, we defined the best practice in dairy breeding which are necessary to promote the quality of secured milk.

Methods: Three farms located in the willaya of Constantine have been concerned by the study of conduct of breeding and dairy production: the first farm is endowed with the necessary equipments in the smooth running of the breeding, while the two others have very restricted means. From this critical study, we have to propose a program of the best practice of breeding and hygiene adapted for every exploitation, in order to contribute to the improvement of the used system.

Results: The First farm possesses an organized management system with a good infrastructure. The staff charged of the herd is competent; which allows him to optimize the dairy production. However, for the two other farms, the conduct of breeding is realized with a precarious and elementary way, without focalizing the interest on the improvement. Our proposed program consists into 5 items: the health of the animal,

the site of accommodation, the environment, the food, the hygiene of the draft and the storage of the milk.

Conclusion: this study has allowed us to establish a diagnosis of the conditions of breeding in three farms, to estimate the met failures, and to contribute to the improvement of the conditions of breeding by the proposal of a program of best practice of breeding.

Key words: Survey, dairy cow, best practice of breeding, dairy bovine breeding.

PO3231

EVALUATING HYGIENE PRACTICES IN HOSPITAL FOOD SERVICES

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Background and Objectives: The production of meals in hospital food services is indispensable in the recovery of patient's health status. Special care is required in order to avoid contaminated food, one of the main sources of hospital infection. The purpose of this study was to evaluate the hygiene practices of hospital food services in Natal, Rio Grande do Norte state, Brazil.

Methods: The study was conducted in three units, denominated A, B and C, and a checklist based on current Brazilian law was used to evaluate Good Hygiene Practices. Assessment was carried out in each unit, on three different days. Block weighting methodology, classifying the items as indispensable, necessary and advisable, was used to analyze the checklist. Units were classified as follows: 'Excellent', units scoring between 96 and 100 points; 'very good', from 89 to 95; 'good', from 76 to 88; 'fair', from 41 to 75 and 'poor', less than 41 points.

Results: The results obtained showed that the units analyzed follow some of the legal guidelines; however, Good Hygiene Practices still leave much to be desired. Assessment, which was based on the weighted score of the unit, revealed that units A, B and C obtained scores of 78.05, 74.58 and 68.33 points, respectively. Thus, unit A was classified as 'good' and units B and C as 'fair'.

Conclusions: The study demonstrates the need for better Food Hygiene Practices in hospitals, in order to prevent these units from becoming facilitator agents of hospital-based diseases or infections. These data show the importance of hygiene training and the application of Good Practices in these units.

Key words: Hospital food services, good hygiene practices, food safety.

PO3232

FOOD SAFETY AND NUTRITION KNOWLEDGE OF URBAN SCHOOL CHILDREN

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Background and Objectives: In many urban developing countries, most school children (SC) purchase snacks at school; and often face problems of unsafe food, which may influence their health and learning process. Very limited studies and programs address food safety and nutrition together. This study assess problems of food safety knowledge (FK) and nutrition knowledge (NK) of urban elementery SC.

Methods: A survey was conducted with SC (n=524, 8–10 years old) from different socio-economic status (SES) in Jakarta and Bogor. Data were collected through both interview and record using a pre-tested questionnaire, include 15 items of FK and 15 items of NK which encompass hand washing, type of unsafe food, commonly hazardous substance, risk of unsafe food, balance diet, meal time, breakfast, snack, drink and examples of nutrients source foods. The cutoff point to define a problem of FK/NK is when the question corectly answered for at least 75%.

Results: Overall SC knowlwedge on food safety and nutrition was categorized as medium-low level (88.3%) with the mean score 72.3±11.4. The FK of SC (84.3±11.6) is better than their nutrition knowledge (60.4±14.8). The mean score of food safety knowledge in the high SES (89.5±6.8) is better than the low SES (79.2±13.). Similarly, the NK of the high SES (67.1±13.3) is better than the low SES (53.9±13.2). Three problems of FK were identified: safety of food contaminated by flies, use of food cooked in dark-brown oil, dark-brown used oil, and MSG; and eight problems of NK were identified: drink amount, breakfast benefits, nutritious snacks, nutrient groups, protein role, energy source, protein source and anemia.

Conclusions: There is a need to improve the food safety and nutrition knowledge of SC. There is potential for an effective food safety and nutrition education and other health interventions.

Key words: Food safety, nutrition knowledge, children.

PO3233

THE RELATION BETWEEN DIETARY HABITS AND URINARY LEVELS OF 3-PHENOXY BENZOIC ACID, A PYRETHROIDS METABOLITE

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Background and Objectives: Concerns about pesticide exposure through food consumption have increased during the past several years. Pyrethroids are applied as insecticides throughout the world. Human metabolism of pyrethroids results in urinary metabolites that are suitable for biological monitoring. The objective of our study was to investigate the relation between food consumption and urinary levels of 3-phenoxybenzoic acid (3-PBA), a general metabolite of pyrethroids.

Methods: In a non-occupational exposed adult population from the IDI-IRCCS, Rome, Italy, information on socio-demographic characteristics, smoking, diet and self-reported household pesticide exposure was collected. Urinary 3-PBA level of each subject was measured and adjusted by urinary creatinine.
Results: We found that people consuming both raw and cooked vegetables five times weekly or more had higher mean levels of 3-PBA in urine (1.03 μg/g creatinine versus 0.52 μg/g creatinine; p=0.009 and 0.99 μg/g creatinine versus 0.58 μg/g creatinine; p=0.01 respectively) than subjects consuming less than five times weekly. In a multivariate model, after adjusting for age, sex, BMI, smoking and household insecticide exposure, high intake of raw vegetables (OR: 5.31; 95%CI: 1.32- 21.3) and high intake of cooked vegetables, in particular cruciferous (OR: 4.67; 95%CI: 1.07- 20.5) and leafy vegetables (OR: 6.88; 95%CI: 1.50- 31.7) were associated with high urine 3-PBA levels (≥ 0.70. μg/g creatinine).

Conclusions: The results of this study suggest that part of the variation in pyrethrois intake is explained by vegetable intake.

Key words: Diet, pesticides, 3-phenoxy benzoic acid.

PO3234

EFFECT OF NISIN ON BIOCHEMICAL PARAMETERS

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Background and Objectives: The use of antibiotics for improvements in animal health, food productivity, and microbial food safety is being gradually replaced by other alternatives with less adverse effects to human health, in line with the novel concept of biopreservation. Nisin is a bacteriocin that has been used as an alternative to the use of chemical conservatives in several food products, especially in cheese. Although nisin is recognized as safe and approved for use in food, there are a few studies concerning its effects on human organism. In the present work, we observed the influence of nisin intake on some biochemical parameters in healthy volunteers.

Methods: Volunteers of both genders were oriented to consume soup, supplemented (nisin group, n=12) or not (control group, n=16) with nisin (5.625 mg/person/day). They were oriented to consume the soup 3 times in each week, during six weeks. The levels of the biochemical markers of liver and kidney function alanin-aminotransferase (ALT), aspartate-aminotransferase (AST) and creatinine (CRE) were investigated, as well as the levels of plasma lipids cholesterol, high density lipoprotein (HDL), low-density lipoprotein (LDL), and triglycerides (TGR), before and after treatment.

Results: Results demonstrated that all parameters were under the recommended limits. When control and nisin groups were compared, there were no significant differences (p=0.05) in all parameters levels, except CRE. When comparing the levels before and after treatment with nisin, the HDL levels were higher and ALT levels were lower after the treatment (p=0.05).

Conclusions: These results confirm the concept that nisin is safe to human consume, since there is no harmful changes on biochemical parameters studied.

Key words: Nisin, Bacteriocins, Biochemical Parameters, Volunteers.

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PO3235

INDICATORS OF NON-ENZYMATIC BROWNING IN THE EVALUATION OF HEAT DAMAGE AND AVAILABLE LYSINE CONTENT IN SPANISH COMMERCIAL INFANT FORMULAS

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Background and Objectives: The interactions between infant formula components (proteins, fats, carbohydrates, vitamin and minerals) mainly affect carbohydrates and proteins (Maillard reaction, MR), but those involving proteins are especially important in products used in infant feeding because of the high protein requirements of infants. Nonenzymatic browning reactions in 14 commercial powdered infant formulas (IF) (adapted, follow-up, hyperalergenic, and soybean-based) were evaluated. The objectives were to evaluate heat damage in commercial infant formulas by measuring the non-enzymatic browning indicators and to determine the nutritional value of these IF.

Methods: Furosine, HMF and furfural were studied as indicators of thermal damage and available lysine as nutritional indicator, determined by HPLC in phase reverse and UV detector.

Results: The values of furosine were very varied, being the minimal value for the IF 14 with proteins isolated of soy (79 mg/100 g of protein) and the maximum for the IF 3 with whey protein hydrolyzed (1459 mg/100 g of protein). The available lysine contents were low (1.88-3.87 g/100 g of protein). HMF and furfural contents ranged between 1.28-14.2 and 0.06-0.62 mg/Kg respectively.

Conclusions: Similar IF show varied heat damage and nutritional values. Between furosine and furfural was found a direct correlation for what these indicators are proposed as useful indicators to evaluate the heat damage in IF. All IF except one met the minimum requirements of lysine for a child of 3 months.

Key words: Infant formulas; furosine; HMF; furfural; available lysine.

Acknowledgements: This work was supported by a predoctoral fellowship obtained from the Junta de Andalucía (Spain).

PO3236

EFFICACY OF ZINC SUPPLEMENTATION ON IMPROVEMENT OF WEIGHT AND HEIGHT GROWTH OF HEALTHY 9-18 YEAR CHILDREN IN IRAN

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Background and Objetive: As an essential micronutrient, zinc has a critical role in human growth in different stages of life. The purpose of this study was to evaluate the effect of zinc supplementation on weight and height growth of non-zinc-deficient healthy children.

Methods: A parallel single-blinded randomized clinical trial was conducted on 9-18 year old healthy referred children to Pediatric Clinic of Shahid Sadoughi Hospital, Yazd, Iran from April to October 2011. Children were randomly assigned to two groups to receive daily supplementation of single dose of 5 mg zinc sulfate supplementation for 4 months or placebo. The primary variables were weight gain velocity, height gain velocity and serum zinc level that were evaluated before and four months after intervention. Secondary variable was clinical side effects.

Results: 95 children including 48 girls and 47 boys with mean age of 12.2 ± 2.39 years were compared in two groups (zinc and placebo). Weight gain velocity (0.52±0.41 kg/month vs. 0.27±0.11 kg/month, p= 0.01) and height gain velocity (0.89±0.23 centimeter per month vs. 0.40±0.28 centimeter per month, p= 0.001) were higher in zinc group. Serum zinc level was not significantly different in both groups. Transient mild gastrointestinal side effects were seen in four children (8.3%) in zinc group and treatment was stopped in none of children who suffered from them.

Conclusion: Zinc supplementation can improve weight and height gain velocity of healthy 9-18 year-old children.

Key words: Zinc, Supplement, Height, Weight, Children.

PO3237

DIVERSITY OF VEGETABLES AVAILABLE IN BRAZILIAN HOUSEHOLDS: DATA FROM THE 2008-2009 HOUSEHOLD BUDGET SURVEY

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Background and Objective: Biodiversity loss and inadequate food consumption are critical challenges for decision-makers in food and nutrition policies. Reducing the rapid loss of biological diversity is considered essential for food security and sustainable food production. As part of a comprehensive project characterizing food biodiversity in Brazil, this study aimed to describe the diversity of vegetables available in the five Brazilian geographic regions.

Methods: Data came from the 2008-2009 nationwide Household Budget Survey. Household food availability was estimated for each Brazilian geographic region (North, Northeast, Southeast, South, and Central-Western). All fresh vegetables acquired were identified. Common and scientific names were described and weekly per capita mean amounts available were estimated.

Results: Eighty-four varieties of vegetables were available throughout Brazil. Fifty different varieties of vegetables were cited in the Northern and Northeastern regions; 53 in the Central-West, 55 in the South, and 65 in the Southeast; 35 varieties were common to all regions. The most cited vegetable was the tomato, followed by onion and lettuce. Some varieties were observed only in specific regions, for example, cassava leaves were available only in Central-Western households, sorrel (Rumex acetosa) and onion leaves were consumed exclusively in the Northeast, while asparagus and kohlrabi (Brassica oleracea var. gongylodes) were available solely in the South. In the Southeastern region nine exclusie vegetables were reported. In Brazil, total mean weekly per capita amount of vegetables availability was 11.4 kg; the tomato was the most consumed vegetable with a per capita weekly availability of about 0.5 kg.

Conclusion: The biodiversity of vegetables available in the Brazilian diet is limited, consequent to the reduced consumption of these foods in the country, and revealed by the high prevalence of inadequate intake of several vitamins and minerals observed in this population.

Key words: Food biodiversity, vegetables, Brazil, household expenditure survey.

PO3238

HUNGER IN THE MIDST OF PLENTY: THE NEED FOR PROMOTING NUTRITION THROUGH AGRICULTURE EXTENSION SERVICES

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Background and Objetive: Tanzania's Lake Zone exhibits high household food and nutrition insecurity despite considerable arable land access. Helen Keller International's agriculture-focused nutrition program, Enhanced Homestead Food Production (EHFP), combines home gardening, poultry rearing and nutrition education to improve the nutritional status of women and children. A baseline survey was conducted to assess the nutritional status of women and children under 2 y, home gardening and poultry rearing practices and nutrition knowledge.

Methods: A two-stage cross-sectional sample household survey was conducted to represent the 12-village 2-district EHFP intervention population situated in the Lake Zone of Tanzania (n=300 households).

Results: Very few households practice vegetable home gardening (17.0%), although roughly two-thirds (59.5%) own land and cultivate crops (predominantly cassava and maize). Over 1/3 of households grow fruit (papayas, oranges, mango, and banana) yet 30% of these households did not consume fruit in the previous month. Poultry rearing is common (72.0%) yet only 42% of households consumed chicken in the last week. Only 12% of children between 6 and 24 months of age received a minimum acceptable diet. Over 10% of women 20-29 had a BMI below 18.5. Children under 2 are experiencing high rates of childhood stunting (33.6%) and underweight (16.0%). Monthly growth monitoring attendance is high (80%) yet 87% of caretakers indicated that the child's health and nutrition were not discussed when the child was last weighed. Only 12.8% of households indicated they utilize the services of government extension agents.

Conclusions: Tanzania Lake Zone districts can benefit from nutrition-focused agricultural interventions like EHFP. Heavy dependence on semi-subsistence agriculture yet low uptake government extension services, and high rates of malnutrition despite regular clinic attendance, are both missed opportunities. District services should capitalize on local food diversity and encourage improved dietary diversity.

Key Words: Sgriculture, home gardening, extension services, nutrition education.

PO3239

NEW DATA ON THE PRESENCE OF ORGANOCHLORINE PESTICIDE RESIDUES IN BREAST MILK FROM MOTHERS IN A CENTRAL AREA OF TRANSYLVANIA

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Background and Objectives: Organochlorine pesticides, characterized by high chemical stability, emphasized persistency in the environment, liposolubility, is a category of pollutants that pose great public health concerns. They accumulates over time in fatty tissues, exerts toxic action on the body especially in periods of massive mobilization. Such mobilization takes place in case of increased energy demand, such as in period of lactation and are excreted in breast milk. Thus, in addition to maternal exposure to their toxic action, a major problem is the exposure of the infant to the breast milk, especially in the first months of life, when the milk is the only source of nourishment for many infants. Moreover the European Union documents (CEC, 2001, a.) include chlorine pesticides on the list of substances which are suspected to interfering with hormones. These considerations support the need for continuous determination of organochlorine pesticide residue levels in breast milk in areas exposed to these contaminants.

Methods: An area of interest in Romania for understanding the levels of organochlorine pesticide residues in breast milk is the town Turda and the surrounding area where, for various reasons, production, storage of waste, extensive use, there was a significant environmental pollution. Determination of pesticides was performed by coupled system gas chromatograph-mass spectrometer (GC/MS) in full scan mode at electron energy of 70 eV.

Results: The present paper presents concentration of chlorine pesticides determined from maternal milk collected from 20 subjects. The detected compound are (p,p)-DDE, (o,p)-DDE and DDT. The results are discussed in relation to age of mother and live site at regional level.

Conclusions: The results obtained show the presence of organochlorine pesticide residues in alarming quantities in breast milk and hence in the diet of infants fed with mother's milk.

Key words: Organochlorine pesticides, mother's milk, gas chromatography.

PO3241

MICROBIAL QUALITY OF FROZEN CHICKEN MEAT AT GROCERY STORES IN QENA GOVERNORATE

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Background and Objectives: Chicken meat is the most popular food worldwide and the Egyptian's favorite meat at the moment due to their good nutritive values, high quality protein, and low fat content and economic values.

Methods: 50 frozen chicken, 25 locally produced and 25 imported samples were taken for detection of total aerobic, total coliform, total faecal coliform and total Escherichia coli counts.

Results: The mean values of total aerobic, total coliform, total faecal coliform and total Escherichia coli counts for locally produced chicken were 2.1x103, 5.1x10, 4.9x10 and 3.5 cfu/g for breast and 2.7x103, 6.4x10, 6.4x10 and 1.5x10 cfu/g for thigh samples respectively. Meanwhile, the mean values for total aerobic, total coliform, total faecal coliform and total Escherichia coli counts for imported chicken meat were 5.4x102, 4.0, 0 and 0 cfu/g for breast and 2.4x103, 5.2, 3.2 and 3.2 cfu/g for thigh samples respectively. It could not detected faecal coliform and Escherichia coli from breast samples of imported chicken. All samples were acceptable from microbiological slandered limits.

Conclusions: The microbial qualities of locally produced chicken carcasses were higher than imported one in microbiological counts. The economic importances as well as public health significance of isolated microorganisms were discussed.

Key words: Microbial Quality, Frozen Chicken Meat, Grocery Stores.

PO3242

ANALYSIS OF NUTRIENT COMPOSITION OF TIGER NUT MILK

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Background and Objectives: In some developing countries, access to cow's milk is not readily available to average inhabitants; therefore there is scarce milk supply in various countries and the ever increasing gap between the requirement and population. In view of this scarcity, efforts have been made over the years to develop alternative milk-like products from vegetable sources, termed Vegetable Milk. The objectives of this research were to: 1) To extract milk from Tiger nuts which are common plant foods in Nigeria, locally called aya, imumu, ofio; 2) To analyse the nutrient composition of Tiger nut milk;

3) To compare the nutrient composition of tiger nut milk with that of other milk types.

Methods: To achieve these, four tests of quality was carried out: sensory evaluation, proximate analysis, micronutrient determination and microbiological quality. Data collected during these tests were summarized using percentages, means and standard deviation in which hypotheses were tested using mean comparison.

Results: Proximate analysis showed that Tiger nut milk contains 87.30% moisture, 11.38 % carbohydrate, 0.63% fat, 0.42% protein and 0.27% ash. Micronutrient analysis showed that Tiger nut milk contained 3375mg calcium, 3375mg magnesium and 180mg Iron, Comparism analysis showed that Tiger nut milk was notably higher in carbohydrate, calcium, magnesium and Iron. Sensory evaluation analysis showed that in overall acceptability, soya milk received more preference than Tiger nut milk which was fairly acceptable as shown by the mean scores 4.00+0.71 and 3.24+1.20, respectively.

Conclusion: As a result of these findings, it is been concluded that Tiger nut milk is a good source of milk in areas where accessibility and affordability for Cow milk is inadequate, also for people with lactose intolerance or galactosemia and vegetarians.

Key words: Tiger Nuts, Milk, Sensory Evaluation, Nutrient Composition, Micronutrient determination.

PO3243

GENETIC VARIATIONS IN FE AND ZN CONTENTS OF GRAIN IN IRANIAN WHEAT LAANDRACES

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Background and Objetives: Malnutrition of micro-nutrients such as iron (Fe) and zinc (Zn) are becoming a major problem in populations living in less developed and developing countries. Wheat as one of the major food crops has received considerable attentions for increasing micronutrients. The aim of this study was to evaluate genetic variation of 50 Iranian wheat landraces.

Methods: Landraces were grown for evaluation of Fe and Zn contents in the seeds in 2012 in field experiment station of Shiraz University, Iran. Fe and Zn contents were measured by atomic absorption model Shimatzu-AA-670.

Results: Data indicated that Fe content varied from 24.9 to 66.5 mg kg-1 and the landraces KC120, KC4559, KC4793 and KC4858 with 66.5, 66.3, 64.1 and 64.0 mg kg-1 of seed dry weight had the highest Fe contents while the values in commercial cultivars were from 52.6 to 54.8. The landraces KC4684, KC4542, KC4682 had respectively 38.6, 37.6 and 37.3 mg Zn kg-1. Heritability estimates indicated that Fe (97.7%) and Zn (96%) were highly heritable. Genotypic coefficient of variation (GCV) showed that there are great variations for Fe (22.2%) and Zn (19.9%) among wheat landraces. Grain yield was not significantly correlated with Fe (r= 0.04) and Zn (r=0.10) showing that selection for higher yield reduces micronutrient in the seeds of wheat genotypes. Our results indicated that there are great variations for micro-nutrition's of wheat landraces and Fe and Zn are highly heritable and that focusing on higher grain yield may reduce micro-nutrients.

ConcIusion: Selection for higher Fe and Zn contents would results in commercial varieties that can be used for reducing malnutrition of human populations in developing countries.

Key words: Fe, Zn, Wheat, Genetic variation.

PO3244

GENETIC VARIATION AND INTERRELATIONSHIP OF SEED MUCILAGE, SWELLING FACTOR AND AGRONOMIC PROPERTIES IN PLANTAGO OVATA

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Background and Objetive: mucilage is edible and used in medicine for its demulcent properties. It is a polar glycoprotein and an exopolysaccharide. Mucilage can be used in gastrointestinal inflammatory processes associated with topical irritation agents. The aim of this study was to evaluate mucilage content, swelling factor, morphological traits and antioxidants in seven wild P. ovata accessions that collected from different climates of south of Iran.

Results: Data indicated that although the mean of square for mucilage content was not significant, it ranged from 0.10 g in the accessions of Darab to 0.15 g in Abadeh and Firuzabad. Seed swelling factor averaged 11 ml, was in the range of 8.2 to 16.7 ml. Grain yield, averaged 4.9 g, ranged from 3 to 7.8 g in Jahrom and Marvdasht, respectively. The highest plant height was observed in Marvdasht (35.3 cm), Fasa (35.0 cm) and Abadeh (34.5 cm) while Darab (29.2 cm) was the shortest. The highest genetic coefficients of variation were observed for spike number (50.7%), catalase (47%), spike length (43%) and leaf area (43%). Among mucilage parameters, seed swelling factor

(24%) was highly variable. Correlation analysis indicated that seed swelling factor (r=-0.35) was negatively correlated with grain yield although mucilage content (r= 0.36) had positive correlation with grain yield. The wild accessions classified into three major groups based on their similarities in cluster analysis. Seed swelling, grain yield, antioxidants and morphological traits were highly heritable with heritability estimates over 70%.

Conclusion: the wild P. ovata genotypes are highly variable for grain yield and seed swelling factor that provide opportunities for producing high yielding mucilage varieties.

Key words: Genetic variation, Grain yield, Mucilage, Plantago, Swelling factor.

PO3245

BIODIVERSITY AND INTERRELATIONSHIP OF MICRONUTRIENTS AND BAKING QUALITY IN WHEAT LANDRACES

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Background and Objetive: Bread wheat is known for its baking quality but breeding for higher grain yield decrease baking quality and micronutrients. We aimed to evaluate the micronutrient and baking quality in wheat landraces.

Methods: 50 wheat landraces and 10 commercial cultivars were cultivated for evaluation of Fe and Zn, baking quality and yield. The experiment was conducted in Shiraz University, Iran, in 2012. Fe and Zn contents were measured via atomic absorption.

Results: Data indicated that the range for micronutrient of Fe in wheat cultivars (52.6-55.9 mg kg-1 seed dry weight) was lower than in landraces (64.0-66.8). Similar results indicated that wheat landraces had higher variations for Zn (18.6-38.6 mg kg-1) than cultivars (13.0-29.0 mg kg-1). Gluten content varied from 11.1 to 19.6 % was lower in the landraces compared to commercial cultivars. The highest (16.3-18 ml) Zeleny sedimentation volume (ZSV) in landraces belonged to KC4830, KC4697 and KC4687. Grain yield per plant varied from 6.0 in Falat to 11.8 g in the landrace KC4632. The highest genetic gain from selection belonged to Fe (44.7%), ZSV (37.5%) and Zn (37.4%). Fe and Zn contents were positively correlated (r=0.31) showing that selection for increasing Fe increases Zn content in wheat genotypes and vice versa. Grain yield had weak correlations with Fe (r= 0.04) and Zn (r=0.09) contents and had negative correlation with ZSV (r=-0.45) showing that attempts for increasing yield decrease baking quality and does not affect micronutrients accumulation.

Conclusions: Results indicated that wheat landraces had greater variations and higher micronutrients than commercial genotypes and breeding for higher grain yield may decrease baking quality and micronutrients content. Wheat landraces provide opportunity for incorporation of higher micronutrients into the commercial cultivars.

Key words: Gluten, Landraces, Micronutrients, Variation, Wheat.

PO3246

GENETIC DIVERSITY IN MUCILAGE CONTENT OF PLANTAGO MAJOR

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Background and Objetive: Plantago major, a species of Plantago is native to most of Europe and northern and central Asia, but has widely naturalised elsewhere. The leaves are edible as a salad green when young and tender and contain calcium and other minerals, with 100 grams of plantain containing approximately the same amount of vitamin A as a large carrot. We aimed to evaluate the mucilage content, swelling factor and morphological traits of Plantago plants.

Methods: Eighteen wild P. major accessions were collected from different climates of south of Iran at Shiraz University, in 2011.

Results: Data indicated that the ranges for mucilage content and swelling factor were 0.02-0.06 g and 7.9-12.6 ml respectively. The wild accessions of Mashhad (0.06 g per dry seed weight), Kashmar (0.06 g) had the highest mucilage content. Mashhad and Kashmar with 172.8 g and 152.5 g showed the highest grain yield per plant. Mucilage content and grain yield had positive correlation (r= 0.30). There was great variation for seed swelling factor and the highest swelling factor belonged to Ferdows (12.6 ml) and Kashmar (12.1 ml). The lowest mucilage content (0.02 g) and swelling factor (7.9 ml) belonged to Shiraz and Golpaygan accessions respectively. Genetic coefficient of variation (CVg) was relatively high for mucilage content (CVg=20.3%), mucilage swelling factor (CVg=33.5%) and grain yield (CVg= 38.7%). Stepwise regression analysis indicated that mucilage swelling factor (R2= 0.28) and grain weight (R2= 0.17) were highly contributed in grain yield variation of Plantago plants.

Conclusion: the results indicated that there were great variations for mucilage and swelling factor and grain yield of Plantago genotypes that can be used in breeding high yielding varieties.

Key words: Genetic variation, Mucilage, Plantago.

PO3247

EFFICACY OF MALIC ACID AND MODIFIED ATMOSPHERE PACKAGING AGAINST CAMPYLOBACTER JEJUNI IN POULTRY

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Background and Objectives: Raw poultry is a well-recognized source of Campylobacter jejuni and many surveys have confirmed the presence of this pathogen on fresh poultry. There is a great interest in reducing surface microbial contamination of poultry, with particular regard to reducing the levels of pathogens. The aim of this study was to evaluate the combined effect of malic acid washing and packaging in modified atmospheres on the growth of Campylobacter jejuni on poultry legs stored at 4ºC.

Methods: Fresh chicken legs were inoculated with Campylobacter jejuni. After the inoculation, the chicken legs were dipped into a 2% malic acid solution or distilled water (control). Inoculated samples were packaged under different gas mixtures: vacuum, 20%CO2/80%N2, 40%CO2/60%N2 or air Surface pH values, sensorial characteristics and Campylobacter jejuni, mesophiles and psychrotrophs counts were evaluated after treatment (day 0) and after 1, 3, 6, 8, 10, 13, 15 and 17 days of storage at 4º C.

Results: Significant differences ($p<0.05$) in mesophiles and psychotrophs counts were found between the legs treated with 2% malic acid and the control legs after treatment. The lowest mesophiles counts were observed in those samples packaged in 40%CO2/60%N2. Legs washed with a 2% malic acid solution showed a significant ($p<0.05$) inhibitory effect on Campylobacter jejuni compared to control legs, being about 1.38 log units lower in the first ones than in control legs after treatment. No significant reduction on Campylobacter jejuni was observed in samples packaged in modified atmospheres.

Conclusions: Immersion of chicken legs in a 2% malic acid solution can reduce Campylobacter jejuni populations on fresh poultry. Atmospheres containing 20%CO2 or 40%CO2 are not able to reduce Campylobacter jejuni.

Key words: Food safety, poultry, modified atmosphere packaging.

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PO3248

EFFICACY OF TRISODIUM PHOSPHATE AGAINST SALMONELLA ATTACHED TO POULTRY SKIN DURING REFRIGERATED STORAGE

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Background and Objectives: Raw poultry is a well-recognized source of Salmnella spp. and many surveys have confirmed the presence of this pathogen on poultry. The presence of Salmonella in poultry receives major attention because of the importance of this bacteria as causative agent of human foodborne illness. There is a great interest in reducing surface microbial contamination of poultry, with particular regard to reducing the levels of pathogens. The aim of this study was to evaluate the effect of trisodium phosphate washing on the growth of Salmonella on poultry legs stored at 4ºC for 8 days.

Methods: Fresh chicken legs were inoculated with Salmonella. After the inoculation, the chicken legs were dipped into either a 8, 10 or 12% trisodium phosphate solution or distilled water (control). Surface pH values, sensorial characteristics and Salmonella and mesophiles counts were evaluated after treatment (day 0) and after 1, 3, 6 and 8 days of storage at 4º C.

Results: Significant differences ($p<0.05$) in mesophiles counts were found between the legs treated with trisodium phophate and the control legs. Legs washed with a 12% trisodium phosphate solution showed a significant ($p<0.05$) inhibitory effect on Salmonella compared to control legs, being above 1.0 log unit lower in the first ones than in control legs after treatment. After treatment, Salmonella counts were 2,65 log cycles lower in legs treated with 12% trisodium phosphate than in control ones.

Conclusions: Immersion of chicken legs in a trisodium phosphate solution can reduce Salmonella populations on fresh poultry.

Key words: Food safety, poultry, pathogens.

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PO3249

NUTRITIONAL AND SENSORY STABILITY OF STORED HOME MADE ROSELLE JUICE

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Background and Objetive: Roselle juice is known to be rich in nutrients and is one of the most widely consumed drinks in Africa, Asia and South America. At present there is little information on the storage stability of the drink. The carotenoid, antioxidant, antinutritional and sensory stability of stored home made roselle juice was investigated.

Methods: Control (Commercial roselle juice), and freshly prepared 10% 20%, 30%, 40% and 50% roselle juice were stored under cold temperature (8±2oC) for a period of two weeks. The juice where evaluated at 0 day, 1 week and 2 weeks for chemical properties such as (Carotenoid, vitamin C, titratable acidity, pH, specific gravity, total solids and ash) antinutritional factors (saponin, tannin, phytate and oxalate). Sensory evaluation was done by a 10 member panel made of male and female adults.

Results: Fifty percent (50%) roselle juice at 0 day was significantly higher than other roselle juice in titratable acidity (0.097%), specific gravity (0.962%), ash (0.062%), Vitamin C, (8.700mg/100g), carotenoid (461.05µg/100g), tannin (0.037%) and oxalate (1.705%). In sensory attributes, there was increased preference for roselle juice from 10%-30%. There was a concomitant decrease in some chemical properties and antinutritional factors with increase in storage time. The concomitant decrease in carotenoid at zero day ranged between (424.250µg/100g -461.050µg/100g) compared with (386.350µg/100g -439.400µg/100g) at two weeks and in vitamin C, it ranged between (7.820-8.700mg/100g) at zero day to (6.425-8.415mg/100g) at two weeks. In sensory attributes, there was still an increased preference for roselle juice from 10%-30% at two weeks of storage. Fifty percent roselle juice received lower scores at two weeks of storage.

Conclusion: Generally, roselle juice between 10%-30% was acceptable in sensory scores at two weeks and there was no adverse change in the nutritional quality of the juices.

Key words: Roselle, antinutritional, carotenoid, sensory, vitamin C.

PO3250

STUDY ON HISTAMINE CONTENT IN ROHU FISH (LABEO ROHITA) SOLD IN NEPALESE MARKETS

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Background and Objetive: Histamine is a biogenic amine that occurs in many food products particularly in histidine rich fishes, which is converted enzymatically by some spoilage bacteria into histamine. Different analytical methods such as TLC, ELISA, Colorimetric, HPLC, GC-MS, Fluorometery have been developed for the estimation of such amines in different food products. However, a simple and easy colorimetric method was applied for determination of histamine content in fish samples which showed the R2= 0.998, LOQ and LOD value for histamine in frozen fish samples were determined as 0.02mg/100g and 0.006mg/100g respectively. This study was designed to study the histamine content in Rohu (Labeo rohita) fish, which is a very popular variety of fresh fish sold in Nepalese markets mainly imported from India and some are also produced within the country.

Methods: Altogether 53 fish samples were collected from different main markets of Nepal.

Results: Only the 7.54% of fish samples collected from Biratnagar and Birgunj were found to be exceeded in histamine content showing the range of ND to 8.05mg/100g. Beside these samples, all were found within the limit of recommended concentration i.e. 5mg/100g of US FDA.

Conclusion: It can be concluded that most of Rohu fish sold in Nepalese markets were found within safe level for histamine and there would be less chance of histamine poisoning due to consumption of such fish in Nepal. However, the cold chain should be maintained during whole chain of transportation to selling points to prevent the growth of spoilage bacteria that might cause production of histamine in such fish.

Key words: Histamine, Rohu (Labeo rohita), Colorimetric method, Nepal.

PO3251

OXIDATIVE STABILIZATION OF COOKING OIL BLEND WITH LEAF EXTRACT OF EUCALYPTUS CITRIODORA

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Background and Objetive: Lipid peroxidation not only limits the shelf-life of vegetable oil but also has serious health and economic concerns. Synthetic antioxidants commonly used to improve the shelf life and the oxidative stability of lipids is being discouraged by the consumers due to their perceived carcinogenicity. The scientists are investigating different plants material as an alternate source of safe, nutritious and natural antioxidant to be added in lipid food to cope the recent challenges. The present study was conducted to assess the effects of Eucalyptus citriodora leaf extract on the oxidative stability of blended vegetable oil (Canola, Rap seed and Sunflower oils; 45:20:35 v/v, respectively).

Methods: The blended oil was stabilized (@300 mg/L) with ethanolic extract of Eucalyptus citriodora leaves and heated at 65°C for 8 hours daily for the period of 100 days. The oxidative stability of stabilized and control sample (un-stablized) vegetable oil was measured following the parameters such as free fatty acid (FFA) contents, peroxide value (PV), sponification value (SV), iodine value (IV), color, cloud point and refractive index (RI) after every 10 days, periodically.

Results: Data showed that E. citriodora leaf extract was very effective to maintain the oxidative stability of blended vegetable oil for long duration as compared to control oil samples.

Conclusion: it can be concluded that E. citriodora leaf extract is a potent source of natural antioxidants and can be used to improve the shelf life of vegetable oils.

PO3252

COMPARATIVE EFFECT OF DIFFERENT SMOKING PROCESS ON BIOCHEMICAL, MICROBIAL AND SENSORY CHARACTERISTICS OF PACIFIC OYSTER CRASSOSTREA GIGAS

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Background and objectives: As fresh seafood, oyster was characterized by high initial load of microflora and short shelf-life, which causes substantial practical problems for its distribution. This paper deals with the effects of different smoking procedures and chilled storage period on pacific oysters, as assessed by microbiological and chemical parameters. Hedonic tests were also performed to assess consumers' perceptions and preferences towards different smoking temperatures.

Methods: Pacific oysters of commercial size measuring were kept in ice and transported to the laboratories where they were rapidly scrubbed, rinsed and the meat was aseptically extracted. The freshly extracted meats were separated in to two lots: (i) the first one was used for raw material, (ii) the second lot was processed according to the three smoking methods (S1: smoking at 45°C; S2: smoking at 85°C; S3: smoking at 125°C).

Results: N-3 and n-6 polyunsaturated fatty acids levels were 0.81 and 0.11 g/100g fresh oyster respectively. After processing, all fatty acid groups increased ($p<0.05$) with higher levels in oyster smoked at 125°C. However, storage period didn't have any effect on fatty acid contents. So, saturated, monounsaturated and polyunsaturated fatty acids (4.22; 2.08 and 3.80 g 100 g oyster) contents remain unchanged after 28 days of chill storage. Based on sensory and microbial data, the three smoking methods applied, resulted in a clear preservative effect on oyster samples. Independently of storage time, hot smoked samples (85°C and 120°C) were perceived to be significantly ($p<0.05$) more acceptable than other samples. Smoking process significantly lessened the levels of different strains and pseudomonas was completely eradicated ($p<0.05$).

Conclusions: Assessment of the oyster's quality at different brining-smoking methods lessened the growth of bacteria and led to an appreciated product with higher n-3 and n-6 polyunsaturated fatty acids content.

Key words: Oyster, Smoking, Quality, Fatty acids.

PO3253

FOOD AUTHENTICITY FOR FOOD SAFETY

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Background and Objectives: Food safety and food authenticity are related topics that concern all over the world. It is very important to make sure that the food we purchase are of high quality and safe for consumers. Counterfeiting of food has and can have a number of consequences (e.g. economical or consumers health and wellbeing). Adulteration of food and unfair trade practices, in general food authenticity and traceability practices are monitored in Poland by national official food control agencies.

Methods: Food quality, safety and authenticity reports were obtained from Poland national official food control agencies.

Results: Comparing data of quality control of agricultural and food products over the years in Poland there is a clear tendency of improving of food quality, organoleptic properties of food available on the polish market. The physical and chemical properties of food are slightly deteriorated but still are at low level (less than 3% of controlled food). Majority of food fraud cases are mainly dealing with mislabeling, false declaration of content and/or health claims. Most problems were related to cereals and cereal products, meat and meat products, fish and fish products. Comparing latest data on food authenticity there is a decreasing trend of adulteration of meat, butter and olive oil due to growing awareness of growing availability of efficient analytical capabilities to control safety, and quality and protect authenticity of food from "farm to fork".

Conclusions: There is a need for straightening framework approach to food law, based on integrated approach to food safety and quality from "farm to fork" with clearly defined duties and responsibilities of food operators. There is also need for elaboration fast and efficient analytical methods to be used for food authenticity, traceability and prevent fraudulent practices and build confidence to food chains.

Key words: Food safety, authenticity, adulteration.

PO3254

COMPARISON OF THE SENSORY CHARACTERISTICS OF COMMERCIAL RED PEPPER POWDER PRODUCED IN ASIAN COUNTRIES

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Background and Objective: The chemical and sensory properties of the red pepper powder produced in the Asian countries (India, Vietnam, China, and Korea) were evaluated.

Methods: To investigate the effects of the red pepper powder on Kimchi taste,capsaicinoids, organic acids, and free sugars and sensory properties were studied to compare the quality of the red pepper powders. Result and

Conclusions: Total capsaicinoid, organic acids and free sugar contents of red pepper powder were 21.01 to 88.30mg/kg, 111.75 to 170.82mg% and 5.50 to 19.95mg%, respectively. The highest content of capsaicinoids was the produced in Vietnameseas 88.30mg/kg, whereas Chinese was the lowest, showing 21.01mg/kg. Organic acids such as citric acid were significantly higher of commercial red pepper powder produced in Asiancountries. The highest content of citric acid was produced in India as 106.63±2.62mg% and Vietnamese was the lowest as 55.33±7.54mg%.The sensory evaluation data showed that the red pepper powders produced in India had the highest value of sourness and total overall strength of 2.45 and 6.73, respectively. The red pepper powders produced in Vietnam had the lowest value of sourness and sweet taste of 1.95 and 1.48. As a result of the sensory evaluation, overall acceptability of the red pepper powders was highly influenced by the contents of fructose (3.18 to 11.24 mg%), glucose (2.32 to 8.71 mg%) and citric acid (55.33 to 106.63 mg%). Vietnamese red pepper powder showed higher amount of capsaicin content and obtain higher sensory evaluation in hot taste.

Key words: Sensory characteristics, Red pepper powder, Capsaicinoids, Asian countries, Kimchi.

PO3255

ECO NUTRITION. RETHINKING ASSESSMENT OF NUTRITION AND CLIMATE IMPACT IN PUBLIC PROCUREMENT STRATEGIES – CASE-INSIGHTS FROM INTERVIEWS WITH FOODSERVICE PROFESSIONALS

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Background and objectives: Food intake has not only a significant impact on individual and population health. The environmental impact of food production and consumption is among the most important causes of climate change and contributes to a substantial part of greenhouse gas (GHG) emission. Especially the impact of public food seems to be in focus since there is an increasing expectation to take both climate and nutrition into consideration when planning public food and since public foods in many cases are expected to play an active role in public climate mitigation strategies. The objective of the study was to explore the views of public food planners on the issue of eco-nutrition and to determine the need for future menu planning tools that might be able to fulfil the needs for integrated nutritional and climate impact assessment in public foodservice.

Methods: In depth interviews were carried out with administrative dieticians in 5 public food service units at hospitals and large institutions in Denmark. An open ended protocol were used and interviews were transcribed and a thematic text analysis carried out.

Results: Results showed that dieticians increasingly are faced with demands on being able to declare the climate impact of public food menus in addition to the nutritional impact and that the food and nutritional planning of diets are increasingly computer and database driven.

Conclusion: There is a need for integrating traditional information on nutrient content with climate impact information in foods used for menu planning and dietary assessment in public food service. Official food composition databases should integrate climate impacts and models for the integration of such data should be agreed on by involving both climate and nutrition expertise.

Key words: Econutrition, public food service, climate impact, food composition.

PO3256

RELATIONSHIP BETWEEN CHEMICAL PROPERTIES AND SENSORY EVALUATION IN COMMERCIAL KIMCHI

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Background and Objetive: The aim of the present investigation is to study interactions between chemical properties and sensory characteristics of Kimchi.

Methods: The chemical properties and sensory characteristics of market-available Kimchi from 44 companies were evaluated in comparison. Firstly, freshly made Kimchi were purchased from the market and the chemical properties of Kimchi were determined by measuring pH, titratable acidity, salinity, and capsaicinoid contents. The sensory characteristics included 10 items with a 5 score scale: color, hot taste, salty taste, sour taste, sweetness, off-flavor, anchovy flavor, garlic flavor, texture, and overall preference. The sensory descriptors were determined by a panel composed of 50 people aged 20~50 years. The second step consisted in studying interactions between chemical properties and sensory evaluation. The chemical properties of commercial fresh Kimchi are significantly different that it showed pH of 3.99 ~5.84, titratable acidity of 0.56~1.12%, salinity of 1.17~2.87%, and capsaicinoid contents of 0.44~3.15mg%. Sensory assessment of sour taste was positively related to the titatable acidity and pH was negatively related. The salinity was also positively related to salty taste. In particular, capsaicinoid contents showed a close relationship with hot taste for Kimchi (R2=0.508). Also, it was analyzed correlation coefficient (R2) of independent variable (overall preference) between sensory attribute in commercial Kimchi. The result of regression analysis, R2 in the color, off flavor, hot taste showed, 0.664, -0.576, 0.708, respectively.

Conclusion: It was found that saltinity, color, and hot taste had the greatest effect on the overall preference in commercial Kimchi.

Key words: Kimchi, sensory characteristics, preference, chemical properties.

PO3257

OXIDATION AND HYDROLYTIC PROFILES OF CORNICABRA VIRGIN OLIVE OILS OBTAINED FROM OLIVE FRUITS HARVESTED AT THREE DIFFERENT MATURATION DEGREES

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Background and Objetive: Virgin olive oil is the most representative oil produced and consumed in the Mediterranean basin. This oil has nutritional, cultural and gastronomic importance due among several reasons to its fatty acid composition and minor compounds profiles. However, the concentration of antioxidants as polyphenols and tocoferols could be highly dependent on the harvesting and maturation degree of olive fruits. We aim to compare the total, oxidative and hydrolytic alterations of three virgin olive oils obtained from olive fruits of Cornicabra variety of three different degree of maturation.

Methods: Harvesting of Cornicabra olive fruits was performed in three different periods (C1, C2 and C3) separated by periods of two-week using the ABENCOR system. The total alteration as polar content (PC) and the oxidative and hydrolytic alterations were tested by column chromatography followed by HPSEC analysis of the isolated polar fraction.

Results: The oil obtained from the first harvesting (C1-oil) showed the lowest PC (amounts in g/100 g oil) 1.93±0.07 followed by the C2-oil (2.15±0.16) and finally by the C3-oil (2.70±0.04) (all P<0.05). Oils did not significantly differ in triglyceride dimers but C1-oil shows less oxidized triglycerides (0.39±0.02) than C2-oil (0.61±0.10) and C3-oil (0.84±006) (all P<0.05). Oils did not differ in isolated diglycerides, monoglycerides and free fatty acids; however, C1-oil and C2-oil showed less hydrolytic alteration than C3-oil (P<0.05).

Conclusion: Data clearly suggest that oils obtained from the last harvesting show higher autooxidation and hydrolytic alterations due probably to its lower antioxidant compound content (e.g polyphenols). These facts have permitted us to establish the optimum period for fruit collection in order to keep their antioxidant and shell-life properties.

Key words: Cornicabra, olive fruit, olive oil, maturation, harvesting, oxidation, hydrolysis. Granted by project INIA RTA 2010-00097.

PO3258

THERMAL OXIDATION IN THREE DIFFERENT PICUAL EXTRA VIRGIN OLIVE OILS DURING POTATO FRYING

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Background and Objetive: Fried food consumption has gain popularity and gastronomic relevance. Due to economical and health aspects the knowledge of stability and shell-life of oil used in frying is of main importance. We aim to compare the thermal oxidation degree induced during potato frying in three extra virgin olive oils obtained from Picual olive fruits harvested at three different levels of maturation.

Methods: Olive fruits of Picual variety obtained in three successive harvesting (C1, C2, and C3) separated by two week periods were obtained. Olive oil was extracted using the ABENCOR system. Domestic fryers of 1.1 L vessel volume were used to fry sets of 183 g potato. Forty discontinuous fryings were performed. Fresh oil was added after each 5 fryings. Oil total alteration was evaluated as polar compounds (PC). The HPSEC analysis also permitted quantifying polymerized compounds (oligomers and dimers of triglycerides, PTG+DTG), oxidized triglycerides (OTG) and hydrolytic compounds.

Results: The PC, PTG+DTG, and OTG linearly increased during frying in the three oils (all P<0.01; r2 >0.949). After 40 fryings the three olive oils presented PC and thermal oxidation far from the cut-off points marked by present regulations. Oil obtained from mature olive fruits (C3-oil) increased PC 0.412±0.010 g/100 g oil each frying while PC increase in medium- and lower maturation-oils was 23% and 25.5% less, respectively. Similarly, the oil obtained from the more mature fruits displays the higher increase rate for PTG+DTG and OTG.

Conclusion: Results clearly suggest that Picual olive oils obtained from lower and medium maturation degrees performed better on potato frying.

Key words: Picual variety, extra virgin olive oil, frying, potato, thermal oxidation. Granted by project INIA RTA 2010-00097.

PO3259

SHORT-TERM DIGESTIBILITY OF KETOLINOLEIC ACIDS AND TOTAL OXIDIZED FATTY ACIDS IN FASTED AND NON-FASTED RATS

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Background and Objetive: Western diets contain substantial amounts of lipid oxidation products. Highly thermal oxidized oils are partially digested and absorbed but the absorption of individual groups of compounds is unknown. We aim to investigate the effects of oil oxidation and fasting status on short-term digestibility of oxidized fatty acids (ox-FA) and ketolinoleic acids (keto-LA) of used in frying sunflower oils were evaluated.

Methods: During three days 12 rats were overnight fasted while other 12 had free access to diet. From day 4, and for 4 days, two control groups of rats, nonfasted (NFC) and fasted (FC), received the same amount of fresh oil, and two groups of rats, nonfasted (NFT) and fasted (FT), received 1 g/100 g body weight of sunflower oil reused from 40 deep-frying processes. Intra-intestinal MDA together with Ox-FA and keto-LA were determined 5 hours after the last administration in the various gastro-intestinal compartments.

Results: MDA and keto-LA concentrations correlated each other ($P < 0.05$). Ox-FA and keto-LA levels found in the gastric lumen suggest that digestion contributes to these compounds formation. Oil digestibility was highest in NFC and lowest in FT rats. NFT and FT rats had higher (at least $P < 0.05$) intra-intestinal MDA, ox-FA and keto-LA than NFC and FC.

Conclusions: Oil alteration influenced the digestibility of total-ox-FA and keto-LA more than fasting. Total ox-FA and keto-LA were poorly absorbed during the first 5 h after the fresh oils administration but efficiently absorbed after the altered oil administration. The consumption of products containing oxidized fatty acids must be avoided overall after large periods of fasting.

Key words: Absorption, Frying oils, Ketolinoleic acids, MDA, Oxidized fatty acids. Granted by the Spanish project AGL-2008 04892-C03-02 and by Consolider-Ingenio 2010 project reference CSD2007-00016.

PO3260

NUTRITIONAL DVERSITY OF NATIONAL FOOD SYSTEMS LINKED TO CHILD NUTRITION

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Background and Objetive: Efforts to increase yields have largely excluded consideration of the diversity of food items and their nutrients (nutritional diversity), though this is recognized as a crucial component for human health. In this study, we explore two key empirical questions: (1) does nutritional diversity of national food supply help explain patterns of nutrition-related health outcomes? (2) do countries with more diverse food production systems have greater diversity in their food supply?

Methods: We integrated agriculture, economic and health data for 153 countries from FAOSTAT and the World Bank database for two time periods 2000-2009 and 1990-1999. Nutritional diversity was calculated using three complementary diversity metrics, integrating tools from nutrition and ecology science: Shannon, Modified Functional Attribute Diversity (MFAD), and the percent of energy derived from non-staple food items.

Results: We find strong associations between nutritional diversity of the food available for consumption in a country (food supply) and key child nutriition outcomes. Furthermore, we find that in low-income countries food supply diversity is dependent on national production diversity, while for middle- and high-income countries income and trade are better predictors.

Conclusions: Our results provide evidence that national-level food policies should integrate metrics of nutritional diversity in addition to the economic, caloric, and yield-based metrics commonly used to assess and guide agricultural systems.

Key words: Nutritional diversity, food systems, child nutrition.

PO3261

ASSESSMENT OF CAFETERIA MENUS WITH NUTRIENT PROFILING MODELS

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Background and Objectives: Nutrient profiling is the science of categorization of foods according to their nutrient

composition. Serving a healthier cafeteria menu is essential for the health of the consumers. The objective of this study was to test the efficacy of nutrient profiling models in the assessment of cafeteria menus served in universities.

Methods: Monthly lunch menus of five university (3 private and 2 public university) cafeteria which are located in Ankara, Turkey were evaluated according to their macro and micro nutrient contents, in meeting the daily energy and nutrient needs of the university students. Also menus were evaluated by Nutrient Rich Food Index 9.3 (NRF 9.3), Food Standards Agency (FSA) FSA-Ofcom WXY and International Choices Programme (ICP) Nutrient Profiling Models.

Results: It was determined that, in cafeteria menus the average percentage of energy from carbohydrates, protein and dietary fat were 44.7%, 15.4% and 40%, respectively. According to NRF 9.3 model lowest score was 12.3 and the highest score was 16.5. Using FSA-Ofcom WXY model all the scores were below 4 and menus were considered as healthier. Mann Whitney U test was used to compare models in universities and no statistically significant difference was found ($p>0.05$). Mainly, fiber (49.1%) and saturated fatty acids (78.5%) criteria were not complied, in menus, when ICP Model was applied. In the study, similar results were determined with NRF 9.3 and ICP models.

Conclusions: It could be concluded that nutrient profiling models could be used objectively to evaluate the nutritional profiling of the cafeteria menus. According to the results of this study, ICP nutrient profiling model looks more appropriate to evaluate the cafeteria menus.

Key words: Cafeteria menus, nutrient profiling models, school health.

PO3262

CONSUMERS` WILLINGNESS TO EAT CHOLESTEROL-LOWERING FOODS: THE ROLE OF FAMILIARITY, BELIEFS AND ATTITUDES

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Background and Objectives: Familiarity and cognitive determinants of consumers-willingness to eat functional foods of different kind play an important role in their acceptance and consumption. The understanding of these relations requires further research. The objective of this research is better understanding of consumers-behaviour by exploring the determinants of willingness to eat cholesterol-lowering foods (CLF).

Methods: A questionnaire survey was carried out in September 2008. A total of 1002 Polish consumers aged 15 years or more (X=43.8; SD=18.3) were recruited. Obtained data included socio-demographic characteristics, selected beliefs on CLF, attitudes towards these foods, familiarity with them, and willingness to eat them next year. Participants-opinions were scored on 5-points scales. Descriptive statistics, bivariate correlation matrices and linear regression analyses were used.

Results: About 1/3 of participants were not familiar with CLF. Among those who were familiar with these foods, more than a half of them (50.8%) did not eat CLF at all, and only 13.1% ate these foods daily. The effect of consumers-beliefs, attitudes, and familiarity with CLF on willingness to eat them was examined by using a hierarchical linear regression. The first step of regression, comprising opinions on health value, benefits, risk, and attitude was significant, $R2=0.190$, $F(4,768) = 389.191$, $p<0.001$. The overall model, including familiarity, predicted significantly consumers-willingness to eat CLF next year, $R2=0.209$, $F(5,767) = 415.767$, $p<0.001$. The significant predictors of willingness to eat them were opinions on benefits (Pearsons-correlation coefficient $r = 0.132$, $p<0.001$), attitude ($r = 0.279$, $p<0.001$), and familiarity ($r = 0.143$, $p<0.001$).

Conclusion: The consumers willingness to eat CLF was determined by their familiarity, beliefs on benefits and positive attitudes. The increasing consumption of these foods requires to provide an information about products and opportunity to try them.

Key words: Functional foods, consumer, familiarity, beliefs, attitudes.

PO3263

IMPACT OF NUTRITIONAL CLAIMS ON CONSUMERS' ACCEPTANCE OF CHEESE WITH MODIFIED SALT CONTENT

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Background and objective: Change of the composition of the food product allows to counter the growing problem of diet-related diseases, also hypertension. The aim was to assess the impact of various forms of nutritional information on the package of cheese on the consumers'acceptance and the willingness to buycheese with standard and modified amount of sodium chloride.

Methods: The survey was completedin June2011 among 100 Polish consumers.Three types of cheese:with standard sodium chloridecontent (P), with 15% of reduction of NaCl (P-15), with 25% of reduction of NaClcompared toa standard one (P-25) were assessed. Survey participants rated three pairs of

cheeses with different nutritional labels. In each pair one cheese was presented with two different labels in terms of the scope of nutritional information.

Results: Nutritional labels did not change significantly the overall assessment of the product desirability. Nevertheless, cheese P presented with short table with nutritional value (STNV) was very high scored (rate 8 and 9 on 9-points scale) by 33%, with extended table (ETNV) by 38% of participants. Cheese P -15 with ETNV was very high scored by 30.0% and with ETNV and claim "Contains 15% less salt" by 41%. Cheese P -25 with ETNV was very high scored by 35.0% and with ETNV and claim "Reduced salt content" by 41%. More people expressed their willingness to purchase the cheese with the labels with extended nutritional information, and in particular with the claim of reduced sodium chloride content. The nutritional claims placed on the product reduced the importance of taste when the choice was made.

Conclusions: The extended nutritional information, and especially nutritional claims increased the consumers' acceptance and willingness to buy cheese with modified content of sodium chloride.

Key words: Nutritional claims, acceptance, consumer, reformulation.

PO3264

DETERMINANTS OF WILLINGNESS TO EAT YOGHURTS WITH PROBIOTICS AMONG POLISH CONSUMERS

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Background and Objectives: Most studies highlight the predominant role of consumers-perception for acceptance of innovative products. Objective is to identify factors determining the willingness to eat yoghurts with probiotics among Polish population.

Methods: A questionnaire survey was carried out in September 2011. A total of 1000 respondents participated in the survey. The obtained data included socio-demographic characteristics, acceptance of probiotics in yoghurt, familiarity and frequency of eating yoghurts with probiotics, perception of benefits and threats and willingness to eat them next year. The opinions were scored on the scales. Frequency analysis, cluster analysis and regression model were applied in data analysis.

Results: More than 2/3 of respondents (62.3%) approved probiotic cultures in yoghurts. The more positive consumers-opinions on healthy aspects of eating yoghurt included higher willingness to eat yoghurt with probiotics. About a half a population (48.6%) were familiar with probiotic yoghurts and ate them. 15% of respondents did not consume those foods although they were familiar with them. 36.4% of subjects unfamiliar with probiotic yoghurt declared willingness to try it. Ward-hierarchical clustering according to perceived healthy benefits, threats, and declared attitude towards product led to identification of three homogenous sub-groups: -neutral- (59.2%), -followers- (25.2%), and -opponents- (12.5%). Among the dependent items included to the regression model were socio-demographic characteristics, cognitive factors, familiarity and eating frequency. The independent variable i.e. the willingness to eat yoghurt with probiotics next year was determined to a greater degree by familiarity, eating frequency and perceived healthy benefits.

Conclusion: The increase of willingness to eat probiotic yoghurts requires the provision of information about products and opportunity to try them. Socio-demographic features do not significantly determine the consumers-decisions concerning yoghurt with probiotics.

Key words: Probiotics, consumer, acceptance. Acknowledgements: The study was financed by NCN - project # N312 253840.

PO3265

KINETIC CHARACTERIZATION OF SOLUBLE AND MEMBRANE-BOUND PEROXIDASES FROM RED CABBAGE (BRASSICA OLERACEA)

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Background and Objetives: The aim of this work was to extract and characterize soluble and membrane-bound peroxidases from red cabbage and to determine their kinetic parameters in order to maximise the quality and minimise the economic and nutritional loss induced by this oxidative enzyme during storage or processing.

Methods: Soluble and membrane-bound peroxidases (POD) were extracted from red cabbage (Brassica oleracea L. var. capitata f. rubra) using Triton X-114 and characterized by spectrophotometric methods, using 2,2´-azinobis(3-ethylbenzothiazolinesulphonic acid) (ABTS) as the H-donor.

Results: Optimum activity, was obtained at pH 4.0 in both soluble and membrane-bound enzymes, and both were inactivated by the anionic detergent sodium dodecil sulphate (SDS)

at all pH values studied. The KM and Vm values for H2O2 were found to be 0.98 mM and 8.1 μM/min M/min, respectively, for soluble POD; and 0.82 mM and 6.1 μM/min M/min, respectively, for membrane-bound POD. When the ABTS concentration was increased, maintaining the concentration of H2O2 steady, the activity was inhibited at the highest ABTS concentrations in soluble POD. Ascorbic acid was found to be the most active reducing agent for both enzymes. The effect of cyclodextrins was also studied, and the complexation constant Kc between hydroxy-propyl-β-cyclodextrins (HP-β-CDs) and ABTS was calculated using the enzymatic method (Kc= 312 M-1).

Conclusions: Both enzyme forms were inactivated by the anionic detergent SDS. The reducing agents ascorbic acid, L-cysteine and metabisulphite also inhibited these enzymatic forms. The use of substrate sequestrant agents such as CDs has an antibrowning effect due to the entrapment of phenolic compounds in the hydrophobic cavity of CDs. Food grade cyclodextrins could be an interesting alternative compared to restricted-use compounds.

Key words: Peroxidase, kinetic parameters, SDS, reducing agent, cyclodextrin.

Acknowledgements: This research has been supported by the Fundación Séneca under project PFE-SENECA/06/10.

PO3266

FURAN AND PRECURSORS IN CANNED VEGETABLES AND FRUIT JUICES

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Background and Objectives: Furan is a potentially carcinogenic compound formed in heat processed foods. The content of furan, precursors [ascorbic acid (AA), carotenoids, hydroximethylfurfural (HMF) and furfural (FUR)] and pH have been studied in vegetables and fish canned and fruit juices with the objective to establish relations between furan, precursors and heat damage.

Methods: twelve samples of vegetables and fish and thirteen of fruits have been studied. In vegetables and fish canned was analyzed the food (F) and the liquid medium (L). The furan was determined by HS-GC-MS. Ascorbic acid, HMF and furfural were analyzed by HPLC-UV and carotenoids by colorimetric at 435 nm.

Results: The mean value of furan in vegetables canned was 11.4 μg/kg and ranged between non-detected in peppers and 26.7 μg/kg in cauliflower. The furan content in the liquid medium of canned was higher than food (50.7 μg/kg, mean value). The average contents of AA and carotenoids in the vegetables canned were 6.8 mg/100g and 968 mg/kg respectively. High correlations were obtained between furan (F)-furan (L), AA (F)-AA (L), furan (F)-pH (F), furan (F)–carotenoids (F), furan (F)-HMF (F), furan (F)-furfural (F) and HMF (F)-furfural (F). The furan content in juices ranged between no-detected in cranberry and pink grapefruit and 58.9 μg/kg in lemon; mean value of juice fruit was 13.1 μg/kg. High correlations were also obtained between furan and carotenoids and HMF and pH. The high value of furan in lemon juice may be due to the addition of â-carotene (label information). If the lemon sample is excluded correlations between furan-HMF and furan-furfural were obtained too.

Conclusions: carotenoids, acid ascorbic degradation (measure by furfural), heating intensity (measure by HMF) and pH are the principal factors in the generation of furan in canned vegetables.

Key words: Furan, furan precursor, canned vegetables, fruit juices.

PO3267

ACRYLAMIDE FORMATION IN DIFFERENT BATTER AND BREADING FORMULATION DURING DEEP-FRYING OF ZUCCHINI AND EXPOSURE ESTIMATION

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Background and Objectives: Acrylamide, a probably human carcinogenic, is found to be formed in a wide range of fried foods. Maillard reaction is proposed as the most probable mechanism for the development of acrylamide formation in cooked foodstuff and asparragine and reducing sugars the precursors. Potatoes, cereals and coffee are the principal sources of human exposition. Acrylamide can be generated by domestic cooking (mainly by deep frying) and the previous studies have been carried out in fried potatoes and toasted bread. The objective of this work was studied the contribution of batter and breading procedure on acrylamide formation and estimate the intake by serving.

Methods: Zucchini were cut into in sticks and batter with flour, flour-water, flour-milk or flour-egg and breaded with breadcrumbs-egg or breadcrumbs-egg-flour. Four flour types (wheat, rice, chickpeas, wheat-corn) and two types of breadcrumbs (different size particle) were used. Frying was realized in deep frying with sunflower oil at 190°C and less than 4 min until achieve acceptable organoleptic characteristics.

Results: The mean value of acrylamide was 1941 μg/kg and ranged between 590 μg/kg for batter zucchini with wheat flour-water and 4167 μg/kg for batter zucchini with rice flour-egg. In

general, the samples with egg exhibited the highest acrylamide contents and the breading products showed minor values than batter products.

Conclusions: According to batter formulation for the same type of flour (wheat flour), the intake of acrylamide per serving (120 g) were 5 µg (flour-milk), 14 µg (flour-water), 42 µg (flour) and 83 µg (flour-egg); this values almost triplicate the acrylamide exposure estimated for the Spanish population (30 µg).

Key words: Acryalmide, batter formulation, breading, exposure estimation.

PO3269

MAILLARD REACTION IN THE STANDARD DIET FOR TYPE 2 DIABETIC PATIENTS

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Background and Objective: Dietary Maillard products may influence biological advanced glycation endproduct levels and promote inflamatory reactions in people with diabetes. Design, development and evaluation of a standard diet for metabolic control of type 2 diabetic pacients and valuation of Maillard reaction intensity in the diet foods.

Methods: Diabetes meal planning was carried out according recommendation to diabetic pacients. Exchange system was used to design a diet of 1600 kcal, low cholesterol and energy profile (50% carbohydrates, 20% proteins, 30% fats); 7-days menus were planned and twenty dishs were cooked (soft conditions) and after freezze-dried and analyzed. Chickpeas boiled (30, 100 and 175 min) and ten individual vegetables were also studied. Furosine, furanic compounds (hydroximethyl-furfural and furfural) and glucosylisomaltol were determined by HPLC and UV detector.

Results: Studied foods were grouped into 5 categories, dairy, stews and casseroles, soups, protein food (eggs, pork, fish), carbohydrate foods (potatoes and pasta), vegetables, and cereals. Maillard reaction was detected in all cooked food. The furosine values ranged between 4-490 mg/100 g protein. The foods with highest damage thermic were omelette, York ham, cheese, dairy, pasta and vegetables soup. HMF values ranged between 0.03 and 1.49 mg/kg. Carbohydrate foods (potatoes and pasta) exhibited the highest values oh HMF. The boiled vegetables showed a furosine range between 15.5-83.9 mg/100 g proteins and Maillard reaction wasn´t observed in boiled chickpeas.

Conclusions: Maillard reaction was detected in all the cooked foods; however, average intake of HMF was 0.107 mg/day according to a soft cooking process.

Key words: Diet, diabetes, Maillard.

PO3270

EVALUATION OF MAILLARD REACTION IN THE DIET FOR TYPE 2 DIABETICS APPLYING INTENSE HEAT TREATMENT

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Background and Objects: Intense heat treatment (frying, grilling, roasting) produces Maillard reaction compounds. Dietary Maillard products may influence biological advanced glycation endproduct levels and promote inflamatory reactions in people with diabetes. Evaluation of Maillard reaction intensity in the diet foods designed and evaluated for metabolic control of type 2 diabetic pacients.

Methods: Diabetics meal planning was carried out according recommendation to diabetic pacients. Exchange system was used to design a diet of 1600 kcal, low cholesterol and energy profile (50% carbohydrates, 20% proteins, 30% fats). Twenty eight foods were selected for one week diet. Twenty three dishes were cooked by frying, grilling, roasting and boiling. Furosine, furanic compounds (hydroximethyl-furfural and furfural) and glucosylisomaltol were determined by HPLC-UV.

Results: Studied foods were grouped into 6 categories, dairy, stews and casseroles, soups, protein food (eggs, pork, beef, fish), carbohydrate foods (potatoes, pasta, rice, croquettes), vegetables, baked products and others group. The furosine values ranged between 0.6-615 mg/100 g protein. The foods with highest damage thermic were foods with milk, cheese and egg cooked by gratin, roasted or grilled. HMF values ranged between 0.02-101 mg/kg dried matter and drink coffee, 360 mg/kg fresh matter. Fried or toasted bread and grilled vegetables were the products with highest content. Average intake of HMF was 38.5 mg/día and 2.56 mg/kg if the drink coffee isn't considered.

Conclusions: The formation of Maillard compounds in cooked dishes depends not only of heat treatment but the ingredients used in the recipe. Eggs, milk and dairy products increase considerously these compunds.

Key words: Diet, diabetes, Maillard, domestic cooked.

PO3271

FACTORS MOTIVATING HOME GARDEN CHOICES AFFECTING DIETARY DIVERSITY IN BANGLADESH

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Background and Objectives: Home gardens can improve the agrodiversity of smallholder farms, and the dietary diversity of families inhabiting them. The USAID-supported SPRING nutrition project promotes practices to maximize dietary benefits afforded by home gardens, including year-round production, cultivation of nutritious crops, own-consumption (versus sale), and use of garden-based income to purchase nutritious foods. Smallholders will adopt these practices only if they appeal to individual motivations, and other than the obvious economic concerns little is known about motivations behind crop choice, consumption vs. sale, or purchase. The objective of this study is to investigate the motivations for choices related to home gardening to inform development of behavior change communications to promote greater agrodiversity and dietary diversity.

Methods: In-depth interviews were carried out with 100 husband-wife pairs participating in home gardens in 2 Districts in Bangladesh. Respondents were asked about factors that influence their decisions about crops to plant in a garden, sale or consumption of produce from their garden, and purchases using proceeds from sale of garden produce. In addition to indicating which factor was "most important", subjects rated specific factors on an importance scale ranging from 1 to 3. Respondents also indicated which family member has primary authority for each decision. Promotional approaches were developed portraying positive agrodiversity and dietary diversity practices to appeal to personal motivating factors, targeting the household member most responsible for each decision.

Results: Results of the factor rating will be presented, as well as the promotional approaches developed and their implications for SPRING programs.

Conclusions: Nutrition may be a potent motivating factor for some choices related to home garden production, but other factors are as or more important and should be considered when promoting improved agrodiversity and dietary diversity among home gardening households in Bangladesh.

Key words: Home gardens, dietary diversity, behavior change communications.

PO3272

DIETARY FIBRE AND PROXIMATE COMPOSITION OF SOME SELECTED GHANAIAN UNDERUTILISED FRUITS

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Background and Objectives: Intake of dietary fibre (df) is postulated to be inversely related to the occurrence of colorectal cancer and obesity with a recommended daily intake (RDI) of (21 - 38) g depending on age and sex. European Union regulations on health and nutritional claims, allows for food with at least 6 g of df per 100g to be labelled as high in df. There is dearth of literature on the df composition of Ghanaian indigenous fruits to substantiate related health potential. This paper seeks to document the df fractions and proximate composition of four selected popular but underutilised fruits viz., Irvingia gabonensis (African mango; pulp and seeds), Artocarpus altilis (breadfruit; pulp), Annona muricata (soursop; pulp) and Annona squamosa (sweetsop; pulp).

Methods: Edible portions of commercially matured fruits were freeze-dried and stored at –20°C prior to df analysis and the fractions obtained by an enzymatic-gravimetric procedure. The proximate analysis was done by standard methods.

Results: The total df contents recorded for the samples ranged between 11.50 and 22.70 g/ 100g with the least observed in sweetsop while African mango (pulp) recorded the highest. The samples showed higher insoluble df fractions than the soluble components with African mango (pulp) recording the highest insoluble value of 18.00 g/100g (soluble fraction: 4.71 g/100g) and breadfruit with the least value of 8.01 g/100g (soluble fraction: 3.66 g/100g). Highest soluble fraction, 7.35 g/100g, was recorded in African mango (seeds) (hull included). Crude protein ranged from (2.63±0.11 to 6.71±0.07)%, fat (2.60±0.41 to 13.90±0.58)%, crude fibre (2.09±0.29 to 13.51±2.15)% and ash (2.44 ±0.07 to 4.00±0.03)%.

Conclusion: The df values obtained show the potential of these fruits significantly contributing to consumers meeting the RDI for df. Also, the appreciable protein and ash contents may well serve health-conscious individuals.

Key words: Dietary fibre, health, underutilised fruits.

PO3273

INTEREST FOR NATURAL PRODUCTS AMONG BRAZILIAN YOUNG WOMEN IS RELATED TO CONCERN ABOUT HEALTHY EATING

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Background and Objectives: Healthy eating attitudes could enclose consuming natural products, free of agrotoxics and additives, but not necessarily all people see it as a healthy diet practice and it could vary among different groups. The purpose of this study was to evaluate the relation between interest about natural products and concern about adopting a healthy diet among young women.

Methods: Brazilian female undergraduates (n=146) and patients over eating disorders (ED) treatment (n=26) aged from 18 to 40 years-old, answered the sub-scales General Health Interest and Natural Product Interest from the Health and Taste Attitude Scale. They related age and the nutritional status were assessed by means of Body Mass Index (BMI). Correlation between General Health Interest and Natural Product Interest were assessed by Pearson correlation coefficient. Multiple comparisons between patients and college students (just those without ED risk behavior evaluated by the Eating Attitude Test) were assessed by Tukey's test.

Results: Undergraduates were on average 22.5 years old (SD 4.2), 78.1% had normal range weight and 20.5% presented risk to ED. Patients were on average 25.9 years old (SD 6.6), 84.6% had bulimia nervosa, and 53.8% were overweight. Natural Product Interest score was similar between groups and it was positively correlated with General Health Interest score for both [0.418 for undergraduates and 0.636 for patients ($p < .001$)].

Conclusions: Interest in eating unprocessed foods that do not contain additives was related with interest in eating h ealthily for Brazilian young women despite an ED presence.

Key words: Health, organic food, women, eating disorders.

PO3274

EFFECT OF ELECTROLYZED WATER ON FERMENTATION OF GLUTEN-FREE RICE BREAD

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Background and Objectives: Rice is one of the most important cereals in Asian countries, especially in Japan. Niigata is a famous area for rice-growing, and produce new type of rice flour suit with bread making. Rice is also good for wheat allergy patients, because of absence of gluten. We have investigated to produce gluten-free rice bread using hydroxylpropylmethyl cellulose (HPMC). In the field of food science and technology, water is an important ingredient influencing taste, rheology and preservation of foods. In addition, it is known that electrolyzed-reduced water scavenges active oxygen species and protects DNA from oxidative damages. The aim of this study is to evaluate the effect of electrolyzed water on the fermentation of batter of gluten-free rice bread.

Methods: Batter of gluten-free rice bread was prepared with rice flour (Koshihikari), olive oil, sugar, salt, dry yeast, and HPMC. Electrolyzed water obtained by the electrolysis of tap water and pure water were used. Water content of batter against rice flour changed to 70, 80, 90, 100, 110%. Fermentation of the batter were measured at 25, 30, 35, 40 °C for 120 min.

Results: Fermentation of the batter of gluten-free rice flour advanced at higher temperature. 70% water content batter of pure water fermented earlier than the other batters at 35 and 40 °C, but there were no significant differences between water content of batter on the fermentation at 25 and 30 °C. When electrolyzed water was used, well fermentation observed in 70 and 80% water content of batter at 25 °C. However, gluten-free rice bread prepare by pure water was preferred to that of electrolyzed water on the sensory evaluation.

Conclusions: These findings show that fermentation of the batter of gluten-free rice flour with electrolyzed water advanced at lower water content and temperature.

Key words: Rice bread, fermentation, water.

PO3275

REGULATION (EC) Nº 1924/2006 ON NUTRITION AND HEALTH CLAIMS MADE ON FOODS: FISH AND SEAFOOD CONSUMPTION PROMOTION IN SPAIN

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Background and Objectives: Due to the importance of including fish and seafood in our diet, the Spanish Nutrition Foundation (FEN), in collaboration with the Spanish Ministry of Agriculture, Food and Environment (MAGRAMA) has evaluated this food group in accordance to the Regulation (EC) No 1924/2006 on nutrition and health claims made on foods. The objective was to classify 75 fish species (52 fish, 17 seafood and 6 canned fish & seafood) included in Web Database based on nutritional composition and economic cost of fish and sea-

food (http://www.fen.org.es/magrama/calculadornutricional/index_App.html), according to current EFSA legislation.

Methods: It has been consulted several food composition tables (Moreiras y col. 2010; Martin G. 1997; Ortega y col. 2011; Mataix y col. 1998; USDA National Nutrient Database for Standard Reference, Relase 24 (2011)) to obtain nutritional data for this food group. These data has been used to calculate the conditions included in EFSA legislation in order to evaluate nutrition claims achievements.

Results: All the fish species with available data are "source of/contains" protein, phosphorous and omega 3 and "high" protein. In case of "source of/contains" selenium, vitamin B12 and "high" selenium, all of them follow the regulation, except two. More than 50% of fish species are "source of/contains" vitamin B6 and "high" niacin, phosphorous and omega 3. Finally, more than 70% of fish species are "low" fat and sugars, "sugars-free", "source of/contains" vitamin D, niacin and vitamin B12, and "high" vitamin D and B12. All species could use the term "naturally/natural" as a prefix to the claim.

Conclusions: Classify the fish and seafood group in accordance with the regulation (EC) No 1924/2006 on nutrition and health claims made on foods could provide information to assist consumers in making natural healthy food choices using these nutritional claims in advertising and food labeling.

Key words: Claims, fish, seafood.

PO3276

FOOD AND NUTRITION ASSEMENT IN AFRICAN RURAL COMMUNITIES(UGANDA CASE)

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Background and Objetive: An exploratory study of a rural community of the Busoga Sub- region of Uganda, assessed community nutrition problems and formulated recommendations for nutritional improvement.

Methods: The study emphasised the importance of personal interviews and group discussions over questionnaires in discovering the opinions of village people on particular issues.

Results: Through open-ended surveys and discussions, in-depth information was obtained on agricultural patterns, food habits, food-storage and marketing practices, infant-feeding practices, and cultural beliefs and taboos. Secondary data on health facilities, food-distribution systems, and nutrient-supplementation programs were taken from government sources.

Conclusions: The final section includes four major recommendations for nutritional improvement in the Basoga community: 1) Anthropological methodologies should be used to analyse the food and nutrition situation and to determine root causes of malnutrition at the community level. 2) Storage techniques and marketing strategies must be improved and the food policy reframed in light of specific regional needs. 3) The effect of modernization in agriculture must be reanalyzed to assess its impact on women labourers, to improved nutritional status through active participation, and grass-roots organizations must be encouraged to motivate people especially women's groups.

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PO3277

MICROBIOLOGICAL STABILITY OF COOKIES FORMULATED WITH CASHEW APPLE POWDER

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Background and objectives: Wheat flour is a basic ingredient which is imported into Venezuela, so that foodstuffs formulated with this raw material are more expensive. Therefore, the use of cashew (Anacardium occidentale L) apple powder as an extender in the baking industry to replaced wheat flour, it is feasible alternative to reduce production costs and to formulate healthy foods for human consumption. The purpose of this study was to determine the microbiological stability during 21 days of storage in three formulations of cookies made with cashew apple powder.

Methods: Cashews (red creole type) were collected in Villa del Rosario de Perija, Zulia State, Venezuela. Pseudofruits were oven drying (48 hours at 65°C) and the material obtained was ground, sieved and packed in bags. Formulations of cookies

were prepared from cashew apple powder (CAPC) at 10%, 20% and 30% by substitution of wheat flour. Others ingredients as vegetable fat, water, egg and sweetener (sucralose) were used. A cookie formulation was made from 100% wheat flour to serve as a control (WFC). Cookies were stored in an environment with moderate light at 24°C and 35% humidity for 21 days. Yeasts and molds were determined according to COVENIN methods 1337/1483.

Results: The 10% and 20% CAPC formulations showed <1 log cfu/g for yeasts and molds after 15 days of storage, but before 21 days the growing was found countless. The formulations with 30% CAPC and WFC showed the same microbiological behavior for yeasts and molds, with <1 log cfu/g after 15 days of storage and increasing to 1 log cfu/g after 21 days of storage.

Conclusions: The formulation of cookie with 30% of cashew apple powder had the best microbiological stability, which makes it acceptable for human consumption.

Key words: Anacardium occidentale L, cashew apple powder, cookies, microbiological stability, storage.

PO3278

WHAT A CITY COUNCIL CAN DO TO IMPROVE THE QUALITY OF LIFE IN THE ELDERLY?

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Introduction: The elderly citizens (older than 65 year) living in Barcelona, 338,000 people, represent 20.8% of the total inhabitants (1,600,000). Some of them (26%) live alone and their life expectancy is 85.0 years (women) and 79.3 (men). The Barcelona City Council is member of the World Organisation Global Network of Life Friendly Cities. In 2012 the recommendations of the City Council laid special stress on health, eating habits and physical activity. Goals: Setting the old people from Barcelona and their longevity as a priority in the Municipal Plan for the elderly over the period 2013-2016.

Material and Methods: District programmes for active ageing and promotion of old people giving social priority to meals, nutrition and physical activity.- Cooperation strategies: (Municipal areas, districts, associations, voluntary services, professional sphere).- Promoting good healthy habits and physical activity. Leisure centres, neighbourhood and professional associations (Pharmaceutical Association, health centres).- Production and distribution in cooperation with different institutions of leaflets offering guidance to old people on safety and/or nutrition - (Barcelona Public Health Agency, epidemiology services).- Production of guidelines on nutrition, physical activity and sport (Food conditions: well-balanced and a varied diet planning which can be adapted to people's personal habits - ensuring nutritional safety at any time.

Results: 1) Experiences related to nutritional needs of vulnerable population. Meals sharing with other people, dining premises designed to be used both as a place for meals and for socialising. Home-delivered meals for disabled people. Residential homes: Nutrition monitoring for long-term residents. 2) Experimental work to promote physical activity among old people. Municipal programme of outdoor gymnastic circuits (two in each district) and subsequent follow-up action and evaluation.

Conclusions: Commitment to make progress in building up a city which fully accepts the challenge of ageing and cares for the old people who need to be attended to as they become vulnerable.

Key words: Safety and/or nutrition, Vulnerable population, Physical activity, Nutrition monitoring.

PO3279

NUTRIENT COMPOSITION STUDIES ON MARGINALISED LANDRACES OF RICE, MAIZE, SORGHUM AND KIDNEY BEAN COLLECTED FROM FRAGILE ECOSYSTEMS OF INDIA

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Background and Objectives: Green revolution driven by high yielding varieties has resulted in drastic reduction of area under crop landraces. However, they are still cultivated on marginal lands by farmers primarily for their own consumption because of their perceived nutritional superiority and/or taste attributes and tolerance to biotic/abiotic stresses.

Methods: Unique landraces of rice (12), maize (32), sorghum (9) and kidney bean (15) collected from ethnic communities residing in remote and fragile agro-ecosystems, under the World Bank funded NAIP (GEF) project were analysed for proximate composition, starch, sugar, phenols, antioxidant capacity, phytate and minerals following AOAC methods.

Results: Protein content of rice, maize, sorghum and kidney bean ranged between 6.7%-10.4%±1.12, 8.7%-12.01%±0.94, 11.3%-13.8%±0.88, 21.3%-25.1%±1.12 while starch con-

tent ranged 63.8%-69.6%±1.59, 48.8%-64.9%±3.95, 49.04%-66.51%±6.14, 23.8%-35.3%±4.61, respectively. Highest variability for protein content was observed in rice and for starch in maize and kidney bean landraces. Total soluble sugar content was highest in kidney bean (22.7%-26.7%±2.05) but maximum variability was observed in maize (3.4%-11.1%±1.72). Fat content as well as variability was highest in maize (3.7%-7.96%±1.16) followed by rice (2.7%-4.7%±0.67) and sorghum (1.9%-4.6%±1.03). Kidney bean showed highest mineral content followed by sorghum. Total dietary fibre was highest in sorghum but soluble dietary fibre was highest in kidney bean. Antioxidant activity (GAE) estimated by CUPRAC assay was found to be highest in kidney bean landraces Rajma Him (5.3±0.06), Rajma Chamba (5.11±0.05) followed by red rice land races Begmi (4.98±0.05) and Kathedi (4.88±0.06). Antioxidant activity of sorghum landrace Vayunowka Jonna (3.82±0.04) was more than double compared to other land races and varieties.

Conclusion: Most of the land races showed high proportion of fibre, minerals, phenols, antioxidant potential and lower content of starch/sugar as compared to commercial varieties. Thus landrace diversity offers opportunity to combat emerging public health issues such as micro-nutrient deficiencies, diabetes, CVD, cancers and to conserve diversity and environment.

Key words: Landraces, nutrient composition, antioxidant potential, phytate, minerals.

PO3280

PHYSICOCHEMICAL PROPERTIES OF SOME HONEY PRODUCED IN THE UNITED ARAB EMIRATES

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Background and Objetives: This study focuses on the determination of physicochemical properties of 70 local honeys from two different types (Sider and Samar) obtained in the United Arab Emirates.

Methods: In this study, water content, pH, acidity, electrical conductivity (EC), colour,hydroxymethylfurfural (HMF) and sugar content were all determined in different types of bee honey.

Results: The analysis shows that all samples are acid, with relatively low water content (Sider= 17.35, Samar= 15.92). The values obtained for the electrical conductivity are comparable. A small variation is observed due to the floral origin. The determination of the sugar content, revealed the presence of large quantities of fructose compared to glucose in all samples. Percentage of Sucrose is very low (Sider=3.24, Samar=2.58). According to this analysis the level of HMF in the majority of the analyzed samples is low showing that our local honey is fresh, and meet national (UAE.S GSO 147:2008) and international standards (codex Alimentarius 2001). The rest of the local samples show significantly high HMF levels. These results may therefore be attributed to storage for long periods at high temperatures or adulteration.

Conclusions: the result of this study indicated that Sider and Samar honey differ significantly in their physico-chemical properties. Honey samples purchased from two different region of United Arabs Emirates, were mostly at good quality, but honey type Sider is the best.

Key words: Honey, Samar, Sider, physicochemical characteristics.

PO3281

GENETICALLY MODIFIED FOOD PLACED ON THE POLISH MARKET IN THE YEARS 2007-2010

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Background and Objectives: European Union (EU) legislation ensures that accurate information concerning genetic modification is available at each stage of production and placing on the market of food. Indication on the label information concerning that modification can enable consumers to make an appropriate choice between traditional and genetically modified (GM) food. The objective of the study is to analyse of labelling correctness of potentially genetically modified foodstuffs.

Methods: The food samples were taken from the Polish market according to annual sampling plans for monitoring purposes (in the years 2007- 2010) and examined by State Sanitary Inspection's laboratories paying special attention to presence of GM material and if that modification is approved in EU. Data analysis of food samples tested was conducted based on results from that laboratories.

Results: In the years 2007-2010, 2433 samples of various foodstuffs were taken from Polish market in the direction of checking of labelling correctness, in relation if products have information about genetic modification on the label and if that modification is approved. It turned out that in mentioned period 27 products were identified as containing GM material and without any indication of information concerning genetic modification (1,1% of food samples examined). 25 products contained modification approved in EU. 2 genetically modified samples contained modification, which was not allowed in the EU (flax products).

Conclusions: Ensuring a basic for consumers to make informed choices of food that they consume is very important.

The accuracy of labelling in accordance with EU regulation gives consumers possibility of such a choice and can build trust to that food. Taking into account the results of food monitoring there is need of continuation of that procedure.

Key words: Genetically modified food, labelling, correctness.

PO3282

ANALYSIS OF WASTE IN A RESTAURANT FOOD INDUSTRIAL MARANHÃO - BRAZIL

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Background and Objectives: to verify food waste in a restaurant industry, analyzing and determining the amount of leftover clean to calculate the financial impact of leftovers to food and nutrition unit.

Methods: It is a field study descriptive. The survey included data collected between October and November 2012, for nine days in the morning. The weighing of the Clean Surplus distribution was performed after lunch. Leftovers preparations were weighed separately and these values were recorded and compared to the values of meals served. To analyze the remains clean, tables were used to show the percentage of clean leftovers on the total weight of food produced, the unit cost of the raw material and the unit cost of the clean surplus. The cost calculation was based on the main ingredient spending.

Results: It was found that the average per capita of the total surplus was 116 grams, equivalent to 22,3% of a given quantity of consumption, which exceeds 20% of the margin of safety provided in the planning of the Food and Nutrition Unit.

Conclusions: The unit of food and nutrition presented a safety margin above planned, wasting a considerable loss of food with plenty clean.

Key words: Food-Processing Industry. Food Economics. Food Production.

PO3283

QUANTIFICATION OF ANTINUTRITIONNAL SUBSTANCES IN THE FRUITS OF GLEDITSIA TRIACANTHOS L. IN ALGERIA

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Background and Objetives: Honey locust (Gleditsia triacanthos), also called sweet-locust or thorny-locust, is a moderately fast growing tree commonly found on moist bottom lands or limestone soils. It was largely recommended like food of the cattle at the beginning of the 20 Th centuries, since it can provide a source of fodder, protein and metabolic energy. The tree was introduced in Europe in 1700 when it became current in the Western areas, central and Southerners, and was introduced by the colonists into our country Algeria in 1949. We aim to quantify antinutritionnal substances in the fruits of gleditsia triacanthos l. in Algeria.

Methods: The pods of G. triacanthos L. were collected from the University of Djillali Liabes (ITMA) Sidi Bel Abbes during November 2011. The pods were put to dry in the shade during 3 months. The seeds were separated manually then crushed separately. We carried out following proportioning: total phenols, condensed tannins, hydrolysable tannins.

Results: The obtained results showed that the fruits of G. triacanthos are characterized by very low values in anti-nutritionals factors with the percentages according to: condensed tanins (0, 13% - 0, 03%), hydrolysable tanins (0, 78% - 0, 45%) and total phenols (0, 44% - 0, 16%).

Conclusion: It arises that the fruits (pods and seeds) are a promising source which can be of a great interest for the industry by its use for example in the manufacture of bioethanol and cattle food.

Key words: Gleditsia triacanthos L., pods, seeds, anti-nutritionals factors, valorization.

PO3285

HEALTH BENEFIT CLAIMS AND DAIRY PRODUCTS

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Background and Objective: International authorities in different parts of the world made it their mandate to ensure all health benefit claims made on food labels are clear and scientifically substantiated. In South Africa, as in many other countries in the world, local authorities' govern labeling legislation, regarding which international guidelines should be followed and ultimately what health benefit claims are allowed to appear on food labels.

Methods: A comparative analysis was done by observing and comparing South African health benefit claims on dairy products in 2009 with those in 2013. An analysis of internationally approved health benefit claims were also done and compared to current claims on South African dairy products.

Results: Since 2009 food labeling legislation in South Africa has changed considerably. Nutrient content and comparative claims are allowed under the Labeling and Advertising of Foodstuffs regulations, whilst a restriction was put on functional health claims. Further more, the recently published Consumer Protection Act together with the above labeling regulations, demands that any claim made on a product must be scientifically substantiated Substantiation must be provided within two days upon request by authorities. Nutrient content claims are more standardized than in 2009, with prescribed levels and wording. Strict guidelines determine the sampling and method of analysis for nutrient profiling for labeling purposes. All of the above affects dairy product labels.

Conclusion: International authorities, which allow for functional claims on dairy products, base approval of such claims on science-based nutrient profiling, ensuring all claims are substantiated. From a nutrient profiling perspective, it is thus evident that South Africa is aligning itself with the rest of the word in terms of food labeling. Global and local health trends provide a unique opportunity for the use of health benefit claims and the development of fortified/enriched dairy products.

Key words: Legislation, health benefit claims.

PO3286

THE IMPACT MINIMALLY POSTHARVEST HANDLING OF FRUTS AND VEGETABLES ON FOOD SAFETY IN REMOTE AREA IN TIMOR - INDONESIA

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Background and Objetive: Postharvest handling is done to increase the quality of fruits and vegetables, however this cannot be done because a number of reasons. One of the reasons is cheap prices only can be accessed by the customers such in remote area and poor country such in Timor. Most people think that postharvest handling only wasting time, wasting money , on the other hand they forget that by handling, it can be increase the quality of products such fruits and vegetables and food safety aspects.

Methods: The reseacrh has been done in 7 tradisional markets in West Timor to indentify the postharvest handling technologies that applied to the local fruits and vegetables.

Results: It found that, there was no proper postharvest handling technologies applied to the fruits and vegetables, such washing or rinse with unqualify and unsafety water. It also found that most of the local horticulture product are sold without sorting or grading, no pre cooling treatment, the packing, and others steps of postharvest handling. While these commodities are displayed in wholesome marketplace are not packed, displayed without putting on the top of pallet even put directly to the floor or on the surface of land. These lead to unsafety and unhealthy conditions, and at the end customers got the unsafety fruits and vegetables which caused infections, diseases and others

Conclusion: It may be said that fruits and vegetables sold in the tradisional markets need to be handling properly before eating or cooking because of safety reasons.

Key words: Minimal process, postharvest handling, fruits, vegetables.

PO3287

IMPACT OF SUSTAINABLE PRODUCTION OF PALM OIL ON HOUSEHOLD LIVING STANDARD AND ENVIRONMENT: EXAMPLE OF APPLYING CONTRACT FARMING IN INDONESIA

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Background and Objectives: Environmental damages have negatively affected socioeconomic benefits of expanding palm oil industry in Indonesia. Small-holders are identified as the most vulnerable groups in the term of (i) falling into poverty traps due to using inappropriate practices and inputs, and, (ii) suffering from environmental degradation in rural areas. Contract farming is believed to have a potential to reduce negative impacts on environmental and to increase living standard of targeted farmers. The aim of the study was to analyze present situation and identify potentials for poverty alleviation and environmental conservation.

Methods: Study was carried out in North Sumatra. Review of available literature as well as interview with local administration and NGOs were gathered to determine the bottlenecks and potential benefits of using contract farming. Finally, group discussions were organized with local small-holders (n=45) on preferences regarding to additional income allocation.

Results: Both Indonesian government and local NGOs has a low awareness about positive aspects of contract farming on socioeconomic development and environmental sustainability. Small-holders under contract have a potential to increase the income approximately at 37%. Farmers themselves claimed additional income will be used on education for their children and ensuring food security for household members.

Conclusions: Under the assistance of both governmental and non-governmental organizations, contract farming seems to be a suitable solution for the Indonesian palm oil production as it has capacity to solve problems of both poverty alleviation as well as reduction of negative ecological impacts of the Indonesian palm oil industry on local environment.

Key words: Environment, palm oil, food security, living standard, North Sumatra.

PO3288

CHOICES PROGRAMME NUTRIENT PROFILING MODEL: EVALUATION OF LABELLED FOODS MARKETED IN ANKARA, TURKEY

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Background and Objectives: The International Choices Programme (ICP) is an international applicable nutrient profiling system aimed to product reformulation and to help consumers to make healthier choices. The objective of this study was to use the ICP nutrient profiling model to test the labelled foods and beverages marketed in Ankara, Turkey.

Methods: Totally, 3184 labelled food and beverages from 38 food categories and 500 different brands which were marketed in top two hypermarkets were evaluated. All the foods and beverages were divided into food groups on the basis of ICP product criteria. The criteria for energy, fiber, saturated fatty acids (SAFA), trans fatty acids (TFA), sodium and added sugars were determined according to each of the food and beverages groups.

Results: According to the model energy criteria compliance with the fruit juices, main courses, filled sandwiches were 33%, 95.2% and 90.9% respectively. Fiber criteria compliance with fruit juices, pastas, rice, breads, breakfast cereals and main courses were 2.7%, 1.2%, 0%, 34.1%, 59.6% and 11.9%, respectively. Fruit juices, pastas, rice, grains, breads, breakfast cereals, cheeses, milk products, oils and fats and main courses were complied with the sodium criteria; 9.8%, 4.1%, 7.7%, 4.6%, 0%, 65.4%, 1.5%, 3.3%, 43.8% and 4.8% respectively. Out of total, 39% of the breads did not comply the sodium criteria. SAFA criteria compliance with pastas, breads, breakfast cereals, oils and fats and main courses were 16%, 24.4%, 71.2%, 88.8%, 16.7% respectively. Breakfast cereals sugar content (48.1%) was not comply the ICP.

Conclusions: Choices Programme nutrient profiling model is easy to evaluate the nutrient profiling of foods, but compliance of the criteria of foods and beverages marketed in Turkey is not satisfactory. Reformulation of the products is needed.

Key words: Labelling, nutrient profiling, Choices Programme.

PO3289

FOOD SECURITY AND THE DEVELOPMENT OF URBAN AGRICULTURE IN ACCRA, GHANA

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Background and Objetives: Rapid urbanization has led to poverty and eventually threatened the food security of Accra in Ghana. Accra, like most African cities has witnessed high migration from the rural areas since independence. Main actors in the creation and control of habitats like developers, government etc. in Ghana have long tried to put agriculture under rural living and not urban. For the urban dwellers poverty always lurk around the corner because of the over reliance on a cash economy and unemployment. Urban agriculture provides an alternate path to limiting this menace. The aim of the research was to (1) understand urban agriculture in Accra and its impact on the household, (2) highlight the importance of urban agriculture with regards to food security in Accra, (3) understand why there are no government backing and promotion of urban agriculture.

Methods: Data was collected during the summer of 2012 through face to face interviews and sometimes semi-structure questionnaires with some farmers in Accra who engage in urban agriculture and experts from the Ministry of Agriculture, Ghana.

Results: The most positive aspect with regards to urban agriculture and those who practice it in Accra was the stability in terms of household food supply, employment and subsequently income.

Conclusions: This work shows that with official backing urban agriculture may play a role on how the poor in Accra deal with poverty and subsequently food insecurity. Further, it will give an insight to policy makers and city planners on how embracing urban agriculture would help achieve the millennium development goal of poverty reduction, environmental sustainability and food security.

Key words: Accra, urban agriculture, Food (in) security, Ghana.

PO3290

PATHWAYS FOR SUSTAINABLE FOOD SAFETY

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Globally, the notion of food safety (FS) has become a borderless unifying theme. Inadequate FS situation is recognized as direct threat to healthy living. Therefore, the impending long-term FS concerns call for mobilizing relevant expertise and resources needed to counter this task. Hence sustainable FS assumes special meaning. The national and international custodians of FS, are working on mechanisms for achieving such sustainable pathways with hopes of arriving at comprehensive yet functional FS practices. However, there is tacit admission that it is a complex problem. The requisites for management and communication to deal with different global regions and increasing demands on the scientific and technical competence, jointly influence the outcome. This is further complicated by the need to develop nationally and internationally acceptable FS standards and dissemination of such information to strengthen FS education. There are some positive developments too regarding FS outlook; e.g. (i) the HACCP also includes chemical and physical agents (not only microbiological), thus shifting focus on broader analytical requirements relevant for comprehensive FS; (ii) consumer insights into wholesome nutrition, fear of food adulteration, and of late, awareness of the geographic origin of foods due to prevalence of unsatisfactory food processing practices in some countries; and (iii) the fear of losing market share by export driven countries due to contaminated foods. These are important movements happening at a community level, demonstrating sustainable and positive FS trends. Looking forward, Australia, Canada, some European countries, Japan, and the USA, have evaluated existing and emerging FS risk factors (based on prevention, intervention and response), for consolidating FS gains. Finally, a recently proposed concept namely, Food Safety Security perceived as an early warning system for minimizing FS breaches, offers further insights (IJVNR 82(3), 2012, pp216-222). These and other pathways will be discussed.

Key words: Food safety, Food safety security, sustainable pathways.

PO3291

ASSESSMENT TOOL FOR EDUCATIONAL PROGRAM UNDER THE PERSPECTIVE OF PROMOTION OF FOOD AND NUTRITION SECURITY IN BRAZIL

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Background and Objectives: For the full exercise of the human right to adequate food is necessary not only the design and implementation of programs and policies, but also the empowerment and participation of rights holders. Being the empowerment essential to the formulation, execution and monitoring of public policies and programs. The groups when excluded from decision-making processes that involve itselves

rarely maintain the access to adequate food for long time. The Thousand Women Program is inserted in Plan Brazil without Misery, and has as guidelines: improving access to education, contributing to the reduction of social and economic inequality of women, the promotion of social inclusion; defense of gender equality and, combating violence against women. This research has developed assessment tools to the Thousand Women Program with objective of evaluating the contributions of this in relation to promotion of food security and nutrition in Brazil.

Methods: It was performed a systematic review of the literature and from the theoretical basement tools were elaborated the instruments that present aspects related to the promotion, provision, protection and respect for the human right to adequate food.

Results: They were considered the dimensions concerning to the monitoring of the Food and Nutritional Security according to the National Food and Nutritional Security Council (production and availability of food, income and expenses with food, access to adequate food, health and health services, education, public politics, budget and human rights), the social economic profile demographic of the students (with information regarding education, income and housing, among others) and the state of food insecurity (according to the Brazilian scale of food insecurity).

Conclusions: from the application of these instruments will be possible to verify the impact of the professional qualification of these women in the food and nutritional security of their families.

Key words: Food and Nutritional Security, Empowerment.

PO3292

FEDERAL INSTITUTE OF EDUCATION, SCIENCE AND TECHNOLOGY GOIANO – CAMPUS CERES AND PROFESSIONAL QUALIFICATION OF WOMEN IN THE FIELD OF FOOD

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Background and Objetive: The Brazilian Professional and Technological Education proposes a critical social intervention and qualified for favoring social inclusion and democratization of society social goods. The Program Mulheres Mil (Thousand Women) has among its guidelines: improving access to education, contributing to the reduction of social and economic inequality of women and the promotion of social inclusion. For this, the courses offered in the Federal Network of Technological Education in Brazil have a common core of subjects and some training. This paper aims to present the curriculum, the course of Practice and Food Processing, of the Federal Institute of Education, Science and Technology Campus Goiano Ceres.

Methods: For this work, a documentary search was conducted.

Results: the Common Core presents several disciplines: mathematics (20h), Portuguese (20h), entrepreneurship (10h), ethics and citizenship (10h) and data processing (20h). The professional part was designed by understanding the need of professional qualification, in accordance with the requirements of the National Health Surveillance Agency - ANVISA. Were taught the following subjects with their respective workloads: hygienic handling of food (10h), foodborne illness (10h), good manufacturing practices (30h), food contaminants (10h) and food processing (20h). The offered course developed theoretical and practical related to the knowledge mentioned, and in such diverse areas as: food and nutritional education, full use of food, bakery, best practices in processing fruits and frozen foods. The evaluation occurred through development of portfolio and monitoring the practical activities undertaken. Given the reports of the students, it was realized the change of habits, by incorporating knowledge, generating expectations of application of knowledge at home and in an own business.

Conclusions: From the results observed in the course had begun the develop tools and strategies to measure the impact of professional training offered by the program in the students' lives.

Key words: Professional qualification, Best Practices and Food Processing.

PO3293

DEVELOPMENT OF A METALLOPORPHYRIN COATED FOIL FOR THE DETECTION OF VOLATILE AMINES ORIGINATING FROM FOOD SPOILAGE PROCESSES

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Background and Objetive: Food spoilage processes decrease the nutritional value of products and may be a risk for the consumer's health. Fish and seafood products are consumed worldwide, but their shelf-life is limited due to various

bacterial activity resulting e.g. in the production of biogenic amines such as histamine, and volatile amines, resulting in off-flavours. Within this study, we purposed to develop a foil allowing us to detect volatile amines such as trimethylamine (TMA), dimethylamine (DMA) and triethylamine (TEA), that could be used in food packages as a colorimetric spoilage indicator.

Methods: Organosilicon films were loaded, among other, with chromium 5, 10, 15, 20-tetraphenylporphyrin (CrIIICl(TPP)H2O) by atmospheric pressure dielectric barrier discharge, and were investigated at various conditions for their ability to detect volatile amines and spoilage of fish in simulated storage experiments.

Results: In a first step, various metalloporphyrins (0.05% in ethanol) were tested in solutions, and CrIIICl(TPP)H2O was able to detect several volatile and biogenic amines, in the sequence TEA>TMA>DMA>NH3=cadaverine ($p<0.05$), as measured by absorption intensity shifts and a wavelength shift (ca. 6-9 nm) of the soret band at ca. 435 nm. Following optimization of the foil production to achieve a mesoporous surface, volatile amines could be detected down to ca. 100 ppm (dynamic mode) and down to ca. 1000 ppm (static), with no significant differences between TEA, TMA, and DMA while NH3 detection was >100 fold weaker. Subsamples (20 mg) of seafood fish (hake) of spoiled fish could readily be detected within 60 min.

Conclusions: Atmospheric plasma techniques employing metalloporphyrins appear suitable candidates for the development of spoilage indicators. Additional compounds that result in a stronger, better visible shift are currently being employed, as is the correlation between the measured volatile amines and the biogenic amines.

Key words: Food spoilage, volatile amines, biogenic amines, metalloporphyrins, colorimetric sensors.

PO3294

TRANSGENIC FOOD COMMERCIALIZATION IN SÃO PAULO CITY-BRAZIL

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Background and Objectives: Currently, transgenic crops create huge economic, social and ecological benefits with the development of its commercial production. The goal of the present work was to identify foods containing transgenic components in its composition, according to Brazilian food labeling regulation.

Methods: The seeking for transgenic foods was conducted in 6 supermarkets in São Paulo city, Brazil. The inclusion criteria were: (1) supermarkets presenting a great variety of foods, and (2) at least 1% of transgenic components in the food composition.

Results and Conclusions: It was found a total of 38 transgenic foods, comprising 20 different brands and 5 different kinds of transgenic foods, in all the six supermarkets. These 5 different kinds of transgenic foods included soybean oil (45%), corn starch (25%), powder for desserts (15%), corn meal (10%) and cornflakes (5%). Transgenic crops are increasing the global food production, but its consumption is still limited to soy and corn-derived foods through its commercialization in Brazil markets.

Key words: Transgenic food, food commercialization, food production.

PO3295

MANGOSTEEN PEEL (GARCINIA MANGOSTANA L.) EXTRACT FOR EFFERVESCENT TABLET

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Background and Objetive: Mangosteen peels are huge waste and unuseful material but have biological activity for human health. Preparing mangosteen peels with bitter taste require processing to produce the tasteful beverage, one of the processing is effervescence product. Effervescence has proved its utility as an oral delivery system in the pharmaceutical. This research was done to find out the best quality of effervescent tablet formula and to evaluate the antioxidant activities changes compared to mangosteen peel extract.

Methods: Efferfescence formula comprised sodium carbonate, citric acid, ascorbic acid, aerosil, aspartame, magnesium stearate and various concentrations of mangosteen peel extract. Six effervescent tablet formula and mangosteen peel extract were measured the 1,1-diphenyl-2-picryl-hydrazyl (DPPH) free radical scavenging activity, Superoxide Demutase (SOD) activity and total of phenolic compound using garcinone C, garcinone D, α-mangostin and γ-mangostin as standard.

Results: The DPPH scavenging activity and phenolic compound total of all effervescence product from mangosteen peel extract were lower compared to magosteen peel aqueous extract, but effervescence formula had SOD activity higher than magosteen peel aqueous extract. Based on the quality standard of effervescent tablet showed that six formula of mangosteen extract produced good effervescent tablet.

Conclusions: Mangosteen peel aqueous extract could be used as ingredient effervescent tablet. The DPPH scavenging acitivity and the phenolic compound of mangosteen peel effervescent tablet were lower than mangosteen peel extract, SOD activity of efferevescence were higher than mangosteen extract.

Key words: Antioxidant, effervescent tablet, Garcinia mangostana L, DPPH, SOD.

PO3296

CLASSIFICATION OF FOOD PRODUCTS ADVERTISED IN CHILEAN TELEVISION CHANNELS RELATED WITH THE NATIONAL ASSOCIATION OF TELEVISION DURING NOVEMBER 2010

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Background and Objetives: Studies show that food advertising (PA) displayed in TV channels (TV) during child program action hours is mostly Unhealthy (NS). We aim to determine the nutritional content of Food Products Advertised (PAP) in Chilean TV channels associated with the National Association of Television (ANATEL) between Monday and Sunday from 8:00 to 22:00 during November 2010 to classify them according 'Nutritional Semaphore' according to their frequency and duration in programming.

Method: A qualitative and quantitative non-experimental descriptive transeccional with an oriented display, which corresponds to the PA issued on TV channels associated with ANATEL from Monday to Sunday from 8:00 to 22:00 hours between 7th and 28th November 2010, choosing randomly two weekdays, and Saturday and Sunday per each channel to analyze the frequency, duration, content of critical nutrients (Total Fat (GT), Saturated Fat (GS), simple carbohydrates (CHOs) and sodium), based on the labeling, and classification as ' Nutritional Semaphore' in Healthy (S), Moderately Healthy (MS) and NS, adding the PAP No Nutritional Information (SIN). The data was collected by structured observation within three participants and instruments were design previously.

Results: A total of 1916 ads, which accounted for 67.2% PAP NS, 15.4% S, 9.9% and 7.6% MS to SIN. Also analyzed 16 hours of PA, which were distributed as 66.3% PA NS, and S 17.7%, 9.8% and 6.2% as MS as SIN.

Conclusions: PA TV broadcast primarily shows Chilean food products high in NS GT, GS, and sodium CHOS, over 60% of the overall PA during the week and weekend, as well as in frequency and duration.

Key words: Food advertising, food, critical nutrients, obesity.

PO3411

ESSENTIAL AND HAZARDS: IS SUGARCANE (SACCHARUM OFFICINARUM) MORE THAN AN EMPTY-CALORIE COMMODITY?

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Background and objectives: Sugarcane is one of the most important raw materials used in manufactured food products. Its consumption is under public scrutiny for decades, always associated to cavities, obesity and diabetes. Sugary beverage portion sizes have exploded as high as 64 fluid ounces in some fast food chains in the USA. Additionally, anthropogenic activities such the application of arsenic-based pesticides has resulted in elevated (high as 900 g.g-6) levels of arsenic (As) in surface soils in many historic sugar cane areas of Hawaii, USA. The goal of this study was to screening essential and toxic elements such As, Br, Ca, Na, some RREs, Rb, Sc and U in sugar cane from Minas Gerais, Brazil.

Methods: To quantify simultaneously many elements as possible, it was applied the well-established nuclear analytic technique of Neutron Activation Analysis at the IPR-R1 Reactor of CDTN/CNEN Brazil.

Results: The lack of essential elements in sugar cane is notorious: low concentration for calcium, one of the most important elements in man and animal lives, Ca = 84.8 ± 7.9 mg/100g in sugar cane. It was detect the presence of As, RREs, Rb, Sc and U in this product widely eaten, what is a matter for Public Health concern.

Conclusion: Besides the well documented risks associated to the high consumption of sugar, such as obesity and diabetes, high consumption of sugar can lead to ingestion of not negligible quantities of toxic elements such arsenic and uranium. Outcomes such the low content of calcium and the toxic elements detected raise questions about the appropriateness of the neutral term 'empty calories` what often is used to refer to sugar.

Acknowledgement: This project is supported by Brazilian agencies: CNPq and Fapemig.

Key words: Diabetes, obesity, sugarcane, toxic elements.

PO3412

INFLUENCE OF AGRICULTURAL BIODIVERSITY ON HOUSEHOLD FOOD SECURITY AND STUNTED GROWTH IN CHILDREN AGED 24-59 MONTHS IN RURAL KENYA

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Background and objectives: Agricultural biodiversity has the potential to improve household food security and nutritional outcomes. In spite of this, there is limited scientific evidence in Sub-Saharan Africa linking Agricultural biodiversity with household food security and nutritional status of children hence the need for this study.

Methods: A cross-sectional analytical study was conducted in two rural resource-poor regions in Meru, Kenya. Interviews were conducted to collect data from 500 randomly selected households and anthropometric measurements taken for 500 children 24-59 months old. Agricultural biodiversity was measured by; the variety of food crops grown, animals domesticated for food and food items from natural habitats. Household food security was assessed by means of the household food insecurity access scale (HFIAS). A repeated 24-hour recall was used to collect data to assess individual dietary intake and dietary diversity (DD).

Results: Agricultural biodiversity was low with a total of only 26 food items consumed; 23 cultivated or domesticated and 3 from the natural habitat. Two food items from the natural habitat originated from plants and one from animals. A minority (15%) of the households were food secure. A majority (75%) of the households was food insecure with 50% being severely food insecure. Stunted growth among the children was high at 30.5%. Agricultural biodiversity was positively significantly related to: household food security (Spearman r = -0.10, p=0.022); dietary diversity (ANOVA, p<0.001) and stunted growth in children (ANOVA p<0.0001). Households with higher agricultural biodiversity were more likely to be food secure, have a higher dietary diversity and to have lower stunting levels among the children.

Conclusions: Agricultural biodiversity had a positive impact on household food security, dietary diversity and child growth. Interventions to improve child health in resource-poor rural households should aim at increasing dietary diversity through agricultural biodiversity.

Key words: Biodiversity, food security, Kenya, stunting.

PO3413

MONITORING THE BENZENE CONTENTS IN DIFFERENT FOOD MATRICES BY HEADSPACE-GC/MS

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Background and objectives: Benzene is one of the contaminants with the clearest evidence of carcinogenicity, and has been classified as carcinogenic to humans (Group 1) by the International Agency for Research on Cancer (IARC). People working in industry involved benzene might be exposure to high concentration of benzene. In the case of eating or drinking foods containing high levels of benzene, it can cause vomiting, irritation in the stomach, dizziness, sleepiness, convulsion and death (at very high levels). Benzene in several food is produced from the result of reaction between bezonate salt and ascorbic acid, or migrated from various packing materials, contamination of environment and water supply. Currently there are no legal limits worldwide for benzene in food products or beverages, thus the limit in drinking water is mostly used as a reference value. This reference value is limited to 10μg L-1 by the World Health Organization (WHO, 1996). The objective of this study was to determine the occurrence of benzene in foods of the Korean market and identify potential sources of this contaminant in foodstuffs.

Methods: A headspace gas chromatography/mass spectrometry method for the determination of benzene in various food matrices was developed and validated. The direct method for pre-treatment step was simple and fast compared with the distillation method. And each recovery rate of benzene was 95% and 90%, respectively.

Results: Consequently, the direct method was used to conduct a survey of various food matrices, vegetables, fruits, fat and oils and so on.

Conclusions: Our determined values contained either no detectable benzene or levels below the WHO's drinking water limit of 10 μg L-1.

Key words: Benzene, food, Headspace, GC/MS.

PO3414

PROTEIN ENRICHED ARTICHOKE MEAL WITH HIGH NUTRITIONAL AND FUNCTIONAL VALUE

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Background and objectives: Nowadays is well accepted that a diet based in vegetable proteins is healthier than one based in animal proteins. Usually industrial protein concentrates are obtained by a wet procedure, protein extraction in alkaline solution and precipitation at its pI. This procedure leads to denaturalization of proteins and loss of functional properties, as well as to the reduction of other important products (polyphenols, vitamins, etc.). However, protein concentrates obtained by dry procedures (selective screening and elutration) allows obtaining products with 40-50% native proteins and all the others important compounds. In this work we present the characterization of protein enriched artichoke meal obtained from industrial sub-products of artichoke.

Methods: Artichoke sub-products were made into flour and fractionated by a dry procedure attaining four fractions: F-I, F-II, F-III and F-IV, which were analysed (humidity, ashes, proteins, carbohydrates, lipids, aminogram, solubility, water and oil retention.

Results: Artichoke flour (13.16%) has been concentrated by a dry procedure. Fractions F-III and F-IV present a protein concentration of 26.09% and 33.8%, respectively. F-IV amino acidic composition is well equilibrated (46.36 mg AEE/100 mg protein). This product can be used for the preparation of food products or formulas for young and old peoples. The content in AEE covers the FAO and OMS recommendations for preschoolers (32.0 mg AEE/ 100 mg protein) and adults (11.1 mg /100mg protein).

Conclusions: The main advantage of this product is that the proteins conserve their native conformations retaining, practically, all its functional properties, and it conserves also other functional products such as polyphenol, vitamins, fibre, ..., constituting a good sources for the preparation of food products or formulas for young and old peoples

Acknowledgements: This work was supported by funds from the Spanish Ministerio de Ciencia e Innovación and EU funds (FEDER) (IPT-2011-1418-060000).

Key words: Artichoke, protein, high nutritional value.

PO3415

PUBLIC PERCEPTION ON CLIMATE CHANGE AND ITS IMPACT ON FOOD SECURITY BASED ON EDUCATION ATTAINMENT AND GENDER IN BANGLADESH

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Background and objectives: Climate change has become a major issue in recent times for Bangladesh. Bangladesh is an agriculture-based country and evidence shows that agriculture and food security can be affected by climate change. The aim of the study is to address the perception and attitude of climate change and its impact on food security among Bangladeshi urban people based on education attainment and gender.

Methods: A quantitative cross sectional study was conducted among 71 participants who were selected using snowballing method. Self-administered questionnaire was used to assess the outcome. The chi-square test was used to find association between categorical variables. Analysis to test for differences among education level was carried out using the Kruskal-Wallis analysis.

Results: Regarding understanding the definition of climate change, more respondents gave incorrect answers (56%) where as 75 % gave correct answer on food security. Education level was significantly associated with the definition of climate change(X^2=10.719, n=71, p=0.013) and food security (X^2=12.76, p=0.005). Almost all (96%) participant agreed that there is an adverse effect on climate change on food security. Over half (52%) of the participants thought that there will be a very high possibility that the future barriers against taking actions to mitigate climate change on food security will be financial factors followed by education and technology.

Conclusions: Participants with higher education level perceive better understanding of food security than those with lower education level. 'Increase temperature' is perceived by highest numbers of study population as climate change and its effect on food security.

Acknowledgements: I would like to express my sincerest gratitude to my respected supervisors Professor Cynthia Burek and Dr. Basma Ellahi during the submission of dissertation in 2009 in accordance with requirement of the University of Chester, UK.

Key words: Education attainment, gender, perception, climate change, food security.

PO3416

RESEARCH INFRASTRUCTURE IN THE EUROPEAN FOOD, NUTRITION AND PUBLIC HEALTH AREA: CURRENT INITIATIVES FROM EURODISH

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Background and objectives: Successful food and health research infrastructure is necessary to conduct high quality research and design effective public health strategies to improve population health through lifestyle, food and nutrition.

Objectives: EuroDISH will provide recommendations to stakeholders such as the European Strategy Forum on Research Infrastructures (ESFRI), the Joint Programming Initiative-Healthy Diet Healthy Life (JPI-HDHL) and future European funding programmes (e.g. Horizon 2020) on the needs and best-practice for food and health research infrastructures.

Methods and results: Research has been organised using the "DISH" model which represents four areas of food and health research: Determinants of dietary behaviour; Intake of foods and nutrients; Status and functional markers of nutritional health; Health and disease risks of foods and nutrients. The project consists of three phases: - Phase one (completed July 2013): Desk research, interviews (N=30) and stakeholder workshop conducted to map existing research infrastructure and identify gaps and needs. Initial findings suggested that research infrastructure was developed to different degrees across the four "DISH" research areas. - Phase two: Synthesis of research infrastructures and or different areas of research and explore the governance of research infrastructure. - Phase three: Feasible designs and roadmaps for the future development of research infrastructure.

Conclusions: The EuroDISH vision is to encourage the development of infrastructures that bring together resources and knowledge from different scientific fields. This will enable state-of-the-art, pioneering and innovative research to be conducted across Europe serving to provide a competitive advantage at a global level and tackle today's food related social, economic and health challenges.

Acnowledgements: EuroDISH is supported by the European Commission under the food, agriculture and fisheries and biotechnology theme of the 7th framework programme for research and technological development (grant agreement no. 311788)

Key words: Research infrastructure; Europe; EuroDISH; ESFRI; Nutrition.

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Abstracts NUTRIMENTHE

01

CHILDHOOD DIETARY PATTERNS AND COGNITIVE FUNCTION

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Background and objectives: Childhood is a time of rapid cognitive development and Nutrition can optimize brain cognitive capacity via different mechanism. Most of studies examining diet and cognitive function in children focus on specific micronutrient including Iron, Iodine, Zinc and Folate or different kinds of fatty acids such as EPA, DHA or ALA. However the pattern of food consumption may be of greater relevance too.Dietary pattern approach look beyond the single nutrient and therefore might better capture associations between diet and health outcomes.This review conducted to know dietary patterns identified related to cognitive function in childhood age.

Methods: Articles published in the PubMed database on this topic were searched and reviewed

Results: Studies showed that eating the recommended daily number of breads and cereals was associated with significantly higher IQ scores at 3.7 years.Ones who Eat fish at least weekly had signifantly higher IQ scores at 7 yearstoo.Consumption of margarine daily was associated with poorer cognitive functioning.In an other study,Higher scores on a discretionary pattern(characterized by biscuits,sweets,soda,crips and chocolate) were associated with 1-2 point lower IQ.

Conclusions: Association between overall diet and cognitive function early in life is less studied.As foods eaten together may be more important than any single ood or nutrient,Further research is needed to identify Dietary patterns associated with brain function in children.

02

PEDIATRIC OBESITY, A RISK FACTOR FOR IRON DEFICIENCY AND ITS COGNITIVE COMPLICATIONS: A NEED FOR DEVELOPMENT OF INTEGRAL NUTRITION PROGRAMS

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Pediatric obesity, a risk factor for iron deficiency and its cognitive complications: A need for development of integral nutrition programs Edalati S;Bagherzadeh F;Nabavi S Students' Research Committee, Faculty of Health & Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran

Background and Objectives: Childhood obesity is a major public health problem. In addition to increased risk of several complications, including metabolic syndrome or future cardiovascular diseases, obese children may be more prone to poor iron status that can affect long-term cognitive function. Different mechanisms explaining this relationship have been proposed. This review focuses on recent human studies that test hypotheses about the association between childhood obesity and anemia.

Materials and Methods: English articles published since 2000 and listed in PubMed were identified using defined key words and reviewed.

Results: Several studies found higher rates of iron deficiency in obese children and adolescents. Obesity may be associated with poor quality or restricted diets low in iron. Iron requirements in overweight individuals may be increased as well. In addition to poor dietary iron intake, the pro-inflammatory environment of adipose tissue appears to increase hepcidin concentrations and reduce iron absorption and availability in obese children compared to normal-weight children. Pediatric adiposity may also affect the response to iron fortification.

Conclusion: Co-occurrence of childhood obesity and anemia highlights the need to include obese or overweight children in screening programs for anemia. It is necessary to install integral nutrition education programs to address both of these common public health issues to prevent cognitive problems associated with anemia.

Key words: childhood obesity, hepcidin, iron deficiency

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03

UNDER-NUTRITION LOWERS LEARNING AND MEMORY ABILITY AMONG CHILDREN AGE 5-6 YEARS OLD IN BOGOR – INDONESIA

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Background: Insufficient nutrient intake during golden period (0-5 years) may influence brain development which is not possible to be paid-off on later life. Indonesian Ministry of Health reported that 17.9% Indonesian children have suffered of under-nutrition in 2010 (13% in West-Java). However, the current status needs to be identified to expand coverage.

Objectives: The objectives were to determine the current nutritional status of Indonesian children age 5-6 years old, to assess whether the nutritional status influenced their brain development, and to identify factors from their baby's history associated with their growth.

Methods: A survey base on cross-sectional study design was conducted to identify the nutritional status, brain development score (IQ, EQ, learning, and memory ability using Projective Multi-phase Orientation method), and some history of baby birth (birth method, birth weight, and exclusive breast-feeding) among 225 children age 5-6 years old from 7 different rural and urban areas in Bogor, West-Java, Indonesia, between November to December 2012.

Results: The prevalence of under-nutrition children age 5-6 years old in Bogor-Indonesia was 13.57%. Learning ability between under-nutrition- (N=30) and normal- children (N=179) were 44.13±29.43 and 46.98±27.03, respectively (P<0.05). Memory ability between severe acute malnutrition- (N=51) and normal- children (N=170) were 46.65±11.13 and 50.49±11.92, respectively (P<0.05). Emotional quotient (EQ) between children who did (N=111) and did not receive exclusive breast-feeding (N=110) were 374.28±46.35 and 367.51±35.88, respectively (P<0.05).

Conclusions: In Bogor-Indonesia, the current prevalence of under-nutrition children age 5-6 years is still high. This under-nutrition lowers their learning and memory ability. Children who received exclusive breast-feeding had a higher EQ score. Stronger efforts are needed to support the exclusive breast-feeding and nutritionally appropriate foods especially during their golden period to support their optimal growth. Acknowledgements: This study was supported by Faculty for the Future program from Schlumberger Foundation.

Key words: Under-nutrition, brain development, Indonesian children.

04

HABITUAL MISSING OF DINNER WAS ASSOCIATED WITH POOR NUTRITIONAL STATUS IN POOR-URBAN PRESCHOOL CHILDREN, LAGOS, NIGERIA

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Background and objectives: Nutritional status is best global indicator of well-being in children. Effect of missing dinner on nutritional status of preschool children was studied.

Methods: A cross-sectional descriptive study was carried out in 304 preschool children in three poor-urban resource communities (Local Development Council Areas (LDCAs)) in Lagos, Nigeria. Anthropometric and demographic data of children were collected. Food questionnaire was distributed to 304 mothers asking them to state usual food intake of their children morning, afternoon and night. Data was analyzed using Statistical Package for Social Sciences (SPSS) 15.0 and National Centre for Health Statistics (NCHS)/WHO Anthropometric Standards, 2005.

Results: 5.6% of children habitually missed dinner. Mean height and weight of boys were 92.5±11.4cm and 14.7 ±2.2 kg and of girls were 91.8±2.3 and 14.9±2.3. 16.4% of the children were wasted, 41.4% were stunted and 6.6% were underweight. Wasting was prevalent in two out of three LDCAs (Oshodi 0.0%, Isolo 13.1%, and Ejigbo 38.5%) while Stunting was also prevalent in two out of three LDCAs (Oshodi 96.0%, Isolo 29.3%, and Ejigbo 0.0%), 0.05. Underweight was also significant with LDCAs (Oshodi 1.8%, Isolo 1.0%, and Ejigbo 17.7%), p<.05. Missing dinner and Locality were significant with wasting, stunting and underweight (0.05). Stunting alone was significant with missing dinner, locality, care giving, maternal and paternal education and occupation (0.05). Wasting and underweight but not stunting were highest in preschoolers who habitually missed dinner (0.05).

Conclusions: Missing dinner is a causative agent for poor nutritional status in preschool children in this study population.

Key words: Habitual missing dinner, Preschool children, Nutritional status, Local Community Development Areas (LCDAs)

05

THE RELATION BETWEEN DIET AND ALLERGEN CONCENTRATIONS IN BREAST MILK; OVALBUMIN CONCENTRATIONS AND LACTOFERRIN LEVELS IN BREAST MILK

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Regardless of the consumption of the same amount of allergen-related foods, allergens were detected in some breast milk samples while not in the others. Breast milk is a secretory fluid. Therefore, concentrations of secretory fluid could potentially be linked with the concentration of allergens in the breast milk. Thus, the total protein and the levels of one particular protein, lactoferrin, in the breast milk were measured. The concentration of ovalbumin in breast milk was measured using an enzyme-linked immunosorbent assay (ELISA) kit, previously reported by us. The limit of ovalbumin level in breast milk is 312 ng/ml.The Lowry method was used for measuring the total protein. A Lactoferrin Human ELISA Kit was used to measure the lactoferrin levels. Therefore, we investigated cases wherein the level of ovalbumin was below or above 312 ng/ml. We found no significant difference when we compared the total protein level between breast milk with ovalbumin below 312ng/ml and that above 312 ng/ml. When we compared the lactoferrin level between breast milk with ovalbumin below 312ng/ml and that above 312ng/ml, a significant difference was observed. Consequently, if the ovalbumin level in breast milk is >312 ng/ml, the lactoferrin level is high, while if the ovalbumin level is <312 ng/ml, the lactoferrin level is low($P<0.01$). When evaluating the concentrations of ovalbumin in breast milk, the lactoferrin levels might be used as the point of reference.

06

ONTOGENY OF HYPOTHALAMIC EXPRESSION OF OBESITY RISK GENES REVEALS TIME SPECIFIC WINDOWS FOR FTO, MC4R AND GNPDA2

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Background: There is increasing and robust evidence for a pluri-genic build-up of human obesity. A staggering number of very rare and common single mutations and structural variants have been found in association with adult BMI. This includes genetic polymorphism for genes strongly expressed in the hypothalamus which may play a role in the early development of energy balance and appetite control. However, very little is known about the ontogeny of these factors during early development.

Methods: We have collected fetal, early postnatal and adult sheep hypothalamus to analyse the possible time-specific expression of hypothalamic risk factors for human obesity. The real-time gene expression of FTO, MC4RM PCSK1, TMEM18, GNPDA2 and LEPR was measure at day -7, 0 (birth), 7, 30 and 365 days from entire hypothalamus.

Results: As expected we observed time dependant changes in gene expression (Paired-t-test) with early and late factors. For instance whilst MC4R and tmem18 showed peak of expression around the time of birth, fto only start peaking by 30 days of postnatal life.

Conclusion: Interestingly, the expressions of these key human obesity-genes are exhibited time dependent windows. In line with the fetal and life course origins of adult BMI, our present observations are suggestive of time windows for gene-environment interactions and corroborate the hypothesis for critical windows for early programming of obesity.

Key words: Hypothalamus, Energy balance, Obesity-related genes, Ontogeny

07

ASSOCIATION BETWEEN DIET AND MENTAL PERFORMANCE OF CHILDREN: VIEWS OF PARENTS AND TEACHERS IN FOUR EUROPEAN COUNTRIES

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Background and Objectives: Nutrition is one of several factors affecting the mental performance of children; other possible influences include genetics, socio-economic background and educational environment. Although perceptions of the impact of diet on physical health is an important public health issue, little attention has been devoted to exploring views about the relationship between diet and children's mental performance. This issue was explored with parents and teachers of children of primary school age in four European countries.

Methods: An online questionnaire (developed in English and translated) was circulated through a market research organisation. Participants were selected from online panels if they were either a parent or teacher of child(ren) aged 4 – 10 years without learning or behavioural issues.

Results: Questionnaires were returned by 1606 parents (401 in England, Germany, Spain; 403 in Spain) and 403 teachers (100 in each country; 103 in Hungary). Teachers were older than parents (35.4% vs. 18.3% over 45years, p<.0005) and less likely to smoke (35.6% vs. 47.6%, p=.003). Diet was regarded as having a higher impact on physical development (overall health, energy, weight, physical activity, sleep) than mental (ability to learn, attention, memory, behaviour, mood) perfomance. Compared to parents, teachers thought that diet had a larger effect on behaviour, mood, attention and sleep. Sleep and teaching quality were viewed as more important determinants of attention and ability to learn than food-related items, of which having breakfast and regular meals were considered the most influential. There were few differences in views between countries.

Conclusions: Parents perceive diet as a less important influence on mental performance of primary school children than teachers in four European countries. This has implications for public health policy.

Key words: diet, mental development, teachers, parents

08

FACTORS AFFECTING FOOD CHOICES OF PARENTS OF CHILDREN AGED 4-10 YEARS IN FOUR EUROPEAN COUNTRIES

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Background and Objectives: Children need a varied diet with good nutritional content for optimal physical and mental health and development. The factors affecting food choices of parents of children aged 4 – 10 years were explored in four European countries to assess the extent to which these were influenced by considerations relating to their impact on health and mental performance. Influences on decision making were investigated.

Methods: An online questionnaire (developed in English and translated) was circulated through a market research organisation. Participants were selected if they were a parent of child aged 4 – 10 years without learning or behavioural issues.

Results: Questionnaires were returned by 1606 parents (401 in England, Germany, Spain; 403 in Spain); 61.8% female. The most important factors affecting food choices were healthiness of the food (considered very much or extremely important by 83.3%), offering a variety of foods (80.0%), flavour of food (74.4%), effect on energy (67.4%). Of less importance was the effect of food on mental performance of the child (ability to learn, 52.5%; attention, 52.1%; mood, 50.4%; behaviour, 49.6%), and pragmatic factors (cost, 41.7%; ease of preparation, 35.3%). Over a quarter of respondents agreed that they did not know what foods affected their child's ability to learn (29.1%) or attention (26.4%); over 10% did not believe that food affected ability to learn (13.3%) and attention (13.3%). Common sense or experience was the most cited influence on food decisions (very much or extremely for 80.8%) with partners being second (52.2%).

Conclusions: Parents of primary school children in four European countries rely largely on their own experience to make food choices for their children and the impact of diet on mental performance is viewed as less important than food related factors. This has implications for public health policy.

Key words: food choice, parents, influence

09

ASSOCIATION BETWEEN DIET AND PHYSICAL AND MENTAL DEVELOPMENT OF CHILDREN: VIEWS OF PARENTS AND TEACHERS IN FOUR EUROPEAN COUNTRIES

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Background and Objectives: Although the impact of diet on physical health is an important public health issue, less attention has been devoted to the relationship between nutrition and children's mental performance. The views of parents and teachers about the extent to which diet affects physical and mental development of children of primary school age were explored and compared in four European countries.

Methods: An online questionnaire (developed in English and translated) was circulated through a market research organisation. Participants were selected if they were either a parent or teacher of child(ren) aged 4 – 10 years without learning or behavioural issues.

Results: Questionnaires were returned by 1606 parents (401 in England, Germany, Spain; 403 in Spain) and 403 teachers (100 in each country; 103 in Hungary). Teachers were older than parents (35.4% vs. 18.3% over 45years, p<.0005) and less likely to smoke (35.6% vs. 47.6%, p=.003). There was no difference between the proportions of parents and teachers thinking that a child's physical development depended very much or extremely (vs. moderately, slightly, not at all) on diet (overall 79.8%). Lower proportions of both groups thought mental development was very much/extremely influenced by diet (67.4%). In regression modelling, believing that physical and mental performance was very much / extremely influenced by diet was significantly and positively associated with living in Hungary, scoring more highly on a measure of general health interest and (parents only) level of education attained.

Conclusions: Diet is regarded as a less important determinant of mental development than physical development by parents and teachers of primary school children in four European countries. Parents who had received less formal education are less likely to view diet as a factor in mental or physical development. This has implications for public health policy.

Key words: Diet, development, parents, teachers

10

MILD IODINE DEFICIENCY IN PREGNANCY IN EUROPE AND ITS CONSEQUENCES FOR COGNITIVE AND PSYCHOMOTOR DEVELOPMENT OF CHILDREN: A REVIEW

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Background and objectives : Several European countries are still suffering from mild iodine deficiency (MID), despite the introduction of salt iodization programmes at national levels. Pregnant women are the most prone to iodine deficiency, due to their increased physiological needs of iodine. MID during pregnancy may affect the neurodevelopment of the foetus. This paper therefore aims to assess the importance of iodine intake during pregnancy by reviewing European studies about the impact of MID during pregnancy on neurodevelopment of children.

Methods: Studies about the cognitive or psychomotor outcomes of European children exposed to MID during pregnancy and studies about iodine or thyroid hormone supplementation were reviewed. 17 European studies were reviewed.

Results: MID during pregnancy may lead to hypothyroxinaemia in the mother and/or elevated thyroid-stimulating hormone levels in the foetus. Hypothyroxinaemia during pregnancy may affect cognitive development of children when appearing before or at 12 weeks of pregnancy. Moderate cognitive impairments have been observed in children from the age of 3 weeks up to 5 years. Elevated thyroid-stimulating hormone levels in the newborn showed to be related with intellectual or psychomotor delay in early childhood. However, no direct link is yet established between MID during pregnancy and maternal hypothyroxinaemia, as well as between MID during pregnancy and elevated neonatal thyroid-stimulating hormone levels at birth. To end, iodine supplementation of pregnant women when taking place from the first trimester until the end of pregnancy may decrease the risk of developmental delay in the offspring.

Conclusions: There is some evidence that MID appearing during pregnancy may adversely affect cognitive and psychomotor development of the offspring. Iodine supplementation during pregnancy may be beneficial to avoid the risk of developmental delay.

Key words: Iodine, Pregnancy, Europe, Psychomotor development, Cognitive development

11

THE EFFECTS OF BREAKFAST ON IN-CLASS BEHAVIOUR IN CHILDREN AND ADOLESCENTS

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Background and objectives: Assumptions regarding the benefits of consuming breakfast for children's learning are largely based on evidence investigating the effects of breakfast on cognitive performance. There is some additional evidence that breakfast consumption, can improve school performance. Studies rarely investigate the effects of breakfast on in-class behaviour despite the clear importance of good behaviour for learning and academic outcomes. Hence our aim was to review existing literature on the effect of breakfast consumption on behaviour in children.

Methods: A comprehensive review of the literature was conducted for original articles and reviews published between 1950-2013. The review identified nineteen studies that examined the effects of breakfast on behaviour in children and adolescents, either by use of classroom observations or teacher completed rating scales.

Results: The evidence indicates a largely positive effect of breakfast on on-task behaviour in the classroom in children aged 6-18 years which is more apparent in children who are undernourished and/or from low socio-economic or deprived backgrounds. Findings for other behavioural outcomes including off- task behaviour, distraction and hyperactivity are inconsistent and often null findings are reported.. Evidence is also limited by the inherent subjective nature of the behavioural assessment and heterogeneity in study designs.

Conclusions: Whilst crude subjective measures of behaviour may not provide the most sensitive indicators of the benefits of breakfast, these outcomes are ecologically valid, and of relevance to pupils, parents, teachers and educational policy makers and, as a result, may produce greatest impact.

Key words: Breakfast, adolescents, in-class behaviour

12

POLYUNSATURATED FATTY ACID LEVELS IN BLOOD DURING PREGNANCY, AT BIRTH AND AT 7 YEARS: THEIR ASSOCIATIONS WITH DIET AND TWO COMMON FADS2 POLYMORPHISMS

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Long-chain polyunsaturated fatty acids (LCPUFA such as DHA and EPA) are essential to brain development and are especially important during pregnancy. They can be synthesised in the body by a metabolic pathway involving fatty acid desaturase genes (FADS) but are also supplied by the diet. The balance between these two sources in a population-based cohort will be investigated. In a UK cohort of pregnant women and their offspring at birth and aged 7y levels of fatty acids (FA) in pregnancy blood samples, in cord blood and at 7y have been measured. DNA was extracted and FADS genotype obtained for mother and child. Diet was assessed at 32 weeks of pregnancy and at 7y by food frequency questionnaire. Energy, nutrient and food group intakes were calculated. Reduced rank regression (RRR) will be used to assess the contribution of different foods to blood FA levels in childhood. We have shown that FADS genotype in the mother modifies individual LCPUFA levels in the blood in pregnancy and at birth. FADS genotype in the child, contrary to expectation, also modifies LCPUFA levels at birth. By 7y, only the child's genotype was independently associated. Oily fish has the strongest association with DHA at all ages with white fish also contributing to cord and 7y levels and shellfish to 7y levels. All three seafood types contributed to EPA levels at all time points in unadjusted analyses. We will present data investigating how linear combinations of FAs can be estimated to maximise the correlation with diet. We will explore whether these linear combinations provide more useful indicators of FA status than individual FAs and how diet and FADS variants contribute to these indicators. We know that fish eating is important for LCPUFA levels in pregnancy. We will provide evidence based advice regarding childhood diet.

13

PREVALENCE OF DELAYED GROWTH IN SCHOOL CHILDREN BETWEEN 5 TO 10 YEARS OF AGE OF DISTRICT EDUCATIONAL INSTITUTION IN BOGOTÁ, COLOMBIA

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Objectives and Study: Delayed growth (DG) is a result of several processes that prevent adequate longitudinal growth in children. Among the causes of this DG, are acute malnutrition processes that occur during prolonged periods of time, changes in the first peak of growth that conditioning a DG throughout life as longitudinal gain can not easily meet as weight gain. The objective is to identify the DG in school children between 5 and 10 years of District Educational Institution in Bogotá, Colombia.

Methods: We included 432 school children between 5 and 10 years, students at an educational institution in Bogotá, Colombia. Anthropometric nutritional assessment was performed. Were classified according to WHO and their respective cutoffs for height/age, as with the cutoff points for Colombia to have a standard deviation less, and is called risk of stunting.

Results: 432 children with 7 years 7 months ± 1 year 3 months (range 5 to 9 years 11 months) of age, which the WHO cutoffs and Colombia, 22 had DG (5.1%): 21 with short stature and predominantly female and one child with severe stunting. According cutoffs for Colombia, 103 were classified at risk of stunting (23.8%) with a predominance of females (52.4%).

Conclusion: The prevalence of DG was 5.1%, predominantly female, being < 9.0% as reported by the Encuesta Nacional de la Situación Nutrcional (ENSIN) in Colombia 2010 and the prevalence of risk of stunting of 23.8% also < of the reported by ENSIN 2010 which was 30.1% for children between 5 and 17 years of age.

14

DOES MATERNAL IODINE STATUS IN UK PREGNANT WOMEN INFLUENCE CHILD NEURODEVELOPMENT?

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Background and Objectives: An adequate intake of iodine is vital during pregnancy as iodine is required for fetal brain development. The UK is now classified as mildly iodine deficient and has no national policy for ensuring adequate iodine status, such as salt iodisation. We aimed to investigate whether a low iodine status in pregnancy was associated with adverse child neurodevelopment.

Methods: We measured maternal iodine status in pregnant women of the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort who were recruited in the 1990s(3). We measured iodine concentration (and creatinine to adjust for urine volume) in spot-urine samples collected from 1475 women throughout pregnancy. We analysed 1142, 557 and 356 urine samples from the first, second and third trimesters of pregnancy respectively.

Results: We have previously shown that a low iodine status during the first trimester is adversely associated with child cognition (verbal IQ and reading ability) up to the age of nine years (Bath et al 2013, Lancet). Urinary iodine-to-creatinine ratio significantly differed between trimesters in women with measures in all three trimesters (n=227, p<0.0001), with iodine-to-creatinine ratio being significantly lower in the first than trimesters two and three (p<0.0001). After adjustment for 21 confounders, a low iodine-to-creatinine ratio in the second trimester (<150 μg/g) was significantly associated with risk of performance IQ score below 85 (OR 1.79, 95% CI 1.03-3.12); there was no association between iodine status in the third trimester and child IQ, although this may reflect the lower number of samples. **Conclusions:** Iodine deficiency during pregnancy is associated with adverse child cognition, even in a country where iodine deficiency is only mild. We are involved with ongoing work with Generation R to compare our results with those of a country classified as iodine-sufficient (the Netherlands).

Key words: Iodine, UK, pregnancy, neurodevelopment.

15

EFFECTS OF MATERNAL CG PRO12ALA PPAR PPARΓ2 POLYMORPHISM ON THEIR INFANTS NEURODEVELOPMENTAL SCORES AT 18 MONTHS OF AGE

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The aim was to determine the influence of mothers' Pro12Ala PPARγ2 gene polymorphisms on their offspring neurodevelopment at 18 months of life. From the 474 pregnant women recruited in the PREOBE study, 138 mother-infant pairs were included in the present analysis. Mothers and infants were genotyped for Pro12Ala PPARγ2 (Applied Biosystems, Foster City, CA-USA). Neuropsychological assessment was performed using Bayley Scales of Infant and Toddlers Development, Third Edition (Bayley III). Pre-conceptional BMI, mother's age, diabetic condition, parity, smoking, alcohol drinking during pregnancy, placental weight, neonatal anthropometry, sex, Apgar 5' and type of feeding during early life were considered as a confounders. SPSS version 20.0 was used for statistical analysis. 118 women (85.5%) had major CC genotype and 20 women (14.5%) showed the heterozygous genotype of CG. No homozygosis was found in the mothers' group. Babies born to mothers with CG Pro12Ala PPAR γ2 polymorphism had higher birth weight (p=0.036). At 6 months of age, no differences in neurodevelopment were observed between babies born to CC or CG mothers. At 18 months, in the cognitive domain, both the composite and the scaled scores were significantly lower in the offspring of CG mothers (p=0.006). Furthermore, logistic regression analysis demonstrated that CG mothers have 13% of risk to have babies with lower cognitive development at18 months (IC: 0.028-0.606). Scaled Receptive Communication, Scaled Fine Motor and Motor Composite scores resulted significantly lower (p=0.020, p=0.042, p=0.013, respectively) in those babies born to CG mothers at 18 months of age. The present study suggests that Mothers' PPARγ rs1801282 CG polymorphism plays a negative role on their offspring neurodevelopment scores at 18 months. Key words: PPARγ2, neurodevelopment, obesity, early programming **This study was granted by Junta de Andalucía: Excellence Projects (P06-CTS-02341) and Abbott Laboratories-General Foundation University of Granada (Contract agreement: 3346)

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IRON DEFICIENCY AND SCHOOLCHILDREN COGNITIVE PERFORMANCE IN MOROCCO

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Background and objectives: Iron deficiency is the most prevalent nutritional disorder in the world. One of the most worrying consequences of iron deficiency in children is the alteration of behaviour and cognitive performance. This study aim to study cognitive performance of schoolchildren in kenitra, Morocco

Methods: All the 296 pupils enrolled in a primary school and aged between 6 and 16 years old were recruited for this study with parental clearance approved.Socio demographic data were collected with questionnaire filled out by the parents. Intellectual Ability was assessed by Raven's Progressive Matrices (Raven, 1958). Blood was collected by antecubital venipuncture .Haemoglobin (Hb), haematocrit (Hct) and mean corpuscular volume (MCV) and Serric Ferritin were masured or calculated.

Results: The average age was 10.2 ± 2.48 years and the mean haemoglobin concentration was 12.41 g/dl in boys and 12. 5 g/dl in girls, whereas the mean ferritin level was 26.7 µg/l and 27.9 µg/l respectively. In this study 12% of schoolchildren have anaemia. Anaemia is predominantly moderate and affects of boys more than girls. Iron deficiency was found in 20.4 % of the children and of iron-deficiency anaemia in 7.7 %. A positive correlation between serum ferritin and both the score in Maths (R = 0.5) and the average annual school score (R = 0.37). Raven Progressive score is correlated to serum iron and school performance (p <0.001)

Conclusions: We found a correlation between the score test matrices progressive Raven and school performance expressed by the global annual rank . We also note a positive correlation between the rate of ferritin and the note of mathematics. Further studies are needed to clarify the physiological and biochemical bounds related to theses statistical associations.

Key words: Iron deficiency, anemia, schoolchildren, Morocco

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RECOMMENDATION PROVIDED BY HEALTH PROFESSIONAL TO PERSON WITH TYPE 2 DIABETES REGARDING PHYSICAL ACTIVITY IN WEST AFRICA

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Objectives: To assess the recommendations provided by health professionals to persons with diabetes regarding physical activity. Methodology: The cross-sectional study was conducted over three months in 2012 in Ouagadougou (Burkina Faso) and Bamako (Mali). Interviews with closed and open-ended questions were conducted with a total of 78 health professionals (including 60 MDs) involved in the treatment of persons with diabetes in public hospitals and health centers.

Results: 77% of health professionals interviewed were physicians For physical activity 95% of the health professionals had a satisfactory recommendation and the factors associated were the country, the occupied station and the received formation. The different physical activity recommended by the health professional was walk, bicycle, house work and jogging. Indeed, the doctors recognize the difficulties related to the practice of sport in the African cities. About the physical activity, for the totality of the health professional, the answer most shared by all and stated is "In the African context, the practice of the sport in the city is almost non-existent. Even the Town hall does not take into account space for the sport. Thus one asks the patients to do themselves, the households, the detergent, to walk to go to work. It is really all that one can do".

Conclusion: The study highlights the need to improve dietary counseling of patients with diabetes, particularly as regards developing specific dietary plans with individual patients for better compliance. Health professionals specialized in nutrition are becoming a priority in Africa to address nutrition-related non-communicable diseases, to train other health professionals and to assist individual patients.

Keys words: physical activity, diabetes, health professional
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LOW HOUSEHOLD DIETARY DIVERSITY IS A MAJOR PUBLIC HEALTH CONCERN FOR WOMEN IN COASTAL BANGLADESH

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Background and objectives: Research indicated that dietary diversity is a good indicator of food security at household level. Women of reproductive age living in resource-poor setting are at risk of micronutrient deficiency. Present study was designed to evaluate the household dietary diversity and individual diversity for women in 3-impoverished districts (Satkhira, Khulna and Barisal) of southwest coastal Bangladesh (a part of Ganges Delta).

Methods: A total of 1536 households were selected to determine household dietary diversity score (HDDS). One woman (aged 15-49 yrs) per household was selected to ascertain the individual dietary diversity score (IDDS). A cluster sampling design was used and in each cluster, 24 households were selected systematically for interview and anthropometric measurements. Information on food intake was collected for 7-days. Food consumed during 7-days was condensed into 9 food groups. The range of possible HDDS was 0-63. The IDDS was assessed on 12 food groups consumed during last 24-hrs and score ranging 0-12. Other relevant data were also collected.

Results: The overall mean HDDS was very low (mean, SE; 32.4, 0.22). We found households in the district of Khulna most vulnerable ($P<0.0001$) compared with other 2-districts. The overall mean IDDS of women was also predominantly low and significantly lower ($P<0.0001$) in the District of Khulna compared with other 2-districts. Low BMI values (BMI <18.5 kg/m2) were highly prevalent (22%) in women. Physical characteristics such as height, weight, MUAC and BMI were not significantly different in three districts.

Conclusions: The results of the study indicated that households in Khulna district might be the most vulnerable to food insecurity and women in this area may be at risk of micronutrients deficiency due to low dietary diversity. Urgent integrated agriculture interventions are warranted for improved food and nutrition security in this region.

Key words: Dietary diversity; Food insecurity; Women; Bangladesh

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MATERNAL LCPUFA SUPPLEMENTATION DURING PROTEIN DEFICIENCY IMPROVES BRAIN FATTY ACID ACCRETION IN RAT PUPS BY ALTERING MILK LCPUFA OF DAM

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Background: Long-chain PUFA (LCPUFA) are important for fetal and neonatal brain development. However, their accretion in the brain is compromised during maternal protein restriction.

Objectives: We investigated the effect of maternal supplementation with n-3 DHA plus n-6 arachidonic acid (ARA) at a low protein level (9 %) on offspring brain fatty acid accretion using Wistar rats.

Methods: Nine female rats per group were randomly fed control (C-18%), low-protein (LP-9%) or low-protein DHA + ARA-supplemented (LPS) diet during gestation and lactation, to assess effects on brain LCPUFA composition of pups.

Results: At birth, pups from LPS group had highest brain DHA and n-3 fatty acid levels(P = 0.001), whereas pups from LP group had highest MUFA (P = 0.05) but lowest DHA and total n-3 PUFA levels (P = 0.000). During lactation, pups from LPS group accrued significantly more α-linolenic acid (P = 0.003), EPA (P = 0.02) and DHA (P = 0.000) in brain lipids than pups from LP group, whereas brain lipids of pups from LP group had markedly increased levels of the n-3 deficiency marker docosapentaenoic acid and n-6:n-3 ratio (P = 0.000). Owing to supplementation, milk from LPS dams had highest DHA and ARA, but lower SCFA and medium-chain fatty acids as compared with milk from C and LP dams during early lactation, which normalized by mid-lactation.

Conclusions: Adverse effects of restricted maternal protein intake on LCPUFA accretion in the brain of offspring were ameliorated by alterations in maternal milk fatty acid profile due to supplementation. Results underscore the importance of LCPUFA for protein-deficient mothers during gestation as well as lactation to achieve the optimum brain LCPUFA status of progeny.

Key words: LCPUFA, Maternal supplementation, Protein restriction, Brain lipids, Milk lipids

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PHYSICAL ACTIVITY, SEDENTARY BEHAVIOUR AND FOOD HABITS, OF OVERWEIGHT STUDENTS BETWEEN 5 AND 10 YEARS OF A SCHOOL IN BOGOTÁ, COLOMBIA

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Childhood obesity is a problem of the 21st century according to the World Health Organization. The ENSIN 2010 reported overweight in 18.9% of children between 5 and 9 years. **Objective:** Describe physical activity, sedentary behavior and dietary habits, of overweight school children between 5 and 10 years of a school in Bogota, Colombia.

Methods: Anthropometric nutritional assessment (H/Y and BMI/Y) with WHO growth standards 2006 - 2007, Resolution 2121 and WHO cutoffs, fat percentage, physical activity measured by pedometer, sedentary activities and habits assessed by survey, energy intake evaluated by food 3 days record, data analysis using descriptive statistics with Microsoft Excel 2011 for Mac and Epi info 7.

Results: Age 8 years 5 months ± 1 year and 3 months, 53.8% male, 41.8% obese schoolchildren by IMC, 80.8% obese according body fat, 7462±3028 steps/day, sedentary students (57.8%), sedentary activities 2-4 hours/day (52.6%), energy 1842±464 kcal/day, caloric distribution: protein (15±1%), fat (30±4%) and carbohydrates (56±4%), excess energy (42.1%).

Conclusion: Students with excess weight, cardiovascular risk, low physical and sedentary activities, sedentary activities more than two hours and energy intake increased but suitable total caloric value.

Key Words: Childhood, Obesity, Physical activity, Sedentary lifestyle, Energy Intake.

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ASSESSMENT OF ENERGY EXPENDITURE AND IRON STATUS OF PREGNANT WOMEN IN URBAN AND RURAL COMMUNITIES IN NIGERIA

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Objective: The study was carried out to evaluate the energy expenditure and iron status of 400 pregnant women in their various trimesters from two hospitals (urban and rural) in Umuahia in Abia State.

Methods: The subjects were randomly selected. Anthropometric measurements, haemoglobin level, Packed Cell Volume, Serum Ferritin level, energy intake and energy expenditure assessment were carried out on the study population using standard procedures.

Results: Results of the analysis showed that the mean BMI of the mothers - the first, second and third trimesters were 25.25 ± 3.81, 26.24 ± 3.37 and 30.64±17.61kg respectively. Arm circumference values ranged between 9.74, 9.85 to 11.15cm in the third trimester. Abdominal circumference ranged 48.24 ± 10.56 - 49.26± 10.61. The result further showed that 19%, 12.8% and 0.5% had mild, moderate and severe anaemia respectively. A total of 40% of the pregnant women in the rural areas had various forms of anaemia as against 24.5% in the urban areas. A total of 32.2% of the pregnant women had iron deficiency anaemia. The prevalence of iron deficiency anaemia was also significantly associated with the trimesters (X2 = 22.58, P = 0.00).

Conclusion: The study found that the pregnant women had a positive energy balance. About 12% and 14% of the women in their second and third trimester respectively had protein intake above the recommended intake. A total of 40.0% of rural women were anaemic.

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DOES MATERNAL POSTPARTUM DEPRESSION HAVE LONG-TERM EFFECTS ON CHILD'S BEHAVIOUR?

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Background and objectives: Previous studies reported that children born to mothers who suffered postpartum depression (PPD) could have increased conduct problems later in childhood. The aim of our study is to assess the relation between child's emotional and behavioural problems at 8 years with mother's PPD considering current maternal health problems (CMP).

Methods: This study uses data from EU-Childhood Obesity Project (NCT 00338689). Mothers completed the Edinburgh Postnatal Depression Scale (EPDS) 3 months after delivery, and once children reached the age of 8y they filled in the Child's Behaviour Checklist (CBCL) (Internalizing (IP), externalizing (EP) and total problems (TP)) and the General Health Questionnaire (GHQ-12) to assess CMP. EPDS scores >10 were defined as PPD and GHQ-12 hits >2 were defined as CMP.

Results: Four-hundred seventy-four mothers filled in a full set of EPDS, GHQ-12 and CBCL tests. Children whose mothers had PPD and CMP (n=50, 11.21%) showed higher TP, IP and EP than those whose mothers only had PPD ($p<0.001$, $p=0.001$ and $p=0.001$, respectively). Children whose mothers only had CMP showed increased TP and IP scores than those whose mothers didn't have any alteration ($p<0.001$, for both cases), while those who only had PPD didn't differ in CBCL results from those without maternal problems at any timepoint. Linear regression models adjusted by gender, maternal education and child's birth weight showed significant effect of EPDS and GHQ-12 on TP (B=0.495, $p=0.004$; B=1.349, $p<0.001$, respectively; r2=15.4%), IP (B=0.127, $p=0.035$; B=0.513, $p<0.001$, respectively; r2=8.5%) and EP (B=0.168, $p=0.012$; B=0.411, $p<0.001$, respectively; r2=12.5%).

Conclusions: PPD and CMP have effect on child's behaviour problems at 8 years. Children whose mothers suffered PPD and CMP were those with the highest problems level. CMP had stronger effect than PPD on child's behaviour problems at 8 years.

Key words: children behaviour problems, postpartum depression, Nutrimenthe, early programming.

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EFFECTIVNESS STUDY OF THE CONSUMPTION OF MILK FORTIFIED WITH IRON ON THE NUTRITIONAL STATUS OF SCHOOL CHILDREN IN MOROCCO

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Iron deficiency anemia is a major national health problem. It can negatively affect growth, motor and cognitive developement, immunity and academic performance of school children. This is a longitudinal, randomized, double blinded study aiming at the evaluation of the effectivness of consumption of iron fortified milk on the iron status of school children in the

rural region of Azilal. The students (n = 361), 7-9 y old, were recruted from 3 schools. The nutritional intervention lasted 9 months. One group of the students received daily 200ml of non-fortified milk (NFG), the other group(FG) received daily 200ml of iron fortified milk (2,1mg of ferrous sulfate). In field, a clinical assessment, morbidity survey, blood samples collection and cognitive tests were performed at T0 – T5 and T9. Ferritine level was determined by immunoassay Elisa test, CRP by nephelometry and Hb concentration by Hemocue analyser. Raven progressive matrix was used for the cognitive test and SPSS for statistical analysis of data. The results showed that the prevalence of anemia (Hb<11,5g/dl), after adjustment for altitude, for the FG was 2,6% at baseline and 0% at T9. For the NFG, it was 3,4% at baseline and 1,8% at T9. Iron deficiency (serum ferritine<12µg/L) for the FG was 34,7% at baseline and only 25% at T9. For the NFG, the prevalence at baseline was 43,9% and 45,7% at T9. As the study has just ended, the interpretation of the results of cognitive tests is still ongoing. The milk is a good vehicle for fortification ; its consumption reduced the prevalence of iron deficiency by 28% in school children of the region of Azilal living in normal conditions and without preliminary deworming. This study was performed with the support of Fondation Centrale Laitière.

Key words: iron deficiency – school children – fortification - iron

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CONTRIBUTION OF LOCAL FOOD BIODIVERSITY TO DIET AND NUTRITION OF WOMEN OF CHILDBEARING AGE IN BENIN

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Background and objectives: Urbanisation and integration to market affect traditional food (TF) production, marketing and consumption systems, leading to increasing utilisation of manufactured foods of poor nutritional quality. Consumption of such foods may be associated with chronic diseases and nutritional deficiencies. Objective of this study was to assess the relation between market integration and the contribution of TF to diet and nutrition of women of childbearing age.

Methods: 472 women were selected in 34 villages in three communes using multistage random sampling. Households were classified according to market categories attended (rural, semi-urban and urban) and market accessibility (time to reach the nearest by car: high, middle, and low accessibility). Foods consumed by subjects were measured using observed weighed records method on two non-consecutive days. Body Mass Index was calculated using anthropometry.

Results: About 100 TF were identified and classified in 13 food groups. Average food diversity score was significantly higher for households attending urban market but was not significantly different between market accessibility groups. About 100% of subjects consumed traditional cereals, spices and condiments, and more than 78% consumed vegetables, legumes, oils, fish, roots and tubers in various form. Consumption of food groups varied according to market categories and market accessibility. Maize was the main cereal consumed with no significant difference between market categories or market accessibility. TF contribution to total daily energy and nutrient intakes was between 76.7 and 98.4%. Iron, magnesium, zinc, thiamine and vitamin A needs were covered by TF only. Nutritional status of women was not significantly different between groups.

Conclusions: The contribution of TF to diet and nutrient intakes of women of childbearing age in study area was high regardless of market integration.

Key words: Traditional foods, women of childbearing age, food diversity score, food intake Acknowledgement: This study was funded by Bioversity International.

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RELATION BETWEEN LEPTIN-ADIPONECTIN RATIO AND BODY FAT, INSULIN, GLUCOSE AND LIPID PROFILE DURING NORMAL PREGNANCY

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Background and objectives: Development of capacities in childhood and adulthood depends primarily on the environnement during pregnancy. Leptin and adiponectin are adipokines involved in food intake and energy balance of the human, especially during pregnancy. The leptin/adiponectin ratio (LAR) is related to insulin resistance and diabetes in non pregnancy conditions. The aim of this study was to evaluate the relationship between LAR ratio and insulin, glucose and lipid profile during normal pregnancy.

Methods: A total of 32 women, pregnant of singleton foetus with a gestational age less than 11 weeks participated in this study. Recruited women were followed at 12, 22-24 and 34-36

weeks of pregnancy. Maternal body fat (BF) was assessed using the dilution of deuterium oxide (D_2O). Blood glucose, insulin, total cholesterol, HDL, LDL, triglycerides were also measured. Leptin and adiponectin concentrations were assayed using radioimmunoassay kits.

Results: Mean age of the participants was 26.8±5.8 years. LAR ratios during for the first, second and third trimesters were 1.99±1.41 ng/mg, 1.20±1.37 ng/mg and 1.19±1.41 ng/mg. LAR was positively correlated to maternal insulin levels in all trimesters (respectively r=0.64, p<0.001; r= 0.39, p=0.032; r=0.39, p=0.038). Additionally, HDL (r=0.45, p=0.012), LDL (r=0.41, p=0.023) at the first trimester, BF (r=0.48, p<0.01) at the second trimester, and glucose (r=0.48, p<0.01) at the third trimester, were correlated to LAR. LDL cholesterol (r=-0.39, p=0.039) was inversely correlated to LAR at the third trimester.

Conclusion: Insulin levels were positively correlated to leptin-adiponectin ratio in all trimesters of pregnancy. Maternal body fat, glucose, and lipid profile were also correlated to leptin/adiponectin ratio at some extent. These correlations suggested a relationship between maternal LAR and insulin resistance, and pregnancy dislipidemia.

Keywords: leptin-adiponectin ratio, lipid profile, insulin, glucose, pregnancy

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IRON DEFICIENCY ANEMIA AND DIETARY PATTERNS OF 6-12 SCHOOL AGE CHILDREN IN KHARTOUM STATE: A HOSPITAL-BASED STUDY

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Background and objectives: Iron deficiency anemia remained a major public health problem among school age children in the developing countries. It has serious implications and negative consequences on cognitive and physical development of children, their immune mechanisms and future work productivity. This study aimed at identifying the prevalence of anemia, iron deficiency and iron deficiency anemia among 300 school-age children (6-12years) recruited at a Pediatric hospital in Khartoum, capital of the Sudan when came for checkup, or referred to the pediatric outpatient clinics for follow up.

Methods: There nutritional status was assessed using anthropometric and dietary parameters and blood samples were collected for cell counter analysis and measure of serum ferritin. Those parameters were correlated with their demographics and the possible associated risk factors for anemia and iron deficiency anemia were identified.

Results: Overall prevalence of anemia was 31.3% with rates of mild, moderate and severe anemia being 81.0%, 11% and 8% respectively. Unexpectedly, anemia was significantly low with consumption of milk (P=0.040), milk products (cheese) (P=0.020), whole wheat products (P=0.015), and Mango (P=0.042). On the other hand it was significantly higher in children consumed bread (P=0.042), and sorghum (P=0.030).

Conclusions: Iron deficiency was 15.3%, and the prevalence of iron deficiency anemia was 5.2% constituting16.7 % of all anemic children in the study.

Key words: iron; anemia; school children; iron deficiency anemia; dietary patterns

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POLYMORPHIC VARIANTS OF RBP4 GENE STUDY IN OVERWEIGHT CHILDREN

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Background: RBP4 is the only vitamin A transporter found in blood circulation and is currently associated with a role as an adipokine related to insulin resistance. Previous studies link the plasma RBP4 concentration to overweight, DM2 and insulin resistance. The function of genetic variability of specific SNPs of this gene has not been fully described.

Objectives: The goal of this study is to examine the relation between 5 SNPs of RBP4 with distinct phenotypic traits associated with overweight individuals.

Method: This study collects data of children between the ages of 5 and 16, which had the SNPs rs10882273, rs3758538, rs3758539, rs34571439 and rs12265684 of RBP4 genotyped in peripheral blood with DNA extraction allelic discrimination and PCR amplification looking for correlations with phenotypic traits in blood biochemistry, holding into account the laws of mendelian inheritance using SNPstats software. Results: In the population studied, no statistically significant correlation between the SNPs analysed and insulin resistance was found, which agrees with previous studies. Nonetheless, we have identified a statistically significant risk factor, SNPs rs12265684 (p=0.019 and OR=2.34), rs10882273 (p=0.03 and OR=2.60), rs3758539 (p=0.024 and OR=2.67), rs34571439 (p=0.019 and OR=2.80); related to the levels of triglycerides in plasma. However, the SNP rs12265684 seems to present a protective factor (more trails needed)

Conclusion: The observation of the recesive allele in the polymorphic sequence rs12265684, rs10882273, rs3758539

and rs34571439 stands as a risk factor for high levels of triglycerides in overweight children. However, we cannot associate it with insulin resistance and whether these individuals are more prone to develop diabetes.

Key words: RBP4, children, overweight, SNPs

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THE EFFECT OF MORINGA OLEIFERA LEAF EXTRACTS SUPPLEMENTATION TO THE PREGNANT WOMEN IN PREVENTING MATERNAL DNA DAMAGE

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Background and Objectives: The extracts of Moringa oleifera leaf have been proven to have potent anti oxidant activity, prevent oxidative damage to major bio molecules and afford significant protection against oxidative damage. DNA damage in pregnancy, particularly that caused by oxidative stress, has been associated with adverse pregnancy outcome including preeclampsia (PE) , and intra uterine growth restriction (IUGR). In Senegal, Moringa oleifera was used to remedy anemia in pregnancy, and reduce prevalence of low birth baby. This study aims to assess the effect of Moringa oleifera leaf extracts supplementation in preventing maternal oxidative DNA damage.

Methods: This is a double bind, randomized control trial study, which was conducted in Gowa District, South Sulawesi Province, Indonesia, from January to December 2012. Seventy six of first trimester pregnant women enrolled in this study. They were randomized to the intervention and control group. Intervention group received Moringa oleifera leaf extracts with fe+folic acid capsules, while the control group received only fe+folic acid capsules for three months. Before and after intervention, blood samples were extracted for measuring of 8-hydroxy 2 deoxyguanosine (8-OH-dG) using ELISA method. The effect of intervention was analyzed by comparing the mean concentration of 8-OH-dG before and after, and between two groups.

Results: In the supplemented group, mean concentration of 8-OH-dG was reached 36.16 pg/ml and significantly reduced during the intervention by 36% (p=0.000). 8-OH-dG levels were higher in the control group (36.90 pg/ml), and reduced by 30.4% (p=0.019). The mean difference was not significant between two groups (p= 0.278).

Conclusions: The result indicate there was no significant difference in the level of 8-OH-dG between intervention and control group but the percentage of velocity in the intervention group larger than control group.

Key words: Moringa oleifera, Maternal DNA Damage

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EFFICACY OF A MULTIPLE MICRONUTRIENT FORTIFIED MILK ON COGNITIVE PERFORMANCE OF SCHOOL-AGE CHILDREN

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Background and objectives: Micronutrients deficiency is a serious health issue affecting children's ability to learn. Regular consumption of fortified foods is and efficient mean to address micronutrient deficiency during childhood. This longitudinal, randomized, and double-blind study aimed to evaluate the efficacy of an enriched milk breakfast intake on the micronutrient status and cognitive function in school-age children participating in a national school-based program providing food fortified with multiple micronutrients.

Methods: A total sample of 351 children, aged 7-9 years was recruited in three schools of the remote regions of Azilal in Morocco. The children were followed for a total period of 9 months, where daily milk was provided (weekends and scholar holidays included). The experimental group (N=123) and the control group (n=238) received respectively 200 ml of fortified (with iron, vitamin A, vitamin D, and iodine) and non-fortified milk. Cognitive function was assessed by the Raven's progressive matrices test at baseline and 9 months.

Results: The sample was constituted by 47.1 % of girls and 52.9% of boys. The mean of raw scores of the Raven's test at baseline were respectively for the experimental and the control groups 0.38±1.73 and 0.36±1.62. At the end of the study, experimental and control groups showed respectively 0.53±2.12 and 0.22±1.43. There were no significant differences between both groups at baseline (p=0.94) and at the 9 months (p=0.16).

Conclusion: The daily consumption of fortified milk did not improve the cognitive function of children over a period of 9 months.

Key words: cognitive function, micronutrients, fortification, school feeding, children

Acknowledgements: This study was performed with the support of Fondation Centrale Laitière.

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EARLY CHILDHOOD STIMULATION AND NEURODEVELOPMENT IN CHILDREN OF 12 AND 24 MONTHS OLD WITH ANEMIA

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Background: The first two years of life are the most important when it comes to growth and brain development, requiring a high intake of iron. Otherwise, a low intake of iron can lead to anemia and therefore provoke negative effects on physical and intellectual development.

Objective: Identify the relation between the stimulation provided by the mother and the neurodevelopment in children at 12 and 24 months old with anemia.

Material and methods: Hemoglobin quantification of capillary blood was obtained from 22,485 children. Children categorized with anemia had levels under 11.0g/dl. The neurodevelopment was evaluated with standard Child Psychomotor Development testing in children at 12 and 24 months old, considering 12 observable behaviors in 6 areas of development. This test categorize neurodevelopment as normal, mild, moderate and severe. The stimulation provided to the child was assessed by a 24 questions inventory. Each question had two answers (yes =1.0 or no=0.Sufficient stimulation was classified with a score between 21 and 24 points, and as insufficient stimulation with a score less than 20.

Results: Children without anemia who received sufficient stimulation had 78% acceptable neurodevelopmental levels. Children with anemia receiving sufficient stimulation reported a 71% acceptable neurodevelopmental levels. In the other hand, children with anemia and without anemia with insufficient stimulation showed 56% and 54% of acceptable neurodevelopment. The same trend was observed by each group of age.

Conclusions: Environmental factors such as early childhood stimulation provided by the mother at home may favor the neurodevelopment in children at 12 and 24 months old even with the presence of anemia. Early childhood stimulation becomes a complementary strategy to promote adequate psychomotor development of children.

Key words: Neurodevelopment, early childhood stimulation, anemia.

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INCIDENCE OF NEURAL TUBE DEFECTS IN BRAZIL BEFORE AND AFTER FOLIC ACID FORTIFICATION

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Background: In June 2004 the Ministry of Health determined the mandatory fortification of wheat and corn flours with iron and folic acid to prevent the occurrence of anemia and Neural Tube Defects (NTD), conditions known to impair child mental development.

Methods: The study analyzed the incidence of NTD, from 2000 to 2010, based on the Ministry of Health birth and death registries. Live births with abnormalities and fetal deaths with NTD were identified by the International Classification of Diseases (ICD-10), codes Q00 (anencephaly), Q01 (encephalocele) and Q05 (spina bifida). Data from eight Brazilian states with adequate coverage of the live birth information system (SINASC) and mortality information system (SIM) were analyzed (Espirito Santo, São Paulo, Rio de Janeiro, Paraná, Santa Catarina, Rio Grande do Sul, Mato Grosso do Sul, Distrito Federal). Incidence for the periods 2000-2004 and (2005-2010 were estimated and compared by Student's t test.

Results: A total of 15,125,782 live birth registries and 162,393 fetal death registries were analyzed, resulting in the identification of 6,657 cases of NTD among live births (incidence 0.44/1,000 live births) and 2,389 fetal deaths related to NTD (incidence 14.73/1,000 fetal deaths); the overall incidence of NTD in live births and in fetal deaths was 0.59/1,000 births, during the period under study. The time series showed a sharp decline of incidence in 2005, which remained until 2009. The average incidence was 0.68/1,000 births for the period 2000-2004 and 0.51/1,000 births after the mandatory fortification of flour occurred (2005-2010). The t test indicated a significant decrease in the average incidence of NTD (p value 0.001) in the two periods studied.

Conclusions: These promising results seem to indicate the effectiveness of this policy; however a follow up for longer periods is necessary in order to confirm such an effect.

Key words: folic acid, neural tube defects

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LONGITUDINAL GROWTH IN MEXICAN CHILDREN FEEDING WITH VEGETARIAN DIET

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Longitudinal Growth in Mexican children feeding with vegetarian diet Acosta ME; Escobar KZ; Sánchez A Health Sciences Department-Nutrition School Montemorelos University, México.

Background and objetives: The aim of this study was to know the longitudinal growth in children and teenager feeding with vegetarian diet in child day care center, during lactation and ablactation stages. A healthy diet in childhood can to reduce the prevalence obesity, malnutrition and chronic diseases in adult life.

Methods: The design of study is prospective cohort study. Include 76 teenagers, (43 male and 32 female). Anthropometric measurements were P/E, T/E, and BMI in two times, during lactation stage and eight years later. The BMI z score for age and sex was calculated and classified according to the WHO 2006. Analyses were conducted using SPSS for windows version 17.0. Written informed consent was obtained from all mothers.

Results: The 7.9% the children have overweight and obesity during the first year, eight years later increase in the same population to 9.2%, whereas the undernourished is 15.7% and decrease to 11.8% in the second evaluation, respectively ; 13.2% shew high height y 34.2% low height in the first evaluation and eight years later the low height decrease to 25% and increase to 60.5% the high height. Only, 7.8% are breast feeding. And Actually 8% to eat a vegetarian diet. This study be continue until to adult life and will be analize others variables.

Conclusions: Early life is the time when dietary practices are established and the type of foods introduced might model food habits that will continue throughhout childhood and others stages. The planned Vegetarian diet no affect the physical growth in children and adolescents, inclusive can to be a model to prevent chronic disease and to control their results in others times.

Key words: Growth, vegetarian diet, children

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GROWTH IN PRE-SCHOOL CHILDREN FROM 3 EUROPEAN COUNTRIES AND ITS RELATIONSHIP WITH DIETARY DIFFERENCES

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Background and Objective: Obesity in childhood is very common in Europe. It may be linked to diet and intakes of protein and polyunsaturated fatty acids (PUFA) have been investigated. The study aims to investigate growth and dietary differences at age 4 years between three European countries and assess dietary adequacy.

Subjects/Methods: 161 four-year-old children from Spain, Germany and Hungary whose mothers had participated in a pregnancy micronutrient supplementation trial. Growth was assessed by standardised anthropometry and diet calculated from parentally-completed food frequency questionnaires. Adequacy of the diet was evaluated using US guidelines. Physical activity was not assessed.

Results: The Spanish children had a higher mean BMI (16.4Â±1.5) than German (15.7Â±1.0) and Hungarian children (14.9Â±1.4, $p<0.01$). In Spanish children, dietary intakes were higher for animal protein density particularly from dairy products, whereas there was little difference in total protein density and slightly lower n-6 PUFA density than the other groups. The diets of many children were lacking in some nutrients; 94.4% were below the recommendation for potassium, 64.4% for iron, 40% for folate and 100% for Vitamin D. However intakes were higher than recommended for saturated fat (in 96.4% of children) and sugar.

Conclusions: Diets eaten by Spanish children may be more obesogenic than those eaten by German or Hungarian children. Evidence showed that many children in all three countries are eating diets that are low in nutrient content but high in fat and sugar.

Key words: diet, growth, pre-scholar children The research leading to these results has received funding from the Commission of the European Community -specific Research and Technological Development Programme, "Quality of Life and Management of Living Resources" within the 5th to 6th Framework Programmes: NUHEAL Study, EARNEST Project and NUTRIMENTHE Project.

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IMPACT OF MOTHERS' OBESITY AND GESTATIONAL DIABETES ON THEIR OFFSPRING NEURODEVELOPMENT IN RELATION TO CHANGES IN PLACENTAL GENE EXPRESSION

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Introduction and aim: Obesity and type-2 diabetes (T2D) in pregnancy are associated with nutritional deficiencies and adverse metabolic adaptations in the mother, compromising foetal-newborn survival and with a special impact on the developing brain. We analyse if the placental epigenetic changes in obese and diabetic pregnancies are involved in brain development.

Methods: 120 infants, participanting in the PREOBE study* which were born to: Healthy normo-weight (n:48), Overweight (n:27), Obese (n:13) and Gestational Diabetic (GD) (n:32) pregnant women, were included in this analysis. Several oligonucleotide primer sequences were used for quantification of target and endogenous control gene cDNA by real-time PCR. Babies were neuropsychological examined with the Bayley III at 6 and 18 months of life. ANOVA, Kruskall-Wallis, t de Student and logistic regression were performed.

Results: AMPK and P70S6KB1 were down-regulated and MTHFR was up-regulated in the placenta of GD mothers. At 6 months, Language Composite Score (LCS) was higher in those babies as much as MTHFR were up-regulated (OR: 1.620; IC: 1.101-2.385); Motor Composite Score (MCS) were positively related to AMPK up-regulated level at 6 months (OR: 2.516; IC: 1.167-5.422) and to IRS1 up-regulated at 18 months (OR: 1.889; IC: 1.009-3.537). Babies with the highest level of IRS1 up-regulated had more possibilities to have a better Cognitive Composite Score (CCS) at 18th months of life (OR: 2.119; IC: 1.112-4.036). Babies born to obese and GD mothers with high levels of P70S6K up-regulated showed higher LCS at 6 months (P=0.018) and at 18 months (P=0.042). Babies born to obese mothers with higher level of AMPK up-regulated showed higher CCS at 18 months of life (P=0.037). ** This study was granted by Junta de Andalucía: Excellence Projects (P06-CTS-02341) and Abbott Laboratories-General Foundation University of Granada (Contract agreement: 3346).

Key words: early programming, obesity, diabetes, cognition

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NEGATIVE EFFECTS ON CHILDREN'S DEVELOPMENT BY PRENATAL EXPOSURE TO ORGANOCHLORINE PESTICIDES

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Introduction and aim: Persistent accumulation of organochlorine compounds (OC) in adipose tissue is related to neurological damage. We aim to evaluate the long-term neurodevelopment effects of intrauterine exposure to OC in children participants in the NUHEAL Spanish cohort.

Methods: 154 Spanish pregnant women were randomized to receive 500 mg docosahexaenoic acid (DHA)+150 mg eicosapentaenoic acid (EPA), 400 µg 5-Methyltetrahydrofolate (5-MTHF), both or placebo from 20 weeks up to the delivery. Blood samples were obtained from 96 mothers-baby pairs at delivery. OC were determined using HPLC, GC/ECD and GC/MS and were expressed in ng/g of lipids. The offspring were followed-up and revised at 7.5 and 9.5 years old, evaluating their neurodevelopment outcomes by using the NUTRIMENTHE Neuropsychological Battery. ANOVA, Bonferroni test, multiple lineal regression and quantile regression were done using the SPSS 20.0 and STATA 12.

Results: There were no significant differences on the OC concentrations between groups neither on the long-term neu-

rological outcomes depending on the prenatal supplementation. At 9.5 years, those children whose mothers had high Mirex concentrations in plasma showed long-term negative effects in verbal comprehension (language) (Token test B = -0.061, p=0.001, IC= -0.097 a -0.026) and in viso-perceptual integration (perception) (HVOT test B = -0.051, p= 0.03, IC= -0.097 a -0.005). The regression analysis was adjusted by smoking, age and maternal schooling but with any statistical significance. Furthermore, those children exposed prenatally to the highest levels of Mirex were under 25 percentile in the scoring above.

Conclusion: From the OC analysed, Mirex concentrations during pregnancy seems to have a major negative long-term effect on verbal comprehension and perception integration in children at 9.5 years. **This work was partially supported by the NUTRIMENTHE EU Project, Grant agreement nº: 212652 and by the Spanish Ministry of Health (FIS 02/1314, FIS G03/176) and European Union (QLK4-CT-2002-00603-EDEN and NoE CASCADE-2003-506319).

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LONG-TERM EFFECTS OF PRENATAL DHA AND 5-MTHF SUPPLEMENTATION ON THE OFFSPRING LC-MS METABOLOMICS BIOMARKERS UP TO 9.5 YEARS OLD, IN RELATION TO FATTY ACID CHECK CELL COMPOSITION, DIET AND FADS POLYMORPHISMS

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Introduction and aim: There is no clear evidence about the long-term effect of prenatal supplementation on children neurodevelopment. We aim to improve this hypothesis by a systematic evaluation of the metabolite profile in urine from the offspring born to prenatally supplemented mothers participants in the NUHEAL study.

Methods: A non-targeted LC-MS method (using both Ion Trap MS and Time of Fight MS) was used to analyze 537 samples, from NUHEAL children at 7.5,8,9, and 9.5 years, to evaluate the long-term effects of prenatal supplementation in their mothers with fish oil (FO), 5-Methyl-tetrahydrofolate (5-MTHF), both or placebo, from 20 weeks of pregnancy until delivery. All possible metabolites within the chromatograms were identified using commercial available standards and TOF capabilities. Statistical treatment involving pre-processing of the chromatograms by removing baseline and correcting for elution time shifts, PCA and PLS-DA was applied checking the structure of the data set and possible systematic groupings. The described LC-MS metabolomics data were studied in combination with some other relevant data, such us fatty acid in cheek cell, neurodevelopment data, FADS1 and FADS2 genotype, dietary intake and relevant confounders.

Results & Conclusions: No significant differences in metabolic profile in urine were demonstrated between groups. Fatty acid status in cheek cell and fatty acid related features in urine samples of children at 7.5 to 9.5 years of age reflected the dietary intake of essential fatty acids and their major LC-PUFA derivatives. Significant relationships between fatty acids intake, metabolites excreted in urine and cheek cell FA were shown. Daily intake seems to have a remarkable influence in the metabolic profile. The influence of FADS1 and FADS2 genotype was reflected in fatty acid related metabolites excreted in urine. **This work was supported by the NUTRIMENTHE EU Project, Grant agreement nº: 212652.

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COMPARISON OF THE ANALYTICAL PERFORMANCE OF DIFFERENT LC-MS METHODOLOGIES TO EVALUATE LONG-TERM EFFECTS OF DHA AND 5-MTHF SUPPLEMENTATION IN PREGNANT WOMEN ON THEIR OFFSPRING METABOLOMIC BIOMARKERS

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Introduction and aim: Mother's nutrition before and during pregnancy and nutrients intake during early life seems to

be linked to later neurodevelopment and long-term behavior outcomes. Modern "omics" technologies open up great expectations to improve the understanding of the mechanisms involved in the role of early nutrition on neurodevelopment. We aim to optimise two complementary LC-MS methodologies to evaluate the long-term effect of DHA, 5-MTHF, both or placebo supplementation received by NUHEAL pregnant women, on their children urinary metabolic biomarkers at 7.5 years.

Methods: Three different sample preparation protocols were compared (protein precipitation and metabolite extraction, simple urine dilution and liquid-liquid extraction), being the first one the optimal extraction system. Two different kinds of columns were used (C-18 and HILIC columns) to compare the performance of two complementary LC methodologies (reverse phase and HILIC). The chromatographic parameters as well as detection conditions (UV, fluorescence and MS detection on-line) were optimized pooling urine samples of all the individuals included in the study. A systematic evaluation of the analytical parameters describing the performance of the two methods was carried out (both with pooled urine samples and a standard mix) considering detection and quantification limits, linearity, calibration range, repeatability intra- and interday, accuracy, etc.

Results and Conclusions: The potential of the two methodologies to determine compounds belonging to diverse chemical categories (amino acids and related compounds, organic acids, alcohols, xanthines, amines, dipeptides, amine groups, compounds with indoles groups, with imidazol groups or with hydroxyl) is extensively discussed in the current contribution. Moreover, the analysis of 138 urinary samples from children at 7.5 years were collected using both LC-MS methods. The quantification of different metabolites was performed, specially for methylmalonic acid, homocysteine and folic acid derivatives. **This work was supported by the NUTRIMENTHE EU Project, Grant agreement nº: 212652.

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NEURODEVELOPMENTAL STATUS IN BABIES BORN TO OVERWEIGHT, OBESE OR DIABETIC PREGNANT WOMEN, DURING THE FIRST 18TH MONTHS OF LIFE

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Introduction and aim: Obesity and Diabetes are related to poor nutritional status, with demonstrated nutritional deficiencies, gut absorptive alterations, less bioavailability, increase of oxidative stress and/or inflammatory status. We aim to analyse the potential negative effects of these metabolic situations on the foetal brain.

Methods: 217 infants' participants in the PREOBE study* were included in this analysis: Healthy normo-weight (n:81), Overweight mothers (n:44), Obese (n:31) and Mothers suffering Gestational Diabetes (n:61). The babies born at 39.52±1.26 weeks, with birth weight adequate for gestational age. No differences were shown in the neonates between the studied groups. The offspring were neuropsychological examined with the Bayley Scales of Infant and Toddlers Development, Third Edition (Bayley III) at 6 and 18 months of life. Statistical analysis: ANOVA, Kruskall-Wallis, t de Student, and logistic regression.

Results: Infants born to Obese mothers showed higher Standards & Composite Scores in Cognition (P=0.003), Expressive Communication (P=0.016) Language development (P=0.008) at 6 months of age. The present results shown that higher pre-conceptional weight in the mother determines better Language Composite Score at 6 months of age (OR:1.133). These differences disappear at 18 months because the rate of change between 6 to 18 months does not exists in these infants (P<0.05).

Conclusion: Offspring born to obese mothers showed higher cognitive scores at 6 months of life, probably due a major nutrient transplacental transfer in obese pregnancies regulated by epigenetic changes in the placenta, which probably exert a transient effect. However, the negative rate of change in cognitive scores from 6 to 18 months in the offspring born to obese mothers suggests that obese condition during pregnancy could have a negative long-term effect on neurodevelopment. ** This study was granted by Junta de Andalucía: Excellence Projects (P06-CTS-02341) and Abbott Laboratories-General Foundation University of Granada (Contract agreement: 3346). Key words: early programming, obesity, diabetes, cognition.

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